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The Human Face of the Urban Environment

Ismail Serageldin

Michael A. Cohen

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Editors



Proceedings of the Second Annual World Bank Conference on Environmentally Sustainable Development

sponsored by The World Bank
and held at the National Academy of Sciences
and The World Bank
Washington, D.C.
September 19-21, 1994



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The Human Face of the Urban Environment

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Cover photo by Curt Carnemark. A crowded street in Benares, India.

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Preface

The Second Annual World Bank Conference on Environmentally Sustainable Development (ESD) was convened by the World Bank in September 1994 to focus on "The Human Face of the Urban Environment."

While the major contribution of the 1992 United Nations Conference on Environment and Development, or UNCED (Rio Earth Summit), was to raise consciousness on environmental issues, it did not provide needed attention to the urgent problems facing people living in urban environments. Yet about half of the world's population lives in cities, and the earth is rapidly becoming urbanized.

To focus global and national attention on the issue of sustainable urban growth, this second ESD conference brought together leaders representing a spectrum of perspectives—international institutions, national and local governments, scientific and academic communities, and local community groups. They assembled to explore the challenges posed by urban environmental problems; to highlight models of good practice in environmental management; and to mobilize global, national, and local energies and resources to address these problems.

The messages emerged loudly and clearly:

1. Urban environmental issues transcend jurisdictional and sectoral boundaries and must be confronted in an integrated and coordinated manner, requiring new institutional arrangements, different patterns of consumption, and new approaches to waste management.
2. Involvement of all stakeholders is vital to good environmental governance.
3. Special attention must be paid to the needs of the urban poor, who often bear the brunt of environmental problems.

Held at the National Academy of Sciences in Washington, D.C., this conference and its Associated Events brought together ministers from the North and South, officials from cities as diverse as Barcelona, Hyderabad, Rome, and Santiago, architects, planners, environmental scientists, and other professionals to demonstrate that urban environmental problems are shared by cities across the world and that mutual learning and exchange of experience with urban problems can benefit all countries.

In response to this event the World Bank pledged to:

- Expand its urban environmental assistance to its member countries
- Assist governments to integrate urban environmental issues into national environmental action plans
- Work with national and local governments, nongovernmental organizations, the Global Environment Facility, and other international institutions to focus attention on these problems
- Carry this message forward to the United Nations Habitat II Conference in Istanbul in June 1996.

This volume contains the presentations at the inaugural, plenary, working group, and other sessions of the conference, edited to maintain

continuity of the themes and to incorporate the discussions. The presentations do not appear in the same sequence in which they took place during the conference but are grouped in closely related themes.

In addition to recapitulating the key messages of the conference, we trust this volume will be a useful addition to the growing literature on the urban environment.

Ismail Serageldin
Michael A. Cohen
K. C. Sivaramakrishnan

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The Second Annual World Bank Conference on Environmentally Sustainable Development was the product of intensive and dedicated efforts by many people in both the World Bank and a variety of other institutions.

In addition to the presenters, who are listed in the table of contents, the editors first wish to express their appreciation to those who worked so diligently to make the conference a reality, beginning with Steering Committee members Pierre Landell-Mills, Mohan Munasinghe, David Steeds, and Andrew Steer. For helping to develop the conference agenda, keeping a record, and serving as the intellectual memory of the conference, the editors thank the Thematic Team on the Urban Environment (TTUE): Carl Bartone, Janis Bernstein, Alison Cave, Alfred Duda, John Flora, Joseph Gilling, Vijay Jagannathan, Vanya Jordan, Josef Leitmann, Mohan Munasinghe, John Redwood, Teresa Serra, Johannes ter Vrugt, and David Williams. For their advice and input in developing conference themes, appreciation is expressed to John Briscoe, Timothy Campbell, François Falloux, Maritta Koch-Wesser, Dennis Mahar, Caroline Moser, and Anand Seth.

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Part One

Introduction and Concepts

INAUGURAL SESSION

Welcoming Address

Bruce Alberts

I am pleased to welcome you to the World Bank's Second Annual International Conference on Environmentally Sustainable Development. We are privileged to be meeting with many distinguished leaders in both national and local government, representatives of nongovernmental organizations, and experts and practitioners from both industrialized and developing countries.

This year's conference is entitled, "The Human Face of the Urban Environment." This topic is timely and appropriate, because the world's population is becoming concentrated increasingly in urban areas, and the issues we address in the next few days are vitally important both to us and to future generations.

I am especially pleased that the conference is being held here in the home of the National Academy of Sciences, the National Academy of Engineering, the Institute of Medicine, and the National Research Council. This "academy complex," chartered in Abraham Lincoln's administration, is a nongovernmental organization that provides independent scientific, technological, and engineering consultation to government. Our mission is to help use science to advance our understanding of the environment, economic development, urbanization, and other societal issues. We make contributions in two different ways.

The first is our traditional one—to undertake studies for and present findings to our government. That is what we were originally chartered

to do by President Lincoln. But more important, we facilitate collaboration with other distinguished academies and institutions worldwide to study scientific, technological, and environmental issues. In turn, we seek to enhance the contributions of the world's scientific and engineering communities to public policy decision-making. We are particularly proud of several collaborations.

One is a major, unprecedented meeting that was held in 1993 in New Delhi among the 60 national academies of science from throughout the world. It culminated in a "Population Statement" from these academies, which helped provide a foundation for the United Nations Conference on Population and Development in Cairo. The sterling success of this scientific meeting led to unanimous consensus to continue symposiums on other issues—specifically those associated with sustainable development.

Other collaborative efforts include several joint studies with academies in other countries on the same issues we are discussing at this conference. For example, we have two projects with the Mexican Academies of Science and Engineering that are nearing completion. We will be discussing one of them at this conference—an assessment of the Mexico City water supply.

We are also beginning joint studies with the Chinese Academy of Sciences, the Indian National Science Academy, and other world academies to address specific topics related to

sustainable development—particularly land use and the urban environment.

These studies have several different aims, encompassing problem resolution, institutional development, and scientific advancement. The primary objective, of course, is to provide sound guidance for resolving particularly complicated scientific or technological problems such as the Mexico City water supply. But this objective is really much more ambitious than that. We want to acquaint scientists in other countries with the procedures that the National Research Council has long used to bring diverse groups of scientists and others together in order to provide advice on public policy issues—objectively, comprehensively, and conclusively.

A broader objective is to help scientists and engineers in other countries to develop the sort of advisory relationship that exemplifies the National Research Council and the U.S. Government. We saw this specifically when we were in New Delhi—the sense that U.S. scientists have a special opportunity to advise our government through the Council. That relationship is unique. No other country has that kind of relationship for soliciting independent advice from its scientists and engineers. And many other

academies, including those in China, India, and Mexico, would like to develop that kind of alliance. We are striving to catalyze their efforts, so that they can pursue these goals independently in the future.

And, of course, we want to help expand the world's scientific community and strengthen the personal interaction among scientists—in essence, to create the foundation necessary to enable us to work together productively on the myriad issues that will emerge as the next century unfolds. Our collective voice and the rationality scientists bring to effective problem resolution will be a major force behind truly sustainable development.

This conference represents a new phase of our recently begun collaborative efforts with the World Bank. We are jointly sponsoring later this year a second meeting entitled “Science and Technology for World Development.” This project brings together World Bank officials and leading experts to explore how current advances in science and technology can contribute to sustainable economic development worldwide.

With these efforts and others, we want to help find solutions to the challenges addressed in this conference, and we look forward in the coming years to fruitful interactions with the World Bank.

Introductory Remarks

Lewis T. Preston

I would like to welcome everyone to the Second World Bank Conference on Environmentally Sustainable Development. This annual event is an affirmation of the Bank's commitment to environmental protection. But it also underscores our determination to nourish productive partnerships as we all seek to deepen our appreciation, knowledge, and practical application of the issues underscoring sustainable development in our urban cities.

Environmental Sustainability on the World Bank Agenda

As you may know, this year marks the Bank's 50th anniversary. Beyond reflecting on the past, however, we are looking hard at how we can be even more effective in the future. Nowhere is our commitment to the future more evident than in our urban development agenda—to protect the environment, to promote economic growth, and to reduce poverty simultaneously.

Protecting the Environment

Five years ago our annual lending for environmental management was \$245 million; today, it has grown tenfold, to \$2.4 billion. Five years ago we had only a handful of environmentalists on our staff; today we have more than 300—and we continue to add to this number. Five years ago we were working with just a few countries to prepare national environmental action plans; today we are helping about 50 nations. In addition, we are

proud to have been asked to help lead the Global Environment Facility.

Some have called this the “greening of the Bank.” I view it more as a recognition that we cannot achieve effective development *unless* we protect the environment. So in that respect environmental sustainability is integral to our mandate.

People-First Environmentalism

In addressing our Board of Governors here in Washington two years ago, I said that our mandate must be a “people-first environmentalism”—with a strong focus on the cities, because that is where the majority of the world's population is going to be living. Anyone who has visited a large city in the developing world has a sense of the scale and complexity of the issues involved.

Urban Poverty Reduction Is the Key

Reducing urban poverty is essential to reducing environmental problems in our cities. The Bank has been moving vigorously in recent years to address those problems, but we have a long way to go. This conference offers us a marvelous opportunity to learn from key actors from more than 60 countries, including mayors and city officials from Barcelona, Hyderabad, Manila, Rome, and Santiago, to name just a few. In other words, this is a chance to acquire valuable insights from those who deal with the issues day in and day out.

Our keynote speaker is one of those people. He began his career in the City Manager's Office

in San Antonio, Texas, and then moved on to the City Council. And, of course, he rose to national prominence in 1981 with his election as mayor. In the process he not only assumed responsibility for the tenth-largest city in this country, but also became the first Hispanic mayor of a major U.S. city. Today Henry Cisneros is the Secretary for Housing and Urban Development, the nation's foremost federal housing and community development officer.

When he assumed his current position as Secretary, he said that his job was more than to help build houses—it was also to help build *com-*

munities. In pursuing this mission he has gained many admirers for his commitment to both environmental and social issues—but even more so for his compassion toward the poor and the homeless.

Secretary Cisneros is respected worldwide for his views and actions on urban issues. He has also been an active proponent of cooperative efforts internationally—and particularly of endeavors to share best practices across cities in different parts of the world. Although this conference is not being held at his own Department, he is very much on home ground when he offers us lessons about “The Human Face of the Urban Environment.”

Urban Poverty and Urban Environment

Henry G. Cisneros

Since the birth of the environmental movement in the late 1960s and early 1970s, environment and development have been viewed as mutually exclusive concepts. Protecting the environment has meant halting the encroachment of development in pristine areas. And environmental protection has been viewed or defined as an ex-urban issue—something outside or foreign to the concerns and interests of the cities.

Those of us who have been grappling with the problems of American cities have been concerned with jobs, housing, and transportation. We have been concerned with public services, schools, law enforcement, and fire protection. And we have been concerned with the ever-increasing concentration of poor people in our urban cores. But with the exception of air pollution—which cannot be ignored, disregards boundaries, and compels regional action—environmental concerns have too often been perceived as a luxury reserved for the suburbs.

At the same time, as poor people—especially poor minority Americans—are becoming increasingly concentrated in inner cities and other isolated communities, these places have literally become dumping grounds for the waste of other, wealthier communities. For example, all of the hazardous waste in eight southern states is disposed of in two landfills located in mostly African American communities. All three of California's commercial hazardous waste sites are located in mostly Latino communities. More than 100 proposals have been disseminated for locating garbage dumps, landfills, incinerators, and low-level nuclear

waste storage facilities on the reservations of Native Americans.

Inner-city communities, which were once the anchors of America's industrial, manufacturing base, are now paying the price for years of environmental abuse. Businesses have moved to the suburbs or overseas, shutting down plants, leaving behind "brown fields"—empty buildings on contaminated lots, with toxic materials buried in the ground, totally unfit for development. This legacy of industrial pollution perpetuates poverty in these communities because it works against their revitalization; when the community is no longer a desirable place for business, it can no longer sustain itself.

Clearly, environmental concerns are critical to the future of our urban communities, and we must face them. We must also confront political pressures that make some places become dump sites for the problems of people in other places. And we must strike a balance between economic needs and environmental imperatives.

This is uncharted territory for us. We are striving to combine activities that have been considered incompatible—environmental protection and economic development. And we are trying to do so in a way that creates sustainable neighborhoods, sustainable cities—sustainable communities that will stand the test of time and will remain inviting places to live for generations to come.

Current U.S. Agenda

We in President Bill Clinton's administration are meeting this challenge. Earlier this year President

Clinton moved to protect the environmental rights of Americans living in inner-city minority communities, in rural pockets of poverty, and on Native American reservations. The president signed an executive order barring federal agencies and other federally funded institutions from engaging in practices that impose unfair environmental burdens on disadvantaged people and communities. Too frequently, those who have been powerless, those who have been disenfranchised, those who are economically disadvantaged are victims for those who must dump materials somewhere.

The administration has committed \$100 million to desperately needed infrastructure projects in the *colonias* along the U.S.-Mexico border. Poor Hispanics—American citizens—drawn by the promise of work in nearby industrial plants, have clustered in these communities, where they are now living without water, electricity, or sewerage—where children literally bathe in irrigation runoffs full of pesticides. The environmental damage and public health problems are simply horrendous.

Looking beyond the immediate problems, the president has established a Council on Sustainable Development, to be headed by Vice President Al Gore, which is bringing together representatives of government, industry, and environmental, labor, and civil rights organizations to develop new ways to integrate and balance environmental concerns with issues of economic and social equity. The council will consist of eight task forces, including a task force dedicated to sustainable communities. This group will examine economic development and jobs, environmental justice, transportation and physical infrastructure, social infrastructure and public participation, and housing and land use at the local level. It will examine the complex interplay of these issues in the context of communities, and explore how these concerns can be balanced to ensure that communities remain decent, healthy places to live as they evolve and grow.

Sustainable Communities and Their Governance

What is a city in the modern context? Where does a city begin physically, and where does it end? How wide is its scope of governance, and how do

we define that scope? Who participates in decisionmaking, and how?

The world is becoming increasingly urbanized. It is estimated that by the year 2025—a single generation from now—4 billion people will live in urban areas, constituting 77 percent of the world's population. Well before then, by 2010—just 15 years from now—24 of the world's largest 30 cities will be in developing countries, and the average population of these 24 cities will be on the order of 15 million people.

So these questions about the nature of urban communities and their governance are assuming greater importance, from New York to Tokyo, from Rome to Capetown, to Lagos to Mexico City. And how we answer them will touch the lives of billions of people.

I would like to offer some observations drawn from the American experience, but which also have more global applicability.

Spatial Separation Breeds Social and Environmental Problems

When poor people become concentrated in precisely defined geographic areas, their problems grow exponentially. We have experienced this firsthand in our most populous urban areas, where the increasing concentration of poor, mostly minority people has been accompanied by soaring unemployment, increased and prolonged welfare dependency, profuse public health problems, and, most startling, rising crime.

In the aftermath of the Los Angeles riots a few years ago, several task forces were established to identify the underlying causes. I was surprised at the overwhelming conclusion reached by the task forces—that at the core of the disaffection was the idea that America's population is separated spatially by race, income, and class. The United States has a long tradition of believing that it is a nation without rigid classes. But we are increasingly recognizing that millions of people are trapped in what can only be called a permanent, rigid underclass, without access to the normal rules and opportunities of society.

The unfortunate tendency in our country is to blame these problems and these realities on the urban poor themselves. But, in fact, it is the sheer number of poor people and the density of poverty that have eviscerated these communities

and turned them into places with few viable businesses and no base for economic activity—where parents have virtually no chance to lift themselves and their children out of poverty and into a better life, where there is literally no hope.

We are coming to understand in the United States that we cannot continue to blame inner-city residents for the problems of our urban enclaves. We are also beginning to understand that withdrawal from the cities is no answer. Middle- and upper-income families may flee to the suburbs, but the problems of the inner city are sure to follow them. They may follow in the form of weakened economies, as the economies of the surrounding metropolitan area tend to suffer from the repercussive effects of stagnation in the central city. The problems of the inner cities may also follow in the form of increased public outlays for welfare assistance, indigent health care, and public safety problems, draining scarce resources from other needs—schools, parks, and libraries. And they may follow in the form of the expanding concentric waves of crime, drugs, and violence that spill over into neighboring communities, eroding their stability and threatening other, more removed areas in turn.

Spatial separation by income and ethnic group also exacerbates environmental degradation. When economically, socially, and politically enfranchised people abandon communities, they also abandon their stake in the physical well-being of those places. They no longer have a direct stake in the environment of those communities. Thus, inevitably, areas in which the poor and politically dispossessed become concentrated evolve into areas in which environmental problems are too easily ignored—where sewerage systems break down; where water purification is inadequate; where vermin infest garbage-filled lots and invade dwellings; where little children eat lead paint from the walls in deteriorating apartment buildings . . . where no one seems to care.

Disconnection among income groups, compounded by disconnection among racial groups, thus leads not only to communities that are economically and socially dysfunctional, but also to communities that are environmentally unsustainable. And the environmental problems of these places inevitably spill over into neighboring areas.

Rethinking Our Understanding of Community and Community Governance

It has become commonplace to talk about the global economy—about the interconnection between the computer-chip manufacturing worker in Silicon Valley and the computer motherboard assembler in Singapore; about the links between the automobile assemblyline worker in Japan and the parts manufacturer in the United States; about the international electronics connections between banks and trading pits that move billions of dollars of capital from one corner of the globe to another in less than the blink of an eye.

We must begin to think of our communities, our cities, our urban areas in the same way—for if our destinies are interwoven around the globe, then surely they are interwoven in our own backyards. And when we truly begin to think globally in the context of our own communities, then we are led to certain inescapable conclusions.

First, the boundaries that divide one community from another in large urban areas are becoming increasingly irrelevant, because the problems of all of these areas transcend those boundaries and touch each other. Thus, we must think of our urban areas as larger units, as urban organisms that have economic viability as regions, and not as separate pieces of political jurisdictions. In turn, we must look increasingly to regional solutions. In other words, we must make the transition from narrow, politically confined governments to broader, task-oriented, regional structures, particularly when environmental issues are at stake. But that alone will not be enough: no amount of enlightened regional governance can succeed unless we also reduce concentrations of poverty. And this understanding leads to another conclusion. In the United States and in other ethnically diverse nations where poverty and minority isolation go hand in hand, we must dismantle the barriers that separate poor and minority people from the rest of society. We must enable the people who now live in these isolated pockets of urban, minority poverty to move into the wider community, where they can find jobs, gain access to better public and private services, and send their children to better schools.

At the same time, these distressed communities must be restored as places where people of all ethnic groups and income levels can choose to live—because decent housing is available;

because the streets are safe; because the schools are good; because jobs are available; because there are parks, libraries, and other amenities that make urban life attractive.

How the United States Is Meeting This Dual Challenge

Increased mobility and community revitalization are the twin pillars of the Clinton administration's urban strategy. We are seeking to enable more people in our distressed inner cities to move to economically viable communities, through initiatives that expand opportunities for affordable rental housing and affordable homeownership in these areas. And we are seeking to restore our inner cities—by transforming public housing, increasing the flow of private capital to affordable housing and business development, and improving public safety.

Grassroots Initiatives Are Essential

One of our most dramatic community revitalization efforts is the Empowerment Zones and Enterprise Communities initiative, which will provide \$3.5 billion in federal tax credits and direct grants to 104 urban and rural communities nationwide, leveraging billions of dollars more in public and private investment in these communities. This initiative puts a premium on results-oriented governance. The communities that win “empowerment zone” and “enterprise community” status will be those that have shown they can bring everyone to the table and transcend traditional jurisdictional boundaries to develop action plans that truly meet local needs. These plans will succeed because they spring from local communities. And that is the only way they can succeed—with local initiative and the engagement of local energy and resources.

The American experience of the last generation—and experience throughout the world—has proved that top-down, centralized approaches do not work very well. Real change happens at the grassroots level.

Thus, even as we strive to expand our vision of community and governance, we must sharpen our focus on community-based solutions as the real source of change. Rather than build increasingly larger, centralized government bureaucra-

cies, we must marshal resources—national, regional, and local, and public and private—and channel them toward cooperative efforts among existing jurisdictions.

We know tremendous things are possible when empowered community residents become agents of change. In my hometown of San Antonio, Texas—where I served as mayor—a citizens group called Communities Organized for Public Service (COPS) has been instrumental in bringing new streets, drainage, sidewalks, libraries, parks, and streetlights to poor, Hispanic neighborhoods. COPS has demolished substandard housing and built new affordable housing. COPS has been the driving force behind economic investment in poor, inner-city neighborhoods. This private, community-based organization has played a key role in building sustainable communities in San Antonio.

We know that regional governance works. In the state of Minnesota—in the seven-county Minneapolis-St. Paul region—188 municipalities have been pooling property tax revenue since 1971. They have been allocating this revenue toward achieving greater parity in resources among local jurisdictions. And, today, the city of Minneapolis—which was once a net revenue recipient—is the region's largest net revenue contributor. This great city has become a powerful engine for economic growth for a metropolitan region that is one of the most vibrant in the nation.

In the end our diverse, increasingly urbanized world contains some universal truths:

- People everywhere want to make their own and their children's lives better.
- People are able to elevate themselves more successfully when they live in economically and social diverse communities that contain thriving businesses and jobs.
- In diverse communities in which everyone has a stake, environmental concerns are addressed, and these communities are healthier places to live.
- Regional cooperation is vital, and local initiative and involvement is critical for real change.

When we act on these universal truths, each in our own way, according to the needs and requirements of our own circumstances, we will build truly sustainable communities throughout the world.

And in doing so we will build—literally from the ground up—a truly sustainable world.

The Road from Rio

Maurice Strong

I am delighted to have been invited to participate in this opening session of what is an extremely important milestone along the “Road from Rio” to a more sustainable way of life on our planet. In a very real sense all of us who are trying to build a sustainable future for those who follow us on this planet are architects of a kind. We are builders, building a better world. And we recognize the extremely important, indeed indispensable, role of our cities and urban areas in achieving the goals and expectations we set for ourselves at the Rio summit in 1992. As the world reaches the point at which half its people will be living in cities, and as populations in the cities of developing countries continue to grow collectively by some 60 million inhabitants annually—a pattern that will double their urban populations in the next 25 years—it is clear that the goal of building a sustainable mode of life on our planet cannot be realized unless the urban environment is sustainable.

Agenda 21 cites the problems that have been created by the explosion of urban populations:

It has put enormous pressure on urban infrastructures already under serious stress and unable to meet the needs of the existing inhabitants. Overcrowding, inadequate housing, inadequate access to clean water and sanitation, growing amounts of uncollected waste, and deteriorating air quality are already serious problems in these cities and may worsen substantially if effective and timely action is not taken.

There has been much hand-wringing over the desirability of improving living standards in rural areas to stem the tide of people moving into the cities of the developing world. There is no question that rural improvement is essential and deserves priority for its own sake. But it would be illusory to rely on this movement to turn back the tide of urban growth. Rather, we must improve conditions in the urban settlements themselves. But doing so creates a catch-22—the more you improve urban living standards, the more attractive the cities become, and the more likely that their populations will increase. But having pondered this dilemma as a layperson, I am convinced that the answer is not to make urban life less attractive. Indeed, quite the contrary. The revolution that is taking place in agriculture is going to require that more and more people move into the cities. We simply have to accept that as a fact of life.

One of the things that has struck me most forcibly about cities in the developing world is that their patterns of growth and their methods for managing that growth tend to mirror those used by industrialized countries, evoking their attitudes and practices. Yet the rates of urban growth in these countries are so much greater than ever experienced in the cities of the industrialized world that the latter simply cannot be taken as a pattern. And in most cases the developing countries do not have, nor will they have in the foreseeable future, the resources required to provide even a decent minimum standard of basic amenities and services for their burgeoning populations if they adopt the conventional,

traditional pathway. Hence, the deterioration of many existing urban areas continues to deepen—with overcrowding, an absence of basic services, and a dearth of employment opportunities—and these urban areas are rapidly becoming festering centers of human suffering and social unrest.

Mobilizing Resources

Our problem is less one of not knowing what to do than of not having the human, institutional, and financial resources required to respond to the challenges. This conference includes people who have been promulgating good, positive solutions around the world—people who do know what to do, and who have the capacity to do it. What has been lacking, really, are the *resources*. And with financial resources continuing to be in short supply, there will have to be a special emphasis on innovative strategies for mobilizing financial resources and ensuring effective planning and management. This, of course, was a major emphasis of Agenda 21, encompassing several areas that are key to sustainable urban development: effective land-use planning to provide an adequate environmental infrastructure of water, sanitation, drainage, and solid-waste management; a sound social infrastructure that can deliver an adequate level of health care, education, and other essential services, and can alleviate hunger and homelessness; and energy-efficient and universally accessible transport systems.

These key areas cannot be fostered, of course, without financial resources, but financial resources will continue to be difficult to come by and, in any event, will not by themselves be sufficient to enable the urban areas of the developing world to make the transition to sustainability. Even with the priority being accorded to urban areas by the World Bank—even with a World Bank 10 times as large as the current capacity of the Bank—the financial resources are not enough to do the job.

Agenda 21: Helping Urban Communities Mobilize Human and Institutional Resources

The answer is to devise more effective ways to mobilize the human and financial resources of urban communities themselves for planning, developing, and managing their own communi-

ties. This strategy will require new institutional mechanisms and programs to give people the necessary skill levels, to build sustainable communities, and to make available the information and the facilities necessary to allow people to play an active role in building a sustainable future for their own communities.

Agenda 21 provides an excellent mechanism for developing this potential—though not a perfect mechanism, since none of these documents, reflecting as they do the degree of consensus that can be achieved at a given moment in time, can be taken as scripture written in stone. But Agenda 21—particularly the human settlements chapter—provides a promising framework for building a global framework within which local communities can develop their own versions of Agenda 21, adapted to their specific conditions, resources, and aspirations. An effective process of developing a local Agenda 21 will require the active participation of and contributions from representatives of all sectors of the community. This involvement is essential to ensuring continued commitment to and participation in implementing community Agendas 21.

The mechanisms and modalities for this broadly based community involvement will necessarily vary according to the cultural and social dynamics and institutional structures of each community. But in all cases the involvement must be real; it cannot just be lip-service, symbolic consultation. It must respect the roles, rights, and interests of each sector of the community. It must be transparent, democratic, and equitable. And this, in many situations, is not that easy to achieve. Leadership from the highest political levels of the community is of course essential. Not much can be done without that leadership. But a surprising amount can be done even when that leadership is not as vigorous or as supportive as it might be.

The process of developing local Agendas 21 cannot be dictated from the top down, but it can be—and must be—supported from the top. The broad participation of people and the various community-level organizations that represent them is equally indispensable for achieving the broad consensus and participation required for an effective agenda that must integrate a wide range of factors and interests.

The International Union of Local Authorities is sponsoring—and the Earth Council is cooperating

with—the Local Agenda 21 Initiative, for which 21 cities have been selected to serve as global models for sustainable development. And many communities are now in fact adopting their Agendas 21. For example, some 200 communities in Sweden have already taken the initiative to develop their own local Agendas 21. And it is encouraging to know that the World Bank, which has become the principal source of international support for urban infrastructure development in developing countries, is in the process of reexamining its experience and rethinking how it can support the transition to sustainable modes of urban development most effectively.

World Bank lending to meet capital needs for basic infrastructure in such traditional areas as water, sanitation, electric power, and transport will continue to be an extremely important, indeed vital, dimension of the support that can come from external sources. But even the World Bank's resources, as I indicated, can meet only a small portion of the capital needs for sustainable urban development if they are undertaken on a traditional basis. Thus, a growing portion of the assistance provided by the World Bank and other external donors must be devoted to supporting the development and dissemination of indigenous technologies, techniques, and skills, and to strengthening indigenous communities and community institutions, with a particular emphasis on those that are truly citizen-based. One true challenge will be to develop technologies and techniques that substitute local human skills for capital, particularly in such areas as the prevention and disposal of waste, and the provision of clean water supplies, health care, and social services.

Grassroots Organizations Are Key to Community Participation

There is ample evidence that when people feel a sense of involvement in their communities and realize that their own efforts can make a real contribution to better conditions and prospects for themselves and their children, they are prepared to assume their share of responsibility for shaping the future of their communities. But these ingredients are often missing in local institutional and social structures, and it is to support that type of local initiative—not to supplant it or to short-circuit it—that external assistance can be most

effective. Indeed, a truly participatory process in formulating and implementing Agendas 21 can release human energies and creativity within the community that have long been latent, dispersed, or dissipated in local tension and conflict. They can give people a whole new vision of their own futures and of their own capacities to realize those futures.

Although all developing countries have a modern sector that tends to follow the example and pattern set in industrialized countries, these societies also have a great reservoir of accumulated indigenous knowledge and experience to draw on. After all, traditional housing in many societies is both adequate and attractive, particularly when compared with the shantytowns and slums into which so many people move when they come to modern urban centers.

Making information available on how best to use locally available materials and techniques has worked well in several situations. But this strategy must be accompanied by basic training that enables people to combine traditional and modern skills and knowledge. It is not a zero-sum game; it is not an either-or game. It is how to make use of traditional skills and knowledge, added to and blended with the best, most applicable, and most affordable of external techniques.

In the urban shantytowns, the majority of people live in settlements that provide only the most basic shelter and usually lack the infrastructure and services that we take for granted. Most people in these settlements cannot afford commercial building materials and must meet their shelter needs from whatever scrap materials may be at hand. And they do not have title to the land on which they build, or access to financing. The move to enfranchise people by giving them ownership is one of the most important elements for ensuring that people have a deep interest in and commitment to their own community futures.

But people have demonstrated that they can overcome these formidable handicaps with concerted, cooperative efforts to improve the quality of their own housing and the life and prospects of their communities. Citizen action in Dakar and in the barrios of Lima provide recent examples. While the leadership and support of governments at both the national and local levels are essential for developing and implementing these grassroots initiatives effectively, much of the task

of mobilizing local initiatives and resources, as well as external support, can be done most effectively through nongovernmental organizations.

One of the most encouraging phenomena of recent years is the explosion of the number and variety of nongovernmental organizations in developing countries—many of which have eschewed the traditional, formal patterns that we are more familiar with in the industrialized world. Many of them are relatively small and informally organized, without the resources or the international linkages that give them access to external sources of information and support; nor are they able to prepare the detailed formal proposals required by most funding and technical assistance organizations as a basis for giving their support.

One of the primary functions of the Earth Council is simply to help to link such grassroots organizations and actors with one another, with external cooperation and support, and with the policy- and decisionmaking processes that affect them. We now have on our roster some 25,000 organizations with which we communicate and cooperate in various ways. Most of them are small grassroots organizations, but some of them are quite large, such as the World Conservation Union, the Society for International Development, the World Resources Institute, and the Third World Academy of Sciences.

Continuing on toward Sustainable Development

Habitat II, to be held in Istanbul in June 1996, will provide a new opportunity to focus attention on, and mobilize the new dimensions of political will necessary for, putting the development of cities and towns of the developing world in particular on a sound and sustainable pathway. I am very pleased that the Secretary General of Habitat II, Mr. Wally N'Dow, is participating in this conference, and I am confident that he will have your full attention and support, in a very real sense. This meeting can be a very important milestone in the road from Rio to Istanbul and beyond.

Habitat II will provide ample prospects for making a real breakthrough to a new era of sustainability and hope for the cities of our planet. The challenge is, of course, formidable, but it is one that we simply cannot ignore or avoid, for the battle to ensure that our planet remains a hospitable and

sustainable home for our species will be won or lost in the major urban areas, particularly of the developing world. If they continue a pace and mode of growth that exacerbates existing pressures and problems, they will inevitably become even greater sources of societal breakdown and conflict, with risks not only to their own populations and countries, but to all of us—risks that will undermine the security and sustainability of their society and ultimately of the world community.

The other side of the coin is that a successful transition to sustainable urban development will create a sustainable way of life for our society as a whole. As Mr. Henry Cisneros has wisely remarked, it is not just an interdependent world we live in; we live in interdependent communities in which the different ethnic and income groups within each community must have solid, functional, interactive links with each other.

Our civilization now is largely an urban civilization, and the great urban centers of the world are the real crucibles of our common future. We must not forget that the urban centers of the industrialized world will have a much greater impact on the local and the global environment—and thus on sustainable development—than any other phenomenon of our times. That is where our talents are concentrated, that is where our resources are concentrated, and that in a very real sense is where our challenges are concentrated.

The voracious resource appetites of the urban conglomerations in the industrialized world and their massive assault on our life support systems are an even greater threat to the global environment—if only because their inhabitants are not so vividly and cruelly reminded of the consequences of unsustainable modes of living as are people in the cities of the developing world.

We talk about the developing world, but we have to set an example in our own cities. The types of changes called for to achieve the objectives of Agenda 21 in the field of human settlements, as in all the other areas it embraces, will clearly be formidable, particularly when virtually all countries today are preoccupied with problems that seem more pressing and acute. Inertia is as powerful a force in human affairs as it is in the physical world. And even as world leaders articulate their commitment to change—as they did at Rio and more recently at Cairo—there is a tendency to move in the same old direction.

Yet the evidence presented at Rio is compelling: we must change course, and we must effect a significant shift in the inertia that is literally continuing to propel our civilization in an unsustainable direction; and the nodal points of that process are clearly in the cities. Every day, every hour, every moment that we lose is a moment that will exact a heavy price on our future, making it far more difficult to make that change of course that is so essential. We must break the current inertia and set ourselves squarely on a new path toward a sustainable future, the type of future that Rio articulated and which still is the only kind of future that can give any of us confidence.

The World Bank, our host, is a central actor in this process, and I am greatly encouraged at the

new leadership it is providing in sustainable development. With the support of President Preston and the tremendous energy, insight, and commitment of Vice President Serageldin, the "new World Bank" has launched the Global Environment Facility (GEF) in cooperation with the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP), and has engaged in a host of other constructive activities.

And as the theme of this conference makes abundantly clear, new leadership, new insight, and a new sense of priority must be pursued to ensure sustainable urban areas—areas that are the vital organs of our civilization, the source of its principal challenges, and the primary source of our hopes for the future.

The Human Face of the Urban Environment

Ismail Serageldin

Last year, in our first conference, we examined issues associated with valuing the environment—how to assess the value of environmental deterioration, deforestation, and air and water pollution. We convened that event in order to examine those important issues in the context of assessing our own efforts to help developing countries formulate strategies to achieve sustainable development.

Now, two years after the Rio Summit, we have convened this conference to focus again on the urban environment and the Brown Agenda, an arena of renewed global interest and concern. Twenty-two years ago in Stockholm, the world community set a “Brown Agenda” tied to the processes of northern industrialization. Since then, with enormous contributions from a wide spectrum of individuals and institutions, the world has set many *Green Agendas*. During the past quarter century the world has come to understand that global and local, national and regional, and rural and urban ecosystems and environmental conditions are all connected—that all of us are downwind or upstream from each another.

In recent years the Brown Agenda has been relatively ignored by the international community, as governments, international agencies, research institutions, nongovernmental organizations (NGOs), and many environmental professionals have concentrated their efforts on the Green Agenda of deforestation, global warming, resource depletion, and biodiversity. Throughout this period, we have embarked together on a mutual intellectual journey, discovering the great risks of resource depletion and the need for

rigorous methods to understand the impact of humankind on the natural world.

Today the world community is consumed with revisiting and renegotiating the “human” agendas, which increasingly require critical attention to the human and environmental conditions in cities and towns of all sizes. As an institution dedicated to environmentally sustainable development, the World Bank shares the view that the most critical development challenge facing the world is *to reduce poverty in developing countries*.

As the recent Population Conference in Cairo highlighted, population growth is both a cause and consequence of rising poverty in all regions of the world. And there is little doubt that a rapidly growing share of the world’s population is living in urban areas. In the developing countries the population will increase by some 2.4 billion people from 1990 to 2020, or by 1 million people a week for the next 30 years. This is roughly equivalent to the number of Rwandan refugees who this year crowded into Goma, Zaire, in a week. But as the world responded generously to this terrible, visible human tragedy, a less visible but no less dramatic movement of people occurred during the same week—1 million new urban dwellers in developing countries, many of whom also lack clean water and sanitation, and who face the threat of waterborne diseases daily.

The Brown Agenda and the Urban Environment

At the core of the Brown Agenda are the dirty air and water in cities, which can make people sick

in just a few hours, and which, together with issues on the Green Agenda, pose severe cross-generational risks. The short-term urgency of this agenda adds to the moral urgency of reducing poverty and developing the world's poorest communities. Indeed, it is the intersection of these three concerns—reducing poverty, protecting the environment, and improving the productivity of urban economic activities—that is the objective of our urban policy. It is not surprising that these concerns reflect the three sides of what I have called the “triangle of sustainability”—its economic, social, and ecological dimensions.

This conference will examine the many human faces of the urban environment, with an understanding of the close interdependence between the Brown and Green Agendas. The growing concentration of populations in urban areas translates into an increased consumption of scarce natural resources—land, water, energy, and biomass. At the same time, urban areas now account for more than half of gross domestic product (GDP) in most developing countries—for 70 percent of GDP in such Latin American countries as Brazil and Mexico, and almost 75 percent of future GDP growth in the developing world overall.

Urban areas are thus both consumers and producers and have become the economic engines for development. Yet they also contribute to the pollution of the natural environment. As spatial and physical environments, they have their own special problems that have produced new environmental phenomena and behavior: mountains of solid waste, rivers that burn, and air quality that can even cause brain damage. The very density and form of urban areas are contributing factors to, if not determinants of, a city's environmental quality.

Together we have also learned that these problems have disproportionately large impacts on the urban poor. Housing policies that force the poor into unserved squatter settlements perpetuate poverty by denying the poor opportunities to use their scarce incomes to improve their physical environment. The result is that only 40 percent of urban dwellings in developing countries are connected to sewers. Inadequate water supply forces the poor to pay higher prices for water, often 10 to 15 times what middle-income households pay per liter of potable water. The absence of effective sanitation and waste disposal facili-

ties pollutes shallow aquifers that other poor residents use as their water source. Middle- and upper-income groups can afford solutions to these problems; the poor cannot.

These afflictions of the urban environment do not exist only in the South. Indeed, all of these problems are shared by cities in the North, sometimes to new extremes, as we have seen in Eastern Europe. This commonality of experience suggests a hypothesis of urban convergence—exemplified by World Cup visitors from São Paulo saying the pollution in Los Angeles reminded them of home. Cities in the North and South share a common set of challenges, including crumbling infrastructures, environmental degradation, social unrest, unemployment, and fiscal deficits—and in many cases, the absence of consensus about how these problems can be resolved.

The degree and meaning of these problems vary considerably between the North and South. And in reality the countries of both the North and South each contain cities of both the North and the South. As Mayor Maragall of Barcelona noted during his visit to the Bank last year, his city is the North of the South and the South of the North, with its cultural and political implications. Perhaps U.S. Housing and Development Secretary Cisneros's hometown of San Antonio, Texas, also faces these issues.

Yet with all these important differences, the urban environment offers an opportunity for mutual learning and understanding. We hope that the debates on green issues can be complemented by constructive exchange and two-way learning, as the many participants in this conference, from both the North and South, seek together to identify the issues that must be addressed to improve the sustainability of urban areas and to increase their contribution to national development. My colleagues from the World Bank and I are excited that we are all here together, pooling our experience, expertise, and insight into these problems, and we look forward to learning from the diverse experiences and perspectives that this conference brings together.

Posing the Questions for the Conference

With this background, the critical features of this human face of the urban environment can best be

defined by posing the broad questions that this conference and its participants will address.

Why Is the Challenge of the Urban Environment a Human Problem?

At the risk of stating the obvious, the manner in which people have organized themselves—increasingly concentrated in urban areas of all sizes, from 17 million in Mexico City to African villages of 5,000 people—has important consequences for environmental resources. The availability of water, air, and land resources affects the welfare and productivity of individuals, households, and communities. As increasing proportions of national populations are found in urban areas, their consumption patterns become more significant. These are, of course, magnified by patterns of industrial concentration. Different densities induce different behavioral patterns and consequences for natural resources.

These general observations have become very real as we observe behavioral responses to, for instance, transport-related air pollution in Bangkok or Mexico City; industrial waste and pollution in Katowice, Poland; fecal contamination of the water supply in Lima; and the pollution of natural waterways, such as the Nile in my hometown of Cairo. The Nile is now many times more polluted than the World Health Organization (WHO) guidelines allow. The costs of these disastrous conditions have become internalized in human behavior: Mexico City is no longer growing at its projected rate, new patterns of residential location are developing in Bangkok, and improved sanitary practices have reduced the spread of cholera in Lima.

Yet these conditions do have huge costs for the respective city economies. For example, it is estimated that Bangkok loses a large percentage of its products from traffic delays; each car spends the equivalent of 44 days a year stalled in traffic, which has corresponding effects on Thailand's GDP. This level of inefficiency affects the country's regional and global competitiveness, and thus the generation of jobs for the many newcomers into Thailand's labor force.

So the definitional question is answered. The urban environmental agenda is a human problem, because it directly derives from human activities, directly and immediately affects the

well-being of the poor and their children, and, at least over the medium term, reduces the efficiency of the economic performance of human societies.

Are Cities Sustainable?

As we come to understand the interdependence between welfare and natural resources, the answer to this second question could easily be that alternatives do exist. But that answer is insufficient. The question itself must be broken down. First, *are cities living within reasonable resource limits?* What are the facts about the impact of urban consumption on the degradation and depletion of land, water, and biomass? For example, some cities and towns in China and India are consuming dangerously unsustainable quantities of natural resources. Almost all urban areas are experiencing increasing marginal costs for urban water supply, as water utilities go greater distances to water resources and use a greater amount of energy to transport water to urban areas. Beijing is now planning to obtain water from sources more than 800 miles away from the city and at the same time is prohibiting rural residents of the areas surrounding these sources from using the water.

While those located on rivers may not face these transportation costs, they are coming to learn about upstream pollutants. We are learning that we all live downstream. These pressures have also heightened the conflicts between rural and urban water users and demonstrated that broader regional strategies must be adopted to manage water resources.

The second part of the question pertains to *the future of cities*. Have the large urban areas—the megacities—reached their environmental limits? Do market forces generate excessive concentration in urban areas and the consequent negative externalities, such as congestion and the degradation of natural resources? Do the slowdown of demographic growth in the largest cities, whether Calcutta or São Paulo, and the growth of urban regions and secondary urban centers imply that we must revise urban economic thinking about economies of scale and agglomeration? Do the problems of large cities demand alternative spatial patterns of settlement within countries?

These questions certainly demand a greater appreciation of the negative externalities of agglomeration, urban density, and scale—which may have been underestimated in the past. In Asia and Latin America we are seeing that the growth of cores of megacities is slowing down in absolute terms, as people vote with their feet and settle on peripheries or in secondary towns. This phenomenon raises the difficult issues of land use and transportation patterns, both of which directly involve the consumption of land, energy, and air.

*What Policies and Approaches
Have Enabled Some Cities to Successfully
Manage Environmental Resources?*

Where have cities managed to change the existing patterns of resource consumption? What are the lessons of experience that 30 speakers will share with us tomorrow? We have frequently heard of the innovations in recycling and transportation planning in Curitiba, Brazil, but what about other cases? Which urban areas can claim to have made strides toward improving the efficiency of longer-term resource use?

As we assess this experience, we must seize upon *effective mixes of instruments* that can shape a sustainable urban environment—such as regulations, economic incentives, pricing strategies, comprehensive planning, and various forms of public and private investment and participation in decisionmaking. Do the cases to be presented at this conference provide the basis for identifying a new body of sustainable urban practices? Does experience suggest that commonly accepted criteria for governing sustainability be modified? Is there a particularly urban character to this body of practice as distinct from other environmental policy and action?

Here I would like to address the issue of *urban environmental governance*. Is this concept useful? For example, do we believe that managing the urban environment is significantly different from managing cities and towns? Do our preoccupations with environmental deterioration imply a new set of challenges for urban government? How will the mayors and other public officials participating in this conference answer this question? Do mayors from the North and the South have similar perspectives on this issue?

These many questions suggest that we are at the beginning of an exciting intellectual journey on the subject of environmental governance. With conference participants from more than 60 countries, from many different types of public and private institutions, clearly there will not be just one answer. Rather, many different perspectives will enrich this discussion as we seek to establish a common understanding of what constitutes good environmental governance. Only by defining and articulating models of good practice can we hope to work with countries to improve their capacity to address these problems.

These are some of the human faces of the urban environment. Fundamentally, we are talking about human behavior. When we speak of the vulnerability of urban areas to environmental disasters, it is not because Latin American cities receive more rainfall than does the countryside and thus are more susceptible to flooding. Rather, because of the concentration of people in urban areas, the infrastructure that has been constructed to manage the runoff may not be maintained adequately—and this may cause flooding over the banks of drainage canals. This “natural disaster” may thus be “natural” only in the sense that it is a commonly understood part of human experience. The same analysis can apply to the collapse of water tunnels in Chicago or here in Washington, D.C.

It would be presumptuous to believe that these myriad questions can be treated adequately in a three-day conference. Indeed, as the program was being designed, it soon became evident that many important questions could not be included in such a short time frame. We have thus added three important Associated Events to this year’s ESD Conference: two-day symposia on “The Business of Sustainable Development: Private-Public Partnerships for Creative Technical and Institutional Solutions” and on “Enabling Sustainable Community Development”; and a symposium on “Quality Design and Sustainable Built Environment,” held at the American Institute of Architects. Each of these represents an important dimension of the human face of the urban environment. Progress on this broad agenda will require broad cooperation with many actors and institutions, and I am delighted to see how we are transforming this corner of Washington into an urban environmental campus this week.

The World Bank's Commitment to the Environment

The Bank is committed to finding answers to these questions and solutions to real-world problems. It is significantly expanding its environmentally related activities; in fact, the environment is already the fastest-growing sector in our portfolio. In 1994 the Bank lent US\$1.4 billion to fund solutions to issues on the Brown Agenda. It lent another US\$1 billion to address issues on the Green Agenda, bringing cumulative lending for all aspects of the environment to US\$9 billion in the past decade. As our *Annual Report on the Environment* points out, we have both broadened and deepened our commitment to sustainable development. But we appreciate that successfully translating that commitment into results will

require many forms of cooperation together with efforts to strengthen our understanding of the operational meaning of sustainable development. To this end, we intend to strengthen our partnerships—with our member countries, with the many multilateral and bilateral assistance agencies in the international community, with NGOs, with the professional and academic communities, and, most important, with people who share our belief that sustainable development must start with a “people-first” environmentalism. This commitment to cooperation will also extend to the United Nations Centre for Human Settlements as it prepares the Habitat II Conference, scheduled for June 1996 in Istanbul.

We are delighted that you are here, and we look forward to an exciting and productive week.

ARE CITIES SUSTAINABLE?

Introduction

Mahbub ul Haq

We all agree about several aspects of the sustainability of cities. For instance, we recognize that a great urban explosion is coming in the developing world. In the past 70 years the urban population in developing countries has increased 17-fold—from around 100 million in 1920 to 1.7 billion in 1990. This growth has been far beyond anything imagined only a few decades ago, and its pace is without historical precedent. We also know that the developing world will contain the megacities of the future. In 1960 just 3 of the world's 10 largest cities were in the developing world. By the year 2000, however, 8 of the top 10 megacities will be in developing countries. And their sheer size boggles the mind—the largest city, Mexico City, has 25 million people, followed by São Paulo, with 22 million people, followed by Bombay, Calcutta, and Shanghai, three of the poorest cities, with more than 15 million people each.

Still another area of consensus is that the global profile of poverty is changing dramatically. The long-held assumption about the developing world was that poverty was a rural phenomenon. In fact, it has now become an urban phenomenon. By the year 2000, the number of poor urban households is projected to increase by 76 percent—to about 72 million poor urban households—while the number of poor rural households will fall by nearly 30 percent, to 56 million. The urban poor will soon predominate—in fact, about 90 percent of poor households in Latin America, 45 percent in Asia, and 40 percent in Africa will be in urban areas.

Future developers and decisionmakers must become accustomed to the challenges of planning sustainable livelihoods and environments to meet this precipitous urban growth and the emergence of megacities in the developing world: the year 2000 is just around the corner, and whatever is done in the next few years will not substantially alter this scenario. They must also determine how the tremendous urbanization of poverty can be contained, because many of these urban areas will obviously be at dire social, economic, political, and environmental risk.

How Do We Define Sustainability?

Despite consensus about some of the aspects of sustainable development, the concept itself is still rather nebulous and ill-defined. Many analysts quote the celebrated definition from *Our Common Future* (known as the Brundtland Report; World Commission on Environment and Development 1987):

Sustainable development is development which meets present needs without compromising the ability of future generations to meet their own needs. . . .

Unfortunately, this definition begs all the relevant questions. What *are* the present needs, for instance? Are we to accept or to freeze the present pattern of global consumption? If so, poor nations

will merely be sustaining the extent of poverty. Conversely, are we to engender a major change in the consumption patterns of rich nations and the redistribution of global consumption and income? If so, we should discuss the policy dimensions of this change before we talk about present needs. "Present needs" is an ambiguous concept and can be interpreted in several different ways—from passive acceptance of current global realities to a radical plea for redistribution. And the concept of "future needs" is even more vague and ill-defined. While the Brundtland definition is an attractive one rhetorically, it is neither rigorous nor functional for any analytical purpose.

Preserving Resources

Some analysts interpret sustainability as a framework for preserving *all* natural heritage—all forms of natural resources, wildlife, and natural capital. Great confusion exists here between ends and means. Obviously, what must be sustained is human life. The preservation or regeneration of natural resources is only a means toward this end. Throughout history, technological progress has continually altered the balance of natural resources that are necessary for sustaining human life. And whether or not we believe in technological fixes, it is clear that the natural resources necessary for sustaining our current standards of living may be quite different 50 years from now. What must be preserved for future generations are developmental opportunities and human choices, and not each and every form of natural capital, or every ecological resource, or every species. If more efficient substitutes are available, they will be used—as they have always been throughout history. What must be sustained for the next generation is the capacity to enjoy at least the same level of well-being that our own generation possesses. This must be regarded as the ultimate objective; preserving or regenerating natural resources is only one of the means toward that end, and, as with all means, it should not be allowed to usurp policy attention from the real objectives.

Regenerating Capital, Not Deferring Debts

Sustainable development is a process in which economic, fiscal, trade, energy, agriculture, industrial—indeed, *all* policies—are designed to

bring about economically, socially, politically, and ecologically desirable growth. This process has several implications. It means that current consumption cannot continue to be financed with economic debt that future generations must repay. It also means that sufficient investment must be made in the education and health of today's population so as not to create a social debt for these future generations. And it means that natural resources must be used judiciously so as not to impose ecological liability on those who come after us.

All deferred debts mortgage the prospect of sustainability, whether these debts are economic, social, or ecological. That is why sustainable development models require that all forms of capital—whether physical, human, or natural—be regenerated. Thus, analysts who emphasize only one component of the sustainability equation—natural capital—are clearly ignoring the total picture.

But in striving to ensure sustainable development in the future, we cannot overlook the present. It would be rather odd to worry about generations yet unborn if our current generation remains poor and miserable. And it would clearly be immoral to sustain current levels of poverty. Development that perpetuates today's inequities is neither sustainable nor worth sustaining. Indeed, global sustainability without global justice is likely to prove elusive. A major restructuring of the world's income and consumption patterns—particularly a fundamental change in the current lifestyles of rich nations—may be a necessary precondition for any viable strategy of sustainable development.

I have dwelled on this confusion about the concept of sustainable development merely because it would be frustrating to discuss whether cities are sustainable without a rigorous concept to buttress our discussion. Sustainability is a comprehensive developmental concept, not merely an environmental one. And to discuss sustainability only in terms of increased overcrowding is also unacceptable, because 50 years ago it was inconceivable to envision the megacities of today, and 50 years from now we may have entirely different patterns of urbanization.

I am often mystified how the ghost of Malthus has traveled with us throughout history, even when all his premises have been discredited by

historical developments. When Malthus lived, the population of the world was less than a billion persons. Had Malthus been told that more than 5 billion persons would inhabit this planet in the 1990s, he would have called it an impossibility. Yet here we are in the year 1994—with more than 5 billion people who are much better fed than at the time of Malthus, have a much longer life expectancy, are much better educated, and enjoy more comforts. It is time to give Sir Robert

Malthus a decent reburial, but this time with finality. And let us discuss the issue of sustainability in the true development context. The question is not *whether* cities are sustainable, but *how* we can make cities sustainable.

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Making Cities Sustainable

Lester Brown

One aspect of making cities sustainable is to link them to the broader issue of resources—food, energy, nutrients, water, and materials. How will the supply of and demand for these resources affect urbanization?

Food: Prices and Production Allowed People to Move to the Cities

The enormous urbanization of the world population in the past four decades was underwritten by the unprecedented growth in food production. In the absence of this growth, it would not have been possible for such a large number of people to leave the countryside for the city.

The farmers who were on the land in 1950 were the first generation of farmers ever to double production in their lifetimes. They did so in exactly 23 years. World grain production rose from 630 million tons in 1950 to 1.27 billion tons in 1973—a remarkable achievement. In the North American breadbasket, farmers increased their grain exports from 23 million tons in 1950 to 120 million tons by 1980. Exports of grain from North America helped underwrite urbanization in many other parts of the world. Cities in the developing world are often not integrated into the national economies; rather, they are tied to the international trading system, and get much of their resources internationally, which has certainly been true of food.

In the past four decades the real price of food has been declining steadily and rather impressively. Throughout this period the world grain

market has been a buyer's market, except for a brief period from 1972 to 1974, when scarcity converted it temporarily into a seller's market. The terms of food trade between the countryside and the city have been increasingly favorable to the cities in the past four decades. This is going to change.

Production and Consumption Are Slowing Down

From 1980 to 1984, world grain production was expanding at 3 percent annually; since then it has lost its momentum, expanding at one percent annually. And although, in relation to the population growth from 1950 to 1984, the one percent annual growth in grain production per person helped improve dietary intake throughout most of the world, we are slowly losing ground, and per capita grain consumption has been declining. In recent years much of that decline has been concentrated in Africa and in the former Soviet Union and Eastern Europe.

One of the reasons that gains in food production have slowed so dramatically is the diminishing response to fertilizer. In the United States farmers are using less fertilizer in the early 1990s than they did in the early 1980s. Worldwide, fertilizer use began leveling off in the 1990s, and since then, as countries have withdrawn subsidies—the former Soviet Union, for example, and more recently China and India—fertilizer use has actually declined. Unless new grain varieties are developed that are far more fertilizer-responsive than those that are now used, food production will continue to decline steadily.

At the same time, the production of food from the oceans—a major source of protein for many developing countries—is also being strained. Much of the increase in protein consumption in developing countries in the past four decades came from the oceans, with an increase in the world fish catch from 22 million tons to 100 million tons. The average worldwide consumption of seafood in 1989 reached 19 kilograms, up from 9 kilograms in 1950.

But oceanic fisheries have hit a wall. In the past four years fishery production has remained the same, and in some cases has even declined somewhat. The marine biologists who projected 20 years ago that the oceans could not sustain more than 100 million tons of annual catch were apparently correct. As a result, seafood prices are rising; in the past decade, they have risen in real terms by 4 percent annually. You do not see many poor people in fresh seafood shops.

The seafood catch is not expected to increase, at least on a sustainable basis. As the world's population continues to grow, as per capita seafood supply continues to decline, and as the price of seafood continues to rise, seafood consumption will shift over time from the poor toward the more affluent in the world.

Demand for Grain Is Rising: The China Case

The loss of momentum on the food front is especially significant in China, given its enormous growth in demand. The industrialization of China has expanded its economy by more than 40 percent since 1992 and has dramatically increased per capita income and the likelihood that the demand for grain will rise even more dramatically. Rapid industrialization in such a densely populated country will have an adverse effect on food production, however. As the demand for grain increases and as the cropland used to produce grain is converted into land for either residential or industrial uses, the loss of cropland will begin to override any increase in land productivity. Suddenly, the production and consumption of grain, which have been moving more or less together, will diverge. Production will begin to decline, and consumption will climb rapidly, creating a gap between the two.

The three models for examining what we can expect in China are Japan, South Korea, and Taiwan (China). Thirty years ago these three countries were largely self-sufficient in grain. Last year, they collectively imported 73 percent of their grain supply. It is one thing when a country such as Japan, with 120 million people, imports most of its grain; it is another thing when a country of 1.2 billion people begins to move in that direction. China's population is projected to increase by 490 million people over the next four decades, and, based on the Japan model, its production will decline gradually, creating a deficit of 216 million tons of grain. That amount exceeds current world grain exports.

If China's consumption of grain increases to the level of that in Taiwan (China) today—from 300 kilograms of grain per person to 400 kilograms—the deficit will be 378 million tons. This amount is staggering when compared with the availability of world exports. China has made similar projections. According to Professor Zhou Guangzhao, head of China's Academy of Science, if the country continues to squander its farmland and water resources in a breakneck effort to industrialize, "then China will have to import 400 million tons of grain from the world markets. And I am afraid in that case that all the grain output of the United States could not meet China's needs."

The likely scenario is that, as China moves into the grain market, it will begin to compete with the other 100 or so countries that import grain, driving up world grain prices. Can China afford to import huge quantities of grain? Yes. Last year China's trade surplus of \$23 billion with the United States was sufficient to import all the grain that the United States exported last year, which is half the world total. But meeting that demand would be impossible.

Rising Food Prices May Slow Urbanization

Never have the incomes of 1.2 billion people risen so rapidly; this economic miracle is occurring at a time when pressures on resources—whether land, water, or oceanic fisheries—is already excessive in many places. The historical decline in real food prices will reverse itself; indeed, we already see a rise in seafood prices. Soon, the price of rice will start to rise, in part

because production is constrained by the availability of both land and water. And price increases will then spread to wheat.

Food scarcity and grain prices in China's 35 largest cities in July 1994 were up 56 percent from a year ago; inflation is now the number one problem in Beijing. In an integrated economy, China's food scarcity will become the world's food scarcity; its land scarcity will become everyone's land scarcity; its water scarcity will become everyone's water scarcity. With the change in prices, the terms of trade not only between the importers and the exporters, but also between the countryside and the cities, will begin to shift. The products of the land will have a much greater value relative to the industrial products of the cities than they have had in the past. This phenomenon may slow the rate of urbanization.

Energy Sources: Making the Transition to a Sustainable System

Another resource scarcity that will affect urbanization is energy. Urbanization was spurred not only by the enormous surplus of food produced in the countryside around the world, particularly in North America, but also by oil, which made it possible to transport materials in and out of cities. Between 1950 and 1960, world oil consumption doubled. By 1973, it had increased six times over its 1950 level. The modern city is a creature of the oil age, of the internal combustion engines of cars, buses, and trucks. Nevertheless, energy will not likely be a serious constraint on urbanization. Although fossil fuels do create problems for cities and for the world as a whole, an energy age beyond fossil fuels—one that will be based on solar/hydrogen-based energy resources—is already emerging. In particular, three renewable energy sources are being developed—solar/thermal-powered plants of the type being built in southern California; photovoltaic cells now being used in thousands of villages in developing countries; and wind power.

Windpower is at the forefront of new energy development. In California enough electricity is generated by wind to satisfy the residential needs of San Francisco and Washington, D.C. Wall Street has invested some \$2 billion in wind farms

and wind turbine manufacturing potential. This market has tremendous growth potential. Its promise greatly exceeds the potential of hydro-generated electricity, which now accounts for one-fifth of world electricity generation. North Dakota and South Dakota alone have enough harnessable wind energy to supply electricity needs in the United States. A recent seven-year survey in China indicates that the country has enough economically harnessable wind energy to triple current electricity generation. The World Bank is now beginning to look seriously at wind energy as an area of investment.

Whether in the southwest United States or in the northwest deserts of India, the solar/thermal potential is enormous; it is possible to build efficient solar/thermal power plants that can convert more than 20 percent of sunlight into electricity. Cheap electricity from renewable resources, whether wind or solar/thermal, allows water to be electrolyzed to produce hydrogen. Hydrogen can easily be transported, and the combination of electricity and hydrogen can run a modern industrial economy. We can make the transition to a sustainable energy system, one that does not create *either* air pollution or acid rain, or disrupt the global climate.

Nutrients: Reestablishing Cycles

In rural societies production and consumption are local activities, and nutrients are recycled back into the land automatically. But market economies, particularly export markets, break that nutrient cycle. An example comes from the United States, which exports nearly 100 million tons of grain annually. The grain contains 2 to 3 million tons of nitrogen, phosphate, and potash, the basic nutrients that plants use. Those nutrients come from farms in Iowa and Kansas; they wind up in sewer systems throughout the world.

The challenge is to reestablish those nutrient cycles. When urban planners look at sewage, they see only a problem; in most cases they do not envision the potential of sewer systems to restore the integrity of the nutrient system. An exception is the city of Shanghai, which, several years ago, expanded its city limits in order to have enough land to recycle all the nutrients from the sewage produced in the city; the city is

now an exporter of vegetables. In Calcutta fish farmers produce 20 tons of fish daily from the nutrients in the sewer system.

Water: Competition Increases Costs, Constraining Urbanization

Another scarce resource is water. In many parts of the world, competition between cities and countryside for water is intensifying. Phoenix and Tucson have taken irrigation water from hundreds of thousands of acres in Arizona. When farmers in that part of the country lose their water, they go out of business. In other states, such as Colorado and Texas, they go back to lower-yielding dryland farming. We face water deficits on an enormous scale. Tokyo, which last year suffered from the hottest summer on record, was forced to import water in 1994. Tokyo Electric hired tankers to haul water from distant regions; some of the water being hauled into Tokyo to keep the utility and factories running came from as far away as Alaska.

Water costs may constrain urbanization in the future, calling for an examination of remedial alternatives. One potential remedy is water-efficient household appliances—in the same way that we began looking at energy-efficient household appliances 20 years ago.

Materials: Shifting to Recycling

The flow of materials—glass, paper, and metals—is another aspect of sustainable development. The throwaway economy is not a sustainable economy. The time has come to move as quickly as possible to a “repair, reuse, and recycle” economy. Germany’s foreign minister, Klaus Töpfer, describes his theory of environmental management as the task of creating bottlenecks. Technology and investment will respond to get rid of them.

Industries are starting to shift from primary dependence on virgin raw materials to primary dependence on recycled materials. The Chicago Board of Trade has opened a futures market in such recyclable materials as paper, glass, and aluminum. Government policies can facilitate markets for recycled goods at both the urban and the national levels. When President Clinton signed an executive order requiring that all paper procured by the government contain 20 percent post-consumer waste, he did more to help the local recycling programs around this country than almost anything that has been done in years. Six months ago the recycling centers in Boston were paying as much as \$60 a ton to get paper hauled to a distant landfill. Today they are selling that waste paper for \$30 a ton.

Industries are relocating, and smart mayors are going to take advantage of this shift. For example, an increasing number of paper mills being built in North America are not being constructed in the northwest, or in Maine, where the forests are; they are being built near the large cities. One was just recently built near Camden, New Jersey, on the Delaware River, across from Philadelphia. It is feeding on the waste paper of the greater Philadelphia area, and is creating local jobs, income, and tax revenue.

When these recycling systems are developed, cities can subsist largely on the existing inventory of glass, steel, and aluminum, and can become more self-contained. Less capital will be going out, and less energy will be used in processing. There will be less pollution.

Environmentally sustainable cities require a major economic adjustment. When we begin to look at the ecology and the economics together, then we can make some real progress in creating environmentally sustainable cities. In short, it is important that we view the city not only as a political unit, but also as an ecological and economic unit.

Discussant Remarks

Pasqual Maragall

The growth of cities is a function of four sets of factors: biological, economic, ecological, and communicatory. Cities are foremost the outgrowth of a *biological instinct*: people tend to concentrate rather than diffuse on earth. But this biological instinct also leads to another interesting biological phenomenon—the inclination toward fertility. For example, in Ethiopia and Rwanda—two examples of rural societies—fertility is uncontrolled, creating overcrowded, sometimes concentrated villages, with their attendant distress and difficulties. It is lamentable that war and famine are the two factors that have any restraint on their population explosion. Compare China, where population growth is concentrating in such east coast cities as Canton and Shanghai; yet, in those cities, the fertility rate is falling. One would hope that their fertility pattern would deter the Malthusian scenario in the future.

The same can be said of cities in the western part of the Northern Hemisphere, where population growth in the large cities is tending to stabilize and contract. This is the case in my city of Barcelona—the municipality, not the metropolitan area. The population, which had been growing ever since the year 5 or 10 bc to a maximum of 1.85 million, is now at 1.65 million, shrinking for the first time in its 2,000-year history. Nothing suggests that the populations of Canton and Shanghai will not also continue to decline in the more or less distant future.

But beyond these effects of fertility patterns on population growth, we can also ask whether these populations are moving out of the large center city only to settle down in the metropoli-

tan periphery, or are going farther out to mid-size or small towns. This concept of periphery is a rather interesting one. For instance, in the year 2000, the 50,000 inhabitants of Girona, a provincial capital 100 kilometers north of Barcelona, will be 30 minutes from downtown Barcelona via a high-speed train. Is this a metropolitan distance, or should Girona be considered a mid-size town?

A second set of factors affecting the growth of cities pertains to *economic and political realities*. More specifically, cities grow throughout long periods of history due to the existence of economies of agglomeration—lower costs of utilities, the spread of commercial opportunities, and so forth. But these economies do not account for many social and ecological costs, and they thus tend to give us a false picture of the optimum size of a city. The market equilibrium size of the city is much larger than the optimal size, since newcomers tend to perceive the average, rather than the marginal (and higher), cost of their moving into the city. Yet taxing external diseconomies to equal private price, or social costs, is preferable to dictating fiscal limits by law.

Of course, one can argue that the factors that explain the growth of cities are more political than economic; thus, once a city exists, it will never shrink by as much as would be dictated by external diseconomies, because residents will exert an influence on the political structure to spend more than is wise to maintain the city.

National chambers of representation tend to be disproportionately rural, thus compensating for urban surpluses of influence. But the political blindness of capital cities and large towns toward

their own costs is a reality. In this regard rural bias is healthy. The larger the town, the louder the noise it creates around it, and the less it hears from the outside. Europe might be worse in this respect than North America, which prefers the Jeffersonian tradition of small farmer democracy that is part of the antiurban formulations today in the United States.

The third factor, the *ecological*, argues for a matrix rather than a dualistic approach to cities and environment. The “large versus small city” approach is crumbling down. The Randstadt in Holland, the Rhine megalopolis in northern Westphalia in Germany, or the Verona-Vicenza-Venezia-Padova network in Italy—these are proof that we are living in urban continuums.

Georges Frêche, the active mayor of Montpellier, recently expressed several interesting views about urban continuums. His city of 250,000 people, within an overall metropolitan area population of 4 million people, is the optimal size for good city governance. He projected Montpellier’s future in view of its proximity to Barcelona and the goods arriving from it. In fact, he is part of a network of six cities, embracing Montpellier and Toulouse in southern France; and Barcelona, Majorca, Valencia, and Zaragoza in Spain. With 15 million inhabitants—5 percent of the population of the European Union—these six towns and their regions are on the threshold of competing successfully with Central and Northern Europe.

The point is, in a global world, a city is no longer a city. A cluster of cities is necessary for financing the amenities that many citizens

believe are their urban right—whether an opera house, a major international airport, or a football team. A cluster is also necessary to have the force to bargain with the big global multinationals. At the same time, however, every city—in the old sense of the daily labor market—must internalize its external costs if it wants its downtown to survive. The coexistence of luxury suburbs and decaying central towns is the worst of the many faces—although many of them marvelous—of American civilization. People using the downtown during the day should pay for it, even if they slip away from it at night. Secretary Cisneros makes some very candid, straightforward, and keen remarks about spatial segregation—that it is the compounding factor of most urban evils. I, myself, when asked Barcelona’s population, answer, “At what time?” At 11 a.m. and 11 p.m., it is not the same.

The final set of factors are *communicatory*. In particular, the density of poverty and the density of traffic alter the nature of things in cities. Cities are based on communication; they exist because communicating is better than not. Thus, no islands are permitted in cities. So if one diffuses problems spatially, the people will be able to care for themselves. If one fights the concentration of problems, the flow of commodities will improve. If one promotes the transition from poverty to cost-conscious behavior—from a need society to a service society—people will follow. This is the lot of local democracy and has much to do with legitimacy. You can do those things if you are seen as a legitimate actor to do them and if you involve constituents in the process. But it is no easy task.

Discussant Remarks

William Alonso

Cities are going to be here whether we like it or not, and they are going to grow whether we like it or not. To speak of this as an issue that is comparable to rearranging the living-room furniture is to trivialize something that is formative and will continue to be formative for the rest of our lives and our children's lives.

I am an agnostic about the scenarios that Lester Brown points to. But though I agree that the terms of trade between the city and the countryside will reverse, the reversal should not lead to a slowdown in the growth of cities. The last time this happened on a large scale was during the enclosure movement in Europe, where the reversal displaced the peasantry and consolidated landholdings. So if this reversal does occur, it should accelerate demographic growth in urban areas—although it might slow down their economic growth.

I subscribe entirely to Pasqual Maragall's concept of the matrix, or the cluster, of cities as the new urban system. He mentioned many examples, and one could mention others, such as the North Carolina Research Triangle complex in this country. But it seems to me that this phenomenon for the foreseeable future will be reserved primarily for the industrial world, the rich countries, because it will require heavy capital investment, advanced technology, and sets of institutional infrastructures, such as laws and agreements, that are not easy to come by.

The remainder of my remarks pertain primarily to cities in poor countries. With all the interesting things that have been said, there has been a tendency to speak of cities in the same voice. But

we are talking about different animals: Barcelona and London are not the same as Calcutta. When I grew up, there were really two worlds—the industrial countries, and the poor countries, called by various names.

Now we have others. We have economies that were once poor but are becoming economically developed—Taiwan (China), Thailand, and the various “dragons” or “tigers”—and they are all experiencing tremendous problems. One problem is the necessity of making massive investments in infrastructure at unimaginable rates. That is a problem. And we now suddenly have a new Third World—the ex-Communist world—where urban problems are of a very different nature. For instance, parking and congestion are not yet very problematic—they will be—but pollution and housing are.

But if we speak of cities in the countries that are still poor—cities that are rapidly expanding—we should recognize that most of the demographic growth in those cities does not originate in migration. And too much of the discussion is often framed in terms of, “How are we going to keep them down on the farm?” Well, you could keep them down on the farm, and they would still grow very fast, because their birth rates exceed their mortality rates. And although the fertility rates of many cities—in Mexico City and São Paulo, for example—are dropping very fast, the age structure of the population is such that the population will continue to grow.

For the truly poor cities—the Calcuttas, the Jakartas—the immediate problem, now and for the rest of our lives, will be to get the water in, get

the excrement out, do something about air pollution, lead, and smoke, and resolve several other pressing problems. These problems are basic, but they are not being addressed. And without resolving them, nothing else will work—neither efforts to alleviate poverty and to spur economic development, nor campaigns to remedy dysentery and malaria or to halt the return of tuberculosis. A low standard of health is incompatible with economic development.

I grew up in the tradition of urban studies, and my friends the urbanists are always in favor of

community participation. In recent years I have spent time with friends in the public health trade. They are also interested in community participation. Yet these two groups seem unable to talk with each other. They do not have a common language. What is needed is an approach to these cities that is environmental in the sense that it views the entire composition of the city—the human beings who reside therein, and the microbes, the vectors, the water, the air—as an interactive system. What are needed are initiatives that address the city in this entirety.

Can Cities Be Sustainable?

Peter Hall

One might say that we are fully briefed—almost overbriefed—on the subject of sustainable urban development. But we have a problem: although we have a much-quoted and generally accepted general definition of sustainability from the Brundtland Report (World Commission on Environment and Development 1987)—

... development which meets present needs without compromising the ability of future generations to achieve their own needs and aspirations ...

—it is not clear how this definition should manifest itself in everyday decisions in everyday urban contexts.

Of course, the general policy strategy is fairly clear. The consensus is that we will need a combination of policies—some pertaining to building construction standards, some to transport, and some to land use. Thus, for instance, we should design buildings that conserve energy and minimize the emission of pollutants; we should encourage accessibility without the need for mechanized transportation (particularly by ensuring that locations can be reached on foot and by bicycle); we should promote public transportation and discourage unpooled driving; we should develop new forms of propulsion that are less polluting and more energy-efficient than the internal combustion engine; and we should develop centers of activity around public transportation nodes.

The problem we face is going on to the next stage: to translate these objectives into workable

strategic frameworks and plans for real places. One of the most critical areas for planning and design is the interface between land use and transportation.

Relationship between Urban Density and the Use of Transportation and Energy

The starting point here is the well-known series of studies by Newman and Kenworthy (1989a, 1989b, and 1992), which posits that, overall, European cities are more compact than either Australian or U.S. cities, and that their greater density is systematically associated with greater public transportation use and with lower energy consumption per capita. In fact, average gasoline consumption in U.S. cities is nearly twice as high as in Australian cities—and four times higher than in European cities. Differences in gasoline prices, vehicle efficiency, and income explain only about half of these variations. What is equally significant is the urban structure: cities with a strong concentration of centrally located jobs, and thus a more highly developed public transportation system, use much less energy than do cities in which jobs are scattered. Overall, Newman and Kenworthy found a strong relationship between energy use and the use of public transportation, especially railways and private cars. In European cities 25 percent of all passenger travel is by public transportation, and only 44 percent use a car to get to work. On average, 21 percent in these more compact cities walk or bicycle to work. In Amsterdam the figure is 28 percent, and in Copenhagen 32 percent.

Some important policy prescriptions have seized upon Newman and Kenworthy's conclusions. For instance, the well-known European Commission Green Paper assumes an ideal urban form, represented by the traditional compact European city that engenders short distances to workplaces and shopping areas, is supported by generous investment in public transportation, uses fewer nonrenewable resources, and creates less pollution than the scattered Anglo-American-Australian urban form. However, Breheny (1992) has questioned the Green Paper for what he believes is an obsession with density. His work, and that of others, suggests that moderate densities may be perfectly satisfactory; it is not clear that packing everyone into existing cities is necessary.

Likewise, Gordon and Richardson (1989) and Gordon, Richardson, and Jun (1991) argue that Newman and Kenworthy's analysis is faulty, that they wrongly diagnose the problems, and that their policy and planning prescriptions are inappropriate and infeasible. In U.S. cities, they argue, the suburbanization of both employment and the population has actually reduced, not increased, commuting times and distances: people have stopped making long suburb-to-city trips and are making short suburb-to-suburb trips instead. Brothie, Anderson, and McNamara (1995) reach the same conclusion for Australian cities.

The point is that in virtually every advanced country since about 1960, cities have decentralized. Evidence is overwhelming that both population and, behind it, employment are moving out and that this process is most marked in the largest metropolitan areas (those with 1 million or more persons) (Hall and Hay 1980; and Cheshire and Hay 1989). The results are complex: journeys may have shortened, but a much greater proportion are made by car, and non-work trips by car have also grown. This pattern is particularly evident in Western Europe, although Cheshire (1994) has recently suggested that the process may have partly reversed in the 1980s. Breheny's recent analysis shows that dispersion in Britain has increased energy use over what would have been observed had the population distribution remained the same as it was in 1961. But the effect is marginal (Breheny 1993).

Policy Responses

I make no apology here for concentrating on the European experience. As is generally known, urban transport authorities in Europe in the 1970s and 1980s sought to develop new public transport systems while progressively placing curbs on free car use in urban areas.

Investing in Railways

Public transportation investments have taken four main forms: (1) extension of existing heavy-railway systems in the largest cities (including Paris); (2) new heavy railway systems, generally in "second-order" cities (Amsterdam, Barcelona, Brussels, Lyons, Madrid, Marseille, Milan, Munich, Oslo, Rotterdam, Stockholm, and Vienna); (3) transformation of old tramway systems into light railway systems, generally in "third-order" cities (Frankfurt, Grenoble, Hannover, Nantes, Stuttgart, and Toulouse); and (4) new express-railway systems (the RER in Paris; the S-Bahn systems in Frankfurt, Munich, and Stuttgart; Thameslink in Glasgow; Merseyrail in Liverpool; and Thameslink in London). These investments have sought to connect city centers with major urban extensions and with freestanding settlements within the extended commuter area.

These new systems have been supported—indeed, in some cases have been necessitated—by the growth of major European cities to levels at which major new systems became viable. However, with the exception of the express systems and some limited light railway extensions along old rights of way, they have generally been restricted to the historic, densely built urban envelope. There is a good reason for this: the characteristics of the journey, including average speed and seating capacity, make them largely unsuitable for longer-distance operations.

Curbing Car Use

Simultaneously, in the past two decades European cities have developed three striking innovations to curb the use of private cars. First, central business cores have been "pedestrianized" and surface public transportation either given preferential access or placed underground,

to make car access relatively less attractive and public transportation more attractive. In the most spectacular cases, such as Munich, this innovation has made public transportation the preferred mode of access. A variant, developed in Italian cities (such as Florence and Milan) in the late 1980s, has entailed barring access by car to the central business district during daytime business hours.

Another innovation is the use of traffic-calming techniques to reduce speed and flow, generally areawide in networks of residential streets, but in a few cases—such as the Lister Meile in Hannover, a main radial street—at main traffic arteries. And that innovation leads to one important general conclusion: in Europe no country has any kind of monopoly on good practice for long.

The third major innovation of the 1990s is urban road pricing in major Norwegian cities—Bergen, Oslo, and Trondheim—in which a fee is charged for central access. The official justification of the Oslo scheme is not to restrain traffic but to finance major road investments (in particular, a very expensive city-center tunnel). But the next major Scandinavian scheme to come into operation, in Stockholm in 1996, will have a dual objective: not only to finance expensive new ring roads but also to restrain traffic in the entire inner city (Sweden 1993; and Tegner 1994).

Each of these three schemes has been specifically urban, even inner-urban; conceptually, they assume that the problems of cities can be dealt with in isolation from the wider urban context. But cities and countries that have invested ambitiously in high-quality public transportation have also tended to be those that experienced the most rapid long-term increases in car ownership; perhaps one is a reaction to the other. It is perhaps significant that in most European countries during the 1980s, public transportation shared in the general upward trend of passenger-kilometers traveled; Britain was an exception (Mackett 1993). These countries—such as France and Germany—have invested more in transportation in general; there is nothing particularly virtuous about this, and it would be possible to argue that one country invests too little, or that its neighbors invest too much. The question could be resolved only with an elaborate international cost-benefit analysis, which has not been made.

But we should return to the basic problem, stated earlier. Ever since Peter Daniels's pioneering work (Daniels and Warnes 1980), we have known that when people and their activities decentralize it has two contradictory effects: commuter journeys are shortened, but a huge transfer occurs from public transportation to the private car. Furthermore, Hall, Sands, and Streeter (1993) recently showed that typical metropolitan areas in Europe and the United States—Frankfurt, Paris, and San Francisco—have decentralized homes and jobs, leading to a huge growth in suburb-to-suburb commuting and a corresponding shift from public transportation to car. The dominance of the car is particularly evident for local trips to work within the outer suburbs, which absolutely dominate the trip matrix in these zones—in both the European case and the U.S. case. Thus, although both Frankfurt and Paris have invested massively in new public transportation, they have failed to adapt transit to the pure suburb-to-suburb commute. Reducing dependence on cars in these outer suburbs, then, can be regarded as the key element of a future metropolitan transportation strategy.

All this discussion does not deny the Newman and Kenworthy thesis: overall, such cities perform better than their New World counterparts. But doubt about where they are going seems to exist. Indeed, by striving diligently to keep their major city centers strong in every way—as centers for offices, for shopping, and for entertainment—Europeans may be exacerbating the problem. Gordon and Richardson may be correct when they say that we should encourage the outward movement of employment closer to where people actually live—a process the British have been encouraging in the London region ever since the original Mark One new towns. And urban road pricing could actually be an agent for this process, strengthening market trends. We must remain agnostic about this point until we have more rigorous research results for the entire citywide region.

Recent Policy Initiatives

It thus appears that everywhere—in Europe as in the United States—cities may actually be moving away from, rather than toward, sustainable patterns. It is not clear how, or even whether, this

trend can be reversed. But there are one or two guideposts. They lie in the combination of transportation and land-use policies, which recognizes that the two form a seamless policy web.

Linking Suburbs through Transportation

Planners in Paris have developed a strategy to resolve the suburb-to-suburb commute problem created by suburbanization. ORBITALE (Organisation Régionale dans le Bassin Intérieur des Transports Annulaires Libérés d'Encombres) is a new 175-kilometer transit system that will serve the higher-density inner suburbs, running primarily on grade-separated rights-of-way, but with some street stretches, and with 50 transfer points to the existing radial transit system. The estimated cost will be 40 billion francs. Three sections have been completed; a fourth will open in 1996 (Direction Régionale 1990).

For the outer suburbs—and particularly for the five new towns—at an average distance of about 25 kilometers from the center of Paris, a longer-term plan has been proposed: LUTECE (Liaisons à Utilisation Tangentielle en Couronne Extérieure), an extension of the RER (Regional Express Rail) system to link the new towns and strategic sectors with each other (Institut d'Aménagement 1990). ORBITALE and LUTECE are integrated into the 1991 regional plan for the Ile-de-France, but they are not consciously designed as part of an integrated land-use/transportation strategy; that would be impossible, given that land uses are largely in place, and that the major emphasis in the next 20 years is on consolidation.

Locating Residences, Workplaces, and Amenities in Proximity

The Government of the Netherlands has taken the lead worldwide in integrating land use and transportation planning as part of environmental strategy at the national level. As described in the *Fourth Report (EXTRA) on Physical Planning in the Netherlands* (Netherlands 1991), the threefold policy seeks to relieve growth pressures, improve the quality of urban life, and reduce car traffic in cities and urban regions by concentrating residences, work areas, and amenities so that trip distances can be reached largely by bicycle and public transportation. Thus, housing sites are

being sought first in the inner cities, next on the urban periphery, and only thereafter at more outlying locations. But wherever the sites are found, the availability of public transportation will be a key factor. Planning for the location of businesses and amenities is predicated on the relationship between user requirements and the features of the site. Activities involving a large number of workers or visitors per hectare, such as public offices, theaters, and museums, receive an "A-profile" rating—that is, they should be located close to the city center. "B-profile" locations are those that are accessible to stations and motorways, making them suitable for access by both car and public transport—for example, hospitals, research and development, and white-collar businesses. "C-profile" locations, close to motorways, are suitable only for activities that have relatively few workers and visitors per hectare, and that must be accessible by car or truck. A related strategy calls for integrating transport and land-use planning in order to enhance the role of public transportation, including restrictions on long-term parking facilities.

The Dutch approach is evoking much interest and even imitation elsewhere in Europe (see, for example, London Planning Advisory Committee 1993). But there is a problem: trends throughout Europe suggest that people and activities are continuing to disperse into increasingly car-dependent forms of living and working. Although it can be argued that the lengths of commuter journeys are stabilizing and in some cases are even decreasing because jobs are moving out to the suburbs where people are, private cars are clearly substituting for energy-efficient public transportation, which is anti-sustainable. The solution is to develop a public transportation system that can cope with dispersed suburban journeys. The answer might be something similar to the French ORBITALE and LUTECE, but it might also be a system in which fleets of deregulated minibuses run in all directions, using specially designated motorway lanes wherever congestion threatens to delay them. And, in terms of land use, it might make equal or more sense to relieve pressure on the Netherlands' Randstad by promoting moderate-size, moderate-density cities elsewhere in the country—a policy that was promulgated in the 1960s but was later abandoned.

It is interesting to compare these European approaches with the U.S. approach, which depends far less on land-use solutions.¹ Instead, U.S. policy initiatives have taken three main forms: as in Europe, investment in light railway systems in a wide range of medium-size cities (Buffalo, Los Angeles, Pittsburgh, Portland [Oregon], Sacramento, San Diego, and San Jose); systems management approaches in which priority is given to car pooling both on the highway and in parking lots (high-occupancy vehicle lanes, ride-sharing information systems, and priority parking); and, most radically, attempts to phase out the internal combustion engine in favor of more sustainable propulsion systems (as exemplified by the South Coast Air Quality Management district strategy in Los Angeles). In essence, the second two policy initiatives accept the existence of the dispersed automobile-oriented city, but seek to change driving behavior. In some parts of California these policies may well be combined with transit investment and with transit-oriented land-use policies to create an amalgam of the European and U.S. policy strategies (Cervero 1989, 1991).

Implications for the Developing World

Almost inevitably, much of the work on sustainable urban development has concentrated on cities in developing countries. At issue is the extent to which the policies and strategies of the industrialized world can be transferred to the developing world, particularly to large middle-income cities that have grown and are projected to grow so rapidly. These cities exhibit some common features but also some differences.

First, their rates of car ownership tend to be moderate, resembling the rates found in cities in the industrialized world of the 1960s. However, car ownership in the developing world varies according to such factors as national circumstances and policies—at one extreme are the oil-rich Latin American cities such as Caracas and Mexico City; at the other are the oil-poor countries such as Hong Kong and the Republic of Korea, which have discouraged car ownership and use. Oil-rich cities, in particular, may have higher rates of car ownership than would be suggested by per capita income levels.

Second, given their size and congestion, almost all of these cities have invested consider-

ably in rapid transit schemes in the past two decades; some now have extensive and efficient systems serving considerable proportions of radial (suburb-to-city) trips.

Third, most have experienced such rapid growth that they have decentralized people, and to some extent households, into wide suburban belts. Development in these belts has taken diverse forms—sometimes planned satellites (as in Hong Kong and Korea), and sometimes unplanned spontaneous settlements (as in much of Latin America). The former are invariably served by planned transit extensions, and the latter only rarely. However, in both cases, suburb-to-suburb journeys tend to be greater and to be served poorly by public transportation.

In important respects, large middle-income cities in the developing world resemble their industrialized counterparts. Furthermore, some of them may present unusual problems for sustainability, given the large number of relatively low-income car owners who operate old, poorly maintained vehicles that lack effective pollution controls. The research and policy issues associated with the two groups of cities are thus more similar than might at first appear.

Research on Sustainability

Planning researchers have only just begun to think about these questions within the framework of urban sustainability. Much of the work is still quite theoretical. Owens (1984, 1986, 1990, 1992a, and 1992b) concludes that the “ideal” energy-efficient urban form would combine clusters of relatively small settlements at the regional scale with compact settlements—probably linear or rectangular in form—at the subregional scale, as well as medium-high residential density with well-dispersed employment at the local scale. Owens stresses that energy efficiency does not imply high density, and that a pedestrian-scale cluster of 20,000 to 30,000 people would provide a sufficient threshold for many activities without creating high density. Breheny (1992) agrees. But the work thus far suffers from methodological or empirical shortcomings. For instance, the research by Owens is largely theoretical and suggestive, and requires a stronger empirical basis. The work by Newman and Kenworthy, although representing a major contribution, has been criticized both on

methodological grounds (Schipper and Meyers 1992) and for its ideological bias (Gordon, Richardson, and Jun 1991). Furthermore, some of the definitive empirical work is now 20 or more years old (Stone 1973). And although recent research on energy use in transport has established some robust empirical relationships (see Banister 1992; and Banister and Button 1993), little is known about the key parameters that characterize a transport- and energy-efficient city.

This latter shortcoming is particularly true with the largest metropolitan areas, which call for such strategic decisions as whether development should be concentrated in higher-density areas within the existing urban envelope, or whether decentralization to new or satellite towns far from the existing agglomeration should be encouraged. Which of these two strategies is better for energy consumption and pollution control is not at all clear. On the one hand, concentrating development in higher-density, more compact cities would reduce the average length of trips and allow more of them to be made with public transportation. On the other, the desirability of this strategy would depend on where jobs are located. For instance, moving jobs out to the perimeter of the city but keeping homes crowded within might create the worst of both worlds: poor living conditions and long commuter journeys by car on congested roads, creating greater stress on the environment.

What is critical here is whether people will move as envisioned by the planners, and whether they will change the location of their jobs. As suggested by the experience of the British new towns after World War II, satellite communities that locate housing and employment near each other at a sufficient distance from the parent metropolis can be highly self-contained and highly sustainable in travel terms. True, that was 40 years ago; but it may be impossible to achieve a similar outcome today given the existence of two-earner households, greater specialization in the employment market, and a wider choice of retail and other services, which diffuse locational choices and options.

Research might start by reexamining the work of Newman and Kenworthy, since only by addressing the criticisms directly can we hope to settle the debate about urban configuration and energy use. Assessing the complexity of city structure against energy consumption would require supplementing such physical factors as

density with an array of demographic, economic, social, and spatial factors. This empirical research would establish the key parameters for determining an energy-efficient urban configuration form in terms of transportation characteristics. At a later stage of research, an assessment of the energy consumption of other types of land uses—housing, commercial, and industrial—would yield a total picture of energy use in urban areas. As usual, both idealized models of urban structure and function and empirical validation would be necessary and desirable. Although unanimous consensus might not be feasible, it should be possible to generate research findings that would provide a robust basis for policymaking at different spatial scales and in different urban-geographical contexts.

Note

1. However, increasing interest has been expressed in such ideas as the pedestrian pocket, suggested by the Californian architect Peter Calthorpe (Kelbaugh and others 1989) and adopted extensively in the city of Sacramento and elsewhere, which seeks to maximize pedestrian access.

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Discussant Remarks

Jorge Wilhelm

In his valuable comments on sustainable development Peter Hall responded to general questions about reshaping the cities of tomorrow, proposing that we focus on the land use and transportation interface. And based on several well-known authors from Europe and the United States, he points out several conclusions. Four are key: that urban areas have both grown and decentralized since the 1960s, increasing energy consumption; that wealthier industrialized countries have made huge investments in expanding and improving public transportation, yet have also shown an increase in private-car use; that, since the well-known pedestrianization of postwar Rotterdam, several downtowns in Europe and the United States have been pedestrianized and upgraded, yet residences have largely moved away from the inner city to suburban satellite towns or redeveloped sectors of the city; and that, although the Netherlands' EXTRA report provides an excellent example of integrated land use and transport—one that has frequently been imitated—car-dependent working and living is one of its results.

We do not always seem to be asking the correct questions, and are thus running in circles, giving new answers to old, inadequate questions. In periods of structural transition, the main task is to determine the relevant issues to be addressed. Doing so is key to this conference.

We are looking at the human face of cities, and we assume correctly that development will create higher-quality, more human cities. We all agree on that, as long as we define development as the articulation and balance among economic

growth, social justice, and a better quality of life—which also means a better environment. Should any of these components fail, we would have to use another word—either “economic growth” or “egalitarianism”—as a substitute for development.

Today, after *Our Common Future* (known as the Brundtland Report), we seek development that is continuous—not just for our own generation—but also sustainable. And since the Rio conference, we agree that protecting natural resources is one way to make development sustainable. A clear example: If in agricultural forestry we produce economic assets greedily and without environmental concern, we might leave a desert to the next generation.

But we are now dealing with the urban scene. Are we really guaranteeing continuous development by protecting only the physical resources of the urban environment? The answer probably is no. This protection is a necessary but insufficient condition. Human resources should be protected as well—a decisive condition in a period of immense structural turmoil, when unemployment means not just the loss of a job but, in Europe, the difficulty of getting a job for the first time.

Five Key Substantive Questions

The first substantive question to be addressed should be: *What is sustainable development when applied to human settlements?* On this question, Mahbub ul Haq's words this morning were music to my ears.

Another substantive question is: *How does an economy grow, and how does this both affect the structure of urban areas and shape our daily lives?* This question alone would take days to debate, but such changes as new systems of production, the emergence of the new transnational corporations, modified processes of decisionmaking, and the advent of robotization, computers, and communications technology—all have had an impact on land use, decentralization, governance, product transportation, and people in urban areas. They have all changed daily routines, aspirations, the environment, and so forth.

Still another question should be addressed, which approaches the issues raised by Peter Hall: *What is quality of life, and how is a good environment related to it?* We need not speculate too much that in the absence of erosion, floods, and pollution, all citizens would feel safe and contented. But as a sociologist wrote, nothing is more practical than a good theory. And we are still absent any defining characteristics of what, on the one hand, are the basic necessities of a population and what, on the other, are quality-of-life indicators. We do not have sufficient empirical knowledge of how people, real people, value freedom, privacy, self-respect, recognition, space orientation, cleanliness, silence, enabling capacity, information, knowledge, social context, family relationships, and so forth. To a great extent these topics are relevant to individual decisionmaking and thus to how the city is shaped. Understanding them would enable planners to propose more effective strategies for urban policies.

The fourth question is banal but basic: *Who builds the city?* It would be convenient to say that planners do, or that government does. But the answer is of course more complex. Businesses, landowners, private transportation companies, corporate lobbyists, social movements, transient interlopers—all are stakeholders and active participants in how our cities are shaped. Although local governments and their planners have substantial responsibility, we should not ignore the different strategies proposed and pursued by all these dynamic partners.

The final question pertains to air and noise pollution: *Is it correct to continue limiting the city-environment debate to the desirability of cars versus public transportation if, as we have seen, the choice between the two is not so simple?*

Here, I quote two writers. Pirandello called the car “the devil’s invention.” Oscar Wilde once wrote: “I can resist anything but temptation.” And the car is indeed a temptation. It is difficult to believe that, even with the existence of flawless public transportation, the car will cease to exist. An automobile is everyone’s dream; it represents individual *freedom* of movement, it is the ultimate *status* symbol, and it is a more *comfortable* way to travel.

In all the examples cited by Peter Hall, increases in income levels tend to generate a greater number of private cars, despite any expansion and improvement in public transportation. But after acknowledging the cultural links that prompt our attachment to the automobile, we can promote several changes in its consumption beyond investing in public transportation.

For example, because private cars remain parked for a large majority of time, perhaps the new paradigm should be to increase car *use*, rather than the number of cars. Let us treat them as the airlines treat planes—airplanes are never kept parked without flying. The best use of cars in cities is taxi service; the next best option would be to devise a system of public car-sharing. This paradigm would not make the automotive industry happy, but the industry should start to diversify its activities, just as the cigarette and tobacco industry is already doing, rather than lobbying for maintaining a status quo that tends to freeze urban traffic.

Another important strategy for curbing air pollution is to promote better technology and alternative fuels. We should give researchers incentives to perfect hydrogen and solar energy for vehicles, and, in the meantime, to expand their work on using natural gas, biomass, ethanol, and electrical networks to operate vehicles.

Some Developing Countries Provide Sound Paradigms

So many authors are still reluctant to accept the possibility that some solutions might come from the South, which in a few years will contain 19 of the 23 largest megacities in the world. In Latin America, a highly urbanized continent, one can easily analyze who builds the city and why and how space is urbanized without planning. Moreover, the air pollution abatement strategies of

Brazil since 1975 represent an interesting case study. In Southeast Asia we find interesting cases of land adjustment; in China new urban patterns can be foreseen. This does not mean that São Paulo has a more human face than New York, or that Cairo is more beautiful than Paris. It simply means that if we want to learn—and we have an urgent need to do so—then we must be open to all possibilities and experiences. If we want to reshape our cities, we must find the right questions; we must also be patient yet persistent. In São Paulo, a metropolis of 16 million people, we had to rethink planning concepts when we prepared the new Metropolitan Plan (1993-2010). We amplified upon the concept of sustainability of development by introducing strong programs for public health and education—focusing particularly on the role of education in the current transition of the global economy. We also reconsidered the role of São Paulo, in general, accounting for its global linkages, and we reassessed water necessities, opening the debate on water recycling. Rather than proposing detailed zoning for the activities of São Paulo's projected 20 million inhabitants in the year 2010, we stressed governance issues that would for-

mally decentralize power and facilitate the participation of all dynamic actors: action through partnerships. And in the area of air pollution, about 40 percent of Brazilian cars already run on sugarcane alcohol, and gasoline has always contained up to 20 percent alcohol. These fuels have reduced the emission of a dangerous pollutant—carbon monoxide. But we have also proposed an ongoing national program that would call for buses to use natural gas and for trucks to use alternative fuels.

All these questions and issues are what lead us on our road to the Istanbul conference. We all hope that the preparatory seminars to be held next year on "Financing the City" and on "Land and Shelter Tenure"; that the several colloquia to be held on the role of cities in development, women in cities, best environmental practices, and future employment structures; and that the several workshops to be held on new urban patterns, transportation, communications, water, energy, waste, alleviation of poverty, and other topics, will enable us to form a deeper understanding of and keener insights into both the risks and the opportunities we face on the urban scene.

Discussant Remarks

Ryokichi Hirono

Peter Hall has just characterized cities as being sustainable when they conserve energy and minimize polluting emissions, when they discourage unlimited accessibility by mechanized transportation and promote foot and bicycle traffic, when they encourage the use of public transportation and discourage unpooled driving, and when they develop forms of propulsion that are less-polluting and more energy efficient than the internal combustion engine.

An OECD project group on the "Ecological City" provides an even more ambitious definition of ecologically sustainable cities: cities are sustainable when they reduce air and water pollution, as well as emissions; when they limit energy and water consumption, and encourage the use of biomass fuels and the conservation of resources; when they encourage businesses to adopt ecologically friendly technology, maintain an ecologically sustainable workplace, and develop and market ecologically friendly products; and when they promote the use of urban transportation to minimize additional, unnecessary transport demands, thus reducing energy consumption and the production of pollutants and damaging gases. The group has also called for new regulations and pricing strategies to encourage compliance with ecologically sustainable norms, and for substantial public investment in new techniques or other environmentally acceptable techniques for such infrastructure services as water and sewage treatment, and transportation.

Identifying Solutions to Environmental Degradation and Urban Poverty: The Asian Experience

I do not object to either set of definitions. As Dr. Hall and the OECD project emphasize, the most important avenue for progress on these issues is not to seek a more detailed account of what constitutes sustainable cities nor the extent and type of ecological problems facing the world's cities; rather, it is to identify technical, feasible, and cost-effective solutions. And as Secretary Cisneros emphasized in his inaugural address, implementing these solutions will certainly require political commitment.

However, I am concerned that both Dr. Hall and the OECD project group assume that economic development in our cities, whether in industrial or developing countries, will continue forever. Neither seems to seriously consider the possibility that the world's cities might decline, as has been observed throughout the centuries and as suggested by Dr. Lester Brown in his cautious predictions.

What I am suggesting is that it is necessary and appropriate to ask a critical, unanswered question: How can we best promote sustainable economic growth in our cities while reducing urban poverty and environmental degradation? Certainly, the mayors of Bangkok, Barcelona, Jakarta, London, New York, and Tokyo must be concerned with this question, as they face persistent poverty, growing unemployment, and ever-increasing budget deficits. Cities cannot depend

forever on floating municipal bonds and on loan guarantees by central and federal governments. A new urban development policy must seek to keep economic growth both sustainable and dynamic by restructuring the economic and industrial base of our cities, providing judicious investment incentives for new technology that gives our cities a competitive edge in national and international markets, and, above all, providing attractive business environments that promote private investment in more efficient infrastructure, social amenities, and environmental controls.

The Euro-American-Australian experience that Dr. Hall discussed resembles in many ways the Asian experience, including our experience in Japan. For instance, we suffer similar types of environmental degradation in our urban communities—from air, water, and soil pollution to urban and industrial solid waste—and our water and energy consumption is excessive; in addition, we are plagued by traffic congestion. All of these problems reflect the transmission of technologies, products, and lifestyles from the West to the East. But some differences have been observed between the two types of experience, as well as within the Asian experience itself, reflecting essential differences in resource endowments, stages of economic development, and, in particular, the density of the population and activities in Asian cities.

Structure of Cities Both Exacerbates and Restrains Environmental Deterioration

Seven Asian cities have more than 10 million people. Urban populations in Asia are concentrated largely in single metropolitan cities, rather than dispersed among several cities. Industrial, health, educational, cultural, and political activities are also concentrated in fewer cities and suburbs. The rapid pace of industrialization and urban growth in the past three decades has created acute air, water, and soil pollution, particularly in East Asia.

Environmental degradation in Asian cities had been restrained in part by the social and physical features of the cities. In particular, Asian cities are conglomerates of self-contained clusters, neighborhoods, and districts that contain

the industrial and service jobs, shops, shelters, and educational and cultural facilities required for the daily work and living activities of their residents. These urban characteristics, however, are rapidly changing due to higher concentration of financial and business offices in the center of Asian cities. Nonetheless, restraining what would be much more severe environmental damage is the extent to which the population relies on public transportation—for instance, 90 percent of commuters in Tokyo use railways and buses, and 9 percent ride bicycles or travel by foot; only 1 percent use automobiles. Urban policies, such as the area-controlled traffic system in Bangkok, the area-license system in Singapore, and the area-restriction system in Tokyo, have also done their share to hold down total environmental damage.

Asian Countries Adopt More Flexible Regulatory Standards

European and Australian governments resort to legislation and regulations for, say, controlling carbon dioxide and nitrogen oxide emissions, and they apply them vigorously and fairly to all, with firm penalties to those who violate the standards. In Asia governments tend to apply administrative *guidelines* for reducing these emissions. In applying these administrative guidelines, governments usually make exceptions, whether for technical, financial, or political reasons—for example, exceptions that are made for small-scale enterprises. The governments apply these exceptions even when the guidelines are enacted as legislation. The application of these guidelines on a case-by-case basis provides a measure of flexibility, while enforcement seeks to maintain consistency and fairness. The prevalence of the discretionary power and authority of governments in most Asian countries, including Japan, stems primarily from the mutuality of interests between the government and the private sector, which often enter into partnerships.

By introducing this measure of flexibility, Asian governments tend to make administrative guidelines and guidance more realistic and pragmatic about the changing and diverse realities of technological development; and, in

doing so, they enhance competitive fairness among different producers, with different technical and financial capabilities to develop and adopt, say, clean air technologies and products. As such, governments promote greater compliance with administrative guidelines, with less resistance.

Countries in Asia also avoid expensive and time-consuming lawsuits, which tend to engender mistrust between the government and the private sector, and destroy the mutuality of purpose. (Incidentally, in my own country, it is often said that, all else being equal, the number of lawyers in a country is inversely related to its economic performance.) Countries in Asia also tend to give the private sector far greater financial, tax, and administrative incentives to achieve a given objective. As such, Asian governments work toward their objectives more rapidly by reinforcing the sense of partnership and a commonality of interests between the government and the private sector.

What We Should Learn from the Asian Experience

All this is not to say that Asians accept the failings of their governments, or that they always support government actions—far from it. As in Euro-American-Australian countries, Asian countries do recognize that government action is a compromise stemming from the process of negotiation among parties with conflicting interests. Nothing is sacrosanct about government action.

These observations seem to indicate that answers to environmental degradation in urban communities are not stand-alone solutions, but have many parts. What is critical is to develop policy measures and strategies that are as cost-effective and feasible as possible within the context of environmentally sustainable cities—but perhaps more important, to develop them in the context of the social fabric and values of respective communities in Africa, Asia, Europe, Latin America, and North America.

Special Address: Great City, Terrible Place

Charles Correa

This evening I would like us to think about the theme of our conference, the “human face of cities.” This is really a marvelous phrase—it evokes a startlingly different aspect of cities. For the last day and a half we have learned a lot through listening to some brilliant analyses of the physical and economic factors that generate a city. But this evening we will examine something a little bit different. We will try to look at some of the myriad layers of myth and urbanity that make cities livable—in short, the factors that give a human face to the cities in which we live.

Let us begin with our notions of what is usually termed “The City Beautiful”—which is the goal we are all striving to achieve. We all know that a city can be beautiful as a physical habitat—it can have broad avenues, open spaces, lots of beautiful trees, uncrowded roads—yet fail to provide that particular, ineffable quality of urbanity that we think of when we talk about a “city.”

We all know examples of this paradox. Bombay, of course, illustrates the very opposite. Every day it gets worse and worse as a physical environment, yet better and better as a “city.” That is, every day it offers more in the way of skills, activities, opportunity—on every level: to squatter, to college student, to entrepreneur, to artist. The vitality of the theater (and the ever-growing audiences), the range and talent of newspapers and magazines—there are a hundred indications emphasizing that the impact (implosion!) of energy and people is really a two-edged sword that is destroying Bombay as an environment, while intensifying its quality as city.

Hence the title of my talk: “Great City, Terrible Place.” As architects, we all strive to create The City Beautiful. Yet, in my own life, I find (like most of my fellow architects) that I prefer to live in what one might call The City Urbane. Sometimes, of course, if we are very lucky, the two cities coincide in one place: San Francisco, Paris, and a few other examples. However, most often, we have to choose.

And unless we understand the nature of this choice, we will never understand, for example, a city like Calcutta. For to us as tourists, as visitors, what do we see? Only the physical plant. But to the Bengali, they see the mythic city. To them it is irreplaceable: the quintessential City Urbane. I would guess that it is very close to what the New Yorker feels about Manhattan. In photo 1 New York is a decayed, decadent, depraved city, really on its last legs. But in photo 2 it is transformed by one of the great mythic images of our century: the Manhattan skyline.

What is the difference between these two images? The power of the culture and the myth. The marvelous glamorous names of Manhattan: 5th Avenue, 42nd Street, Central Park. What are they really? Just numbers, planners’ shorthand on a map. But in our minds they are the very stuff of which dreams are made. Take away those myths, and all you have left is a boring grid of streets. All the magic, the urbanity, will have vanished.

Now one of the best explanations I have heard about this crucial aspect of cities was given by the Greek planner, Doxiades, the founder of Ekistics. I remember a slide-show he gave many

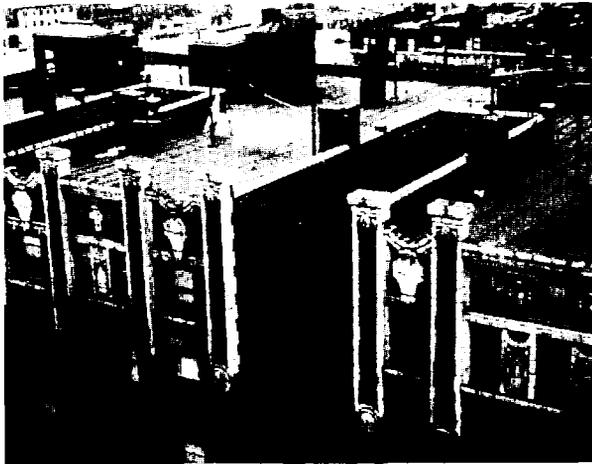


Photo 1. New York: the urban reality

years ago—huge 60 mm slides throwing clear, monumental images on the screen. The first slide was a diagram of a village: 250 red dots and one blue one—it represents a person, a “blue” person. Einstein? The village idiot? Anyway, he is different from the rest.

The next slide was a town of 1,000 people. Now there are four or five blue dots floating around.

Next a town of 25,000 people. Ah! A historic moment: two blue people are meeting for the first time.

Now a town of 100,000—and we have several colonies where blue people reside—and furthermore, some of the red dots on the fringes of these colonies are turning . . . purple!

This is what cities are about. Blue people getting together. Communicating. Reinforcing one another. Challenging (and changing) the red ones. Hence the Quit India movement announced by Mahatma Gandhi from a *maidan* (public square) in Bombay. And Calcutta in its heyday in the 1920s, a powerhouse of ideas and reforms—political, religious, artistic. Hence also the paradox: Bombay decaying as a physical plant, yet improving as a city, as a place where blue people meet, where things happen, where ideas incubate.

And also, of course, as a place where urban skills grow. For the developing world needs these skills. Over the past two decades in the Gulf, a surprisingly large proportion of development has been in the hands of developing country technocrats: engineers, doctors, nurses, construction firms, hoteliers. They are winning contracts in the face of worldwide competition, and from clients



Photo 2. New York: the urban myth

who have a global choice. It is truly an extraordinary achievement—and primarily for our towns and cities that produce these skills.

I love this slide. It is a drawing of European migrants on the deck of a ship pulling into New York, getting their first glimpse of the Statue of Liberty. They are really the boat people of their time, coming across to the Promised Land, to be treated just as contemptuously as the boat people of today. Yet they come with such hope—coming really as blue people—to meet, to find each other. They didn’t know they were blue until they all got together and changed America and, as you all know, made it into a much more rich and human and pluralistic society.

It was a process perceived with great insight by the Jesuit biologist, Teilhard de Chardin, in his book *The Phenomenon of Man*. To him, this increasing complexity (which we also experience as we move from village to town to city) is like the successive folding of a handkerchief on itself, each fold doubling the layers of material—the density of our experience. As a biologist, he felt that it was analogous to the blind drive that made life develop all the way from single cells to more and more complex forms—a movement as compulsive, and as irreversible.

An extension of Chardin’s brilliant insight can, perhaps, help explain not only why the migrant goes from village to town to city, but more importantly, why, having experienced the physical degradation of his new life, he still does not return to his village. He has no choice. We only go back to Walden Pond when we can take our complexity with us. Only the madman or the

mystic goes out into the desert. And the mystic is really taking his God, his complexity, with him. That leaves only the madman.

As we increase in complexity, we most often are also increasing in numbers, and these can soon become quite astronomical—numbers really beyond human comprehension—which, of course, pose a danger. Because we can get high on this arithmetic, as did some of the British viceroys, when they thought of all the natives in need of civilization, and the Victorian missionaries, as they contemplated the billions of African and Asian souls waiting to be saved.

To avoid this very real danger, it is essential that we *disaggregate* the numbers. Only then will we begin to see them clearly. If we consider, for example, the remarkable opus of Modern Architecture in this century, we find that the most glaring failure has been in the field of mass housing—in contrast to private residences, museums, and schools, where the record has been quite the opposite. Without doubt, the architects earnestly and sincerely believed that they were going to create a more humane and livable habitat. In actual fact, in most cases what they produced was faceless, ugly, and dull.

Was this for lack of design talent? I think not. Rather, it was an inevitable outcome of our methodology, of the way we picked up the problem. For due to the enormous success of Henry Ford's assembly line and other such seemingly relevant examples, architects were seduced by the analogue of the mass-produced car—including Le Corbusier, with his Citrohan housing. The principle involved was apparently to first create the ideal house, and then clone it. Unfortunately, this does not work.

Here in photo 3 we have Le Corbusier's visionary plan for Paris. I admire Le Corbusier's architecture very much (he is, for me, the greatest architect of this century), but it is difficult to understand his city planning. This drawing of these giant skyscrapers, all identical, is not for one of the suburbs of Paris—it is for the Ile de la Cité, at the heart of the city. Le Corbusier wanted to knock down all the buildings that presently exist there and put up these cloned monsters. Why? Because he did not disaggregate the numbers. He did not see the people themselves very clearly; he did not see their differences. (How ironic that the hand you see hovering over the

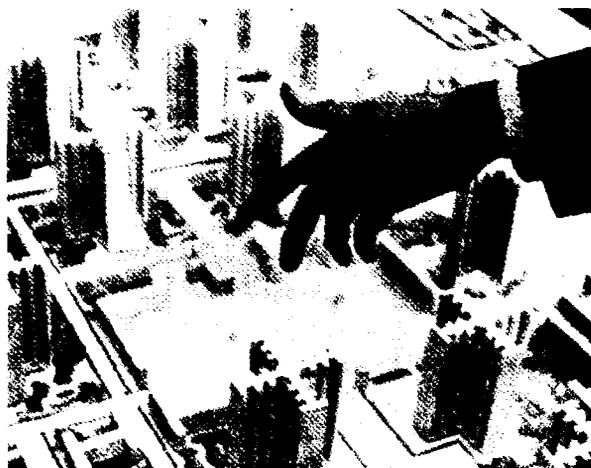


Photo 3. Le Corbusier's Paris

model is the hand of Le Corbusier himself, in a gesture that, one supposes, is meant to recall God giving life to Adam in Michelangelo's painting in the Sistine Chapel.)

So the failure does not stem from any lack of design skills, but from the mind-set with which we pick up the problem. For Henry Ford's paradigm of centralized mass production does not take into account many of the things that are *essential* to our habitat: variety, identity, people's participation. In short: pluralism. Louis Mumford intuitively was right when he criticized modern architects for trying to identify an *ideal* set of environmental conditions—such and such degree of temperature, so much percentage of humidity. Such a search, Mumford pointed out, was doomed to failure, since ideal conditions were, by definition, varying conditions. Given human nature, it would be impossible to establish a fixed static condition as the perfect one. In other words, our way of perceiving our task was wrong—and was doomed to failure.

The first step (into the trap) is to aggregate demand. This means not only current demand, but also backlog, and often future demand as well. The numbers arrived at are, of course, colossal—and start the adrenaline flowing!

The next pitfall is to set up large, centralized agencies to deal with this demand. Now the trap has closed. It does not matter whether the centralized agency is a governmental one, or is organized by private developers. The result is the same—a philosophy best summarized by that old phrase, "count their legs and divide by four."

What you see here in Bombay (photo 4) is a typology of high-rise towers that the poor cannot even begin to afford. So, crowded around the base of the skyscrapers we get these squatter settlements—thousands of huts (or *jhuggies*). It is a very brutal confrontation between two vastly different income groups and lifestyles.

Now let us look at life in one of these *jhuggies*, which are really just improvised shacks. They are built from waste materials, all huddled together with very little space between them. But look at the incredible usefulness of these minuscule pieces of open-to-sky space. Here is a woman cooking on a platform, under a lean-to roof. In the city of Bombay about 40 percent of the people live below the poverty line, so there is a lot we can learn from these images.

Here is a typical house (photo 5). The whole family is housed in just this one room. But outside there is an open courtyard, which is used as an additional room by the family for cooking, for sleeping out at night, for children to play in, to entertain friends. Here is the doorstep, where you meet your neighbor. Here is the water tap, where the women meet. And finally, here is a large water tank in front of the temple.

When we look at this whole sequence of open-to-sky space, we realize that the room (the



Photo 4. Bombay: *Jhuggies* and skyscrapers



Photo 5. Rajasthani village

enclosed box) is only *one* of the elements needed in the creation of habitat. To keep our cities human, we must understand this crucial principle. Housing is not just a question of providing that room, that box, but *the whole hierarchy* of spaces we have just experienced. But if you define housing incorrectly as a box, you inevitably ask the wrong question: “How many boxes can we pile up, one over the other?”

Here is another example of such a system of spaces, in a traditional town in Rajasthan (photo 6). Notice how this densely packed neighborhood—these four- and five-story houses are built around courtyards that connect to the *otlas* (raised platforms) overlooking the streets, so that the whole forms a continuum of usable spaces. Compare that to these contemporary high-rise buildings, which are nothing but boxes, piled one over the other, surrounded by a parking lot. They



Photo 6. Haveli in Jaisalmer

do not make any sense—even for those societies rich enough to afford them.

This photo of Brasilia is particularly poignant. Rio is such a beautiful, exuberant city, full of buildings with open-to-sky balconies, but here in Brasilia, these apartments are just glass-fronted flat slabs, sealed off from the street, from life.

Here is an aerial view of some housing in St. Louis (photo 7). These slab-style apartment blocks are about 80 feet high and about 30 feet wide. They are placed about 80 feet apart, so they really have just about enough space to fall flat—probably where they belong. And then we get wonderful housing, just two stories high—like this shot of houses in the center of Florence (photo 8). The overall densities in these two slides are not so different, but the lifestyles are poles apart.

This question of overall densities is of crucial importance, especially since so many of you in this room are mayors and city managers who understand that the decisions you make can depend on the scale of the context you perceive. This is particularly true of urban densities. If you are concerned only with a particular site (as are most developers), then it makes sense to pile up as many housing units as possible, in order to distribute the cost of the land. But if you are responsible not only for that particular site, but for the whole neighborhood, then you will need to add on the cost of the land required for all the additional parking spaces, roads, schools, green spaces, and hospitals necessitated by the extra units—so your decision might be quite different.

And if you look at an even bigger picture, like the whole city, the decision might change again.



Photo 7. St. Louis: planned housing community

Housing represents only about one-third of land use in a city, so doubling the number of units on any given site may not make more than a 10 percent increase in overall densities at the city scale—yet this doubling can make a colossal difference in the cost of the housing units and in the lifestyle of the inhabitants. In short, it can profoundly affect your city.

In this matter of densities (and hence, building typologies) other issues are involved as well. Most high-rise projects are carried out by the very few developers who can put together the bundle of loans needed to finance them, and by the engineers and architects who can design them, and by the contractors who can build them. Imagine the benefits if the same amount of money were spent on high-density, low-rise construction! Not only would more families get housing (since the units would cost less), but this money would reach those small contractors, carpenters, and bricklayers in the bazaar sector of the economy—precisely the area where the jobs are needed.

Here is a housing project in Belapur in New Bombay that tries to carry out these principles (photo 9). Within an overall neighborhood density of 500 persons per hectare (including open areas and schools), we tried to cover a wide spectrum of the population, from the squatters to the highest income groups. To underline the importance of social equity, we gave each family about the same amount of ground area (varying from 45 to 70 square meters) on which a wide range of housing is available, from a simple lean-to for the squatters, to a split-level house for the affluent. Every family



Photo 8. Florence: spontaneous housing patterns



Photo 9. Belapur, New Bombay: flexible building design
(photo by Joseph St. Anne)

has open-to-sky space, and there is a continuum of typologies from the poorest to the richest.

The basic planning module is the cluster of seven houses, grouped around a small shared community space of 20 feet by 20 feet. Three of these clusters are then combined to generate a larger community space, and then three of these new modules are combined again, in a hierarchy of spaces, culminating in the central community space. The houses themselves are simple: brick walls with tiled roofs. Each is placed at a different location on its site, so as not to share any structural wall with its neighbor—a pattern that allows families to extend their houses unilaterally, without disturbing the others. This process of growth and change is not only allowed but actually encouraged, so that the families can make these houses their own. If our habitat is to project our identity, then the housing itself must be “malleable.” That is, occupants should be able to make it their own territory—a process essential if our urban environment is to have a human face.

So now we see that the choices we make so easily (at those committee meetings) between low-rise and high-rise, which we think are quite innocent, which we think are value-free, can actually cripple and defranchise a whole lot of people who, ironically enough, we are actually trying to “empower.” How on earth do you empower a poor family living in a 20-story building? I mean, just stop and think about it. How are they supposed to make it their own? Yet how perfectly their own is this house in this Greek town, with the cat jumping through the window.

The inhuman housing being built today is often mistakenly believed to be the outcome of a particular political ideology (for example, Stalinism). But, of course, that is wrong. Politics has nothing to do with it. Such housing is found all over the world: in the Bronx, in Moscow, in Bombay, in Singapore, at the various “Portes” skirting Paris. It is the direct result of a particular mind-set. For once you have the aggregated numbers, you are tempted to centralize your response and hey, presto! you are well on your way into the world of cloning. In other words, having to house 1,000 families, the architect designs a building that can accommodate say, 50 of them—which means that 20 such buildings will have to be built. And that is it—Q.E.D. The bureaucrat in the large centralized agency, for whom the architect works, of course loves this. It makes for a very clean office file! He can, for any given financial year, make very precise estimates of exactly how much cement and brick and steel he will need, and he can present a well-organized budget to his political bosses. No wonder he is happy. It is the exact opposite of the pluralistic, disaggregated, messy, user-participation processes we have been discussing.

Modern architects in the 1920s were the first to walk into the trap—this was in the aftermath of World War I, probably the first time that Europeans became aware of such large numbers. And the effect was mind-blowing. It triggered a burst of feverish activity. The next time this happened was in the years immediately after World War II. Again there was a frenzied response, most of it disastrous! The danger has now moved to the developing world, for it is here that the big numbers are surfacing—colossal aggregates that completely dwarf anything experienced by Europe. Are we going to repeat the same mistakes?

If we are not, then we must change the process. Perhaps an analogy to food might be useful here. For instance, on any given evening, one could accurately predict that there would be a need for 6 million dinners in, say, Paris. That is the first step: we have aggregated the demand. Now the next. Staggered by the size of the figure, we hurriedly calculate that the most efficient way to deal with the problem would be to set up, say, 50 central kitchens, producing 120,000 dinners each. Well, we might be able to get all those dinners prepared that night, but they would be largely inedible.

Fortunately, no such thing is happening to food production in Paris. No one aggregates the demand, and the 6 million dinners get cooked in hundreds of thousands of kitchens and restaurants all across the city. We need an analogous methodology for producing housing. It would take a highly inventive management (perhaps the World Bank?) to design it, but it is imperative that it come into being.

Hasan Fathi, the great Egyptian architect, once said, "Nobody should design more than twelve houses at a time. If you take the greatest surgeon in the world and ask him to operate on 200 people in a day, he'll kill them all!"

I would like to end with these two slides. The one on the left (photo 10) shows a squatter family in Bombay living in a large water pipe (which the municipality has conveniently left around). The man is sharing a cup of tea with a neighbor. It is a social occasion! Even under these terrible, dehumanizing conditions, the human beings are intact. This is the real strength of most developing country cities. Compare this with the kind of mugging and meaningless violence that we find in more affluent cities around the world.

The other is this slide of Bombay's skyline (photo 11). Silhouetted in the foreground are the squatters. Behind them rises a bunch of new skyscrapers. To us the buildings are ugly and banal, but to them they are the ultimate, surreal, mythic image of the city—the city they yearn for, but which they can never attain.

For me this image raises the most fundamental moral issues: What is your right to decide for



Photo 10. Bombay: squatters sharing tea



Photo 11. Bombay: city of contrasts

(photo by Joseph St. Anne)

10,000, for 100,000, for 2 million of these people? And then again: What is the moral advantage in not acting, in merely watching passively the slow degradation of life around you?

This is indeed a cruel dilemma. To act or not to act. On the one hand, the dangers of fascism; on the other, the paralysis of Hamlet. It is a profoundly disturbing issue that will be central to the first half of the twenty-first century. Can we really understand another's aspirations? In the 1960s, when European hippies first started coming to Bombay, a lot of rich Indians complained bitterly about them. At dinner parties they would refer to those "terrible, dirty people, with lice in their hair, lying on the pavements begging." In response, one would say, "It doesn't seem to bother you to see Indians under those conditions. Why do you get so upset when you see a European?" Finally, a friend gave me this answer: "Naturally a rich Indian goes berserk when he drives his Mercedes and sees a hippie. The hippie is sending him a message: 'I'm coming from where you're going—and it's not worth going there.' That upsets him terribly."

But come to think of it, is it not a message that can work the other way around as well? The hippie should realize that the rich Indian in his Mercedes, gross as he may seem, is also sending out a message. In fact, it is the same one: "I'M COMING FROM WHERE YOU'RE GOING."

We are but ships that pass in the night. And with that thought, and with this heart-breaking image of Bombay, I must end. Thank you.

Floor Discussion

Question 1: What is the present state of New Bombay?

Mr. Correa: New Bombay is growing, and has reached a population of almost three-quarters of a million. But it is growing for the wrong reasons. We wanted the government to move there, as you may know, but it has not.

The truth is that the people who can change Bombay don't need to change Bombay. You can live a privileged life at the center of Bombay, with clubs, schools, and hospitals all around you. So there is no real motivation for you to change anything!

Yesterday at dinner we were discussing the lack of good public transport in most Third World cities. Well, the reason for this is that the people who matter, the really powerful people (and that also includes professionals like any one of us), would never want to be seen waiting for a bus. It is just not done; and it would also be construed that your business was collapsing.

Yet in London I see directors of the Bank of England waiting at the Tube station. The truth is that most English people (or Europeans or Americans) are not inhibited about using public transport. Though, of course, they have other inhibitions. For instance, I find that classy New Yorkers would not be caught dead in Macy's, or some Londoners in Selfridges. On the other hand, any Indian woman (my wife, for instance) would go to the bazaar to buy fish just as readily as to a swank shop in the Taj Mahal to buy something else.

So in India we are not inhibited about being seen in the wrong kind of shop, but we are

inhibited about being seen using the wrong kind of transport—which of course means public transport. Yet if you got the right kind of people (like the ministers) to go by public transport, it would improve by leaps and bounds.

Audience observation: In Japan they have invented the executive minibus as the right way to get to the office.

Mr. Correa: Yes, and every one of those minibuses must keep about eight cars off the road. I remember years ago in Mexico traveling in community taxis. I think they were called *peseros*. The driver would just hold up one hand, which meant there was space for one more person. So you did not have the ignominy of being seen waiting at a bus stop. You walked along smartly and just waved down a taxi as it passed. We need such a mechanism to break the deadly psychological barrier that exists in many of our Third World cities.

But I wish we could make this much more a discussion among you, the audience. I have been speaking for too long. I would like to know what all of you feel about the different cities of the world from which you come, about the various issues I have tried to raise. Does anyone have anything to say? Anything?

Question 2: I just wanted to share with you one image from the film, *Love Me Tonight*. It starts with the sounds of Paris waking up. The sounds are put together to create a municipal symphony. It is a woman sweeping a sidewalk. It is a blacksmith

hammering nails into a horseshoe. It is a wonderful montage of sound.

What are the sounds that we are losing as we change from these simple technologies to the more advanced?

Mr. Correa: That is a good question, particularly at a seminar on “The Human Face of the Urban Environment.” But I would like someone else who knows these cities much better than I do to answer that. One of you must have feelings about this.

Audience observation: Sound has been made a crime in Scotland.

Mr. Correa: I think it is not just the obvious sounds, such as songs, that change. As a city grows larger, a new sort of omnipresent background hum comes into being. For instance, in Bombay, if I go to the office on a Sunday, the feeling is totally different from the weekdays. There is an absence of these vibrations—which makes everything feel calm.

Don’t you find when you are in New York, in Manhattan, that there is a dreadful hum—overlaid every 30 seconds or so by those terrible police or ambulance sirens? It is not so much the noise, but the ominous low-decibel hum that creates that sense of unease and threat in the air. Cities change not just because buildings change, but because the density of sound changes, and that makes a world of difference in the ambience one experiences of walking down the same street, or working in the very same building.

You know, we could actually record these changes. Sometimes I think someone should set up a camera and take, say, a two-minute shot every year from exactly the same spot. After 20 years there will be 200 minutes of film and these changes would be startlingly palpable. And it may not be in the buildings so much as in the ambience of the place—which is very much a question of noise, of movement, of density, and of the vibrations that one feels.

Audience observation: I wanted to reinforce your point about beauty and cities. I come from the tradition of anthropology, urban sociology and urban politics, not of architecture and planning.

But in all of my work, from living in the *favelas* of Rio de Janeiro to working in Jakarta, Cairo,

Calcutta, Mexico City, New York, and Los Angeles, one of the things that has struck me is that when communities are asked what they want, they always say, “I want something beautiful. Just because I am poor does not mean I have to live in something ugly.”

It comes out over and over again in the desire to make theater, to make art, to make greening. It is so incredibly essential to the human spirit. When we think that only efficiency and economics drive people, we are missing so much. In the poorest squatter hut in Rio, or the poorest place of any of the developing countries, you see incredible beauty.

In the United States I am afraid that we have really deracinated and deculturated these dwellings. I would rather be poor in Rio than in New York, partly because in the *favelas* you have air and beauty even in the smallest space.

I love the fact that you have brought to all of us here the question of beauty and the way we feel about the place we live in, because it goes to the soul.

Mr. Correa: I think you are absolutely right. If you look at the handicrafts that people produce in Peru, in Mexico, in Nepal, in India, they really are the most beautiful, low-cost, or really no-cost, solutions. Yet too often when we architects design habitat for these people, we totally lack that ingenuity, that extraordinary eye—and so we produce stultifyingly ugly environments that will maim future generations of children. I think we have done appalling damage, with of course the best intentions.

It makes you wonder: why do we ever assume that we have to design housing for people? In actual fact, every culture around the globe has developed housing typologies that work (and I would include here the Georgian houses of London, in beautiful places like Bedford Square). These are all organic and indigenous ways of creating beautiful habitat for people. These are typologies invented by many, many people, over many, many generations—and they all go way beyond what any single architect is capable of designing. Why did we ever forsake that path?

Think about it. Every objective of today’s environmentalist, including the recycling of waste and balanced ecosystems, has existed for

thousands of years, in the vernacular habitat of the peoples of this planet. What does not exist is the urban context in which those solutions are viable. Our responsibility, then, is to help modify our cities so that these solutions become viable. This means increasing the supply of urban land—that is, land with jobs and with access to transport, so that people can reach those jobs.

And then, if we just get out of the way, the people will come in and they will make their housing through their own cultural processes. And I don't just mean self-help. I don't necessarily buy this romantic idea that everyone has to come with a hammer and build their own houses. No, I mean through using indigenous and time-tested processes, just like you learn how to cook. You don't need to invent it all by yourself.

Part Two

Lessons of Experience

RISKS OF EXPOSURE: THE CHALLENGE OF URBAN AIR POLLUTION

Introduction

Nafsiah Mboi

Polluted air is a characteristic of urban life almost everywhere in the world today—whether in industrial or developing countries. People living in cities that are dominated by high-rise steel and glass, those in cities dominated by sprawling one- and two-story structures of cardboard, tarpaulin, and irregularly shaped pieces of zinc, and those in cities with both sophisticated and crude structures—all suffer air pollution problems.

What varies from place to place are the “dynamics of pollution”—the sources of pollution, the numbers of people who are affected, the alternatives to avoid pollution, the potential and commitment for its control, and people’s access to information and treatment when needed. One regrettable reality is that almost everywhere the poor are particularly severely affected by air pollution. They tend to live in areas with multiple sources and thus high levels of pollution. They have little option to get away from or protect themselves from its effects. Their access to treatment is limited.

For example, although in Jakarta we all breathe the same polluted air, exposure is very different for different groups of people. Some of us can travel in cars with the windows shut and the air conditioner running to protect ourselves from the polluted air. The poor urban woman, on the other hand, cannot escape. She breathes

the air to which our cars contribute lethal gases and then returns home to the indoor air pollution caused by her simple stove, crude cooking fuel, the dangerous and smoldering anti-mosquito coil. She has nowhere to go and lives with life-threatening pollution both in public and at home.

If we truly want to concern ourselves with the human face of the urban environment—the people and the quality of their lives—we cannot settle for generalizations. We must understand the dynamics of pollution in specific settings and learn to take action on the great issues of poverty, equity, and policy that influence both levels of pollution and its impact on society.

Yesterday we heard a succession of articulate, experienced, and compassionate speakers describing in depressing detail the multiple threats of the urban environment to human development and the quality of life. Today we have a panel of speakers who will share with us an overview of the issue of air pollution, as well as giving us examples of attempts that have been made to address the problem in three countries—Mexico, Poland, and India. None of us can fail to have been moved by the call to action yesterday. Today we have the opportunity to fill some of the gaps in our knowledge of air pollution issues—and to decide how to take action in our own respective settings.

Overview

Jacqueline Aloisi de Larderel

Exposure to air pollution is now an almost inescapable feature of urban life throughout the world, as human activities continue to pour immense quantities of trace gases and chemicals into the atmosphere (table 1).

In 1990, 99 million tons of sulphur oxides, 68 million tons of nitrogen oxide, 177 million tons of carbon monoxide, and 57 million tons of suspended particulate matter were released into the atmosphere from human activities. OECD countries accounted for about 40 percent of sulphur oxides, 52 percent of nitrogen oxide, 71 percent of carbon monoxide, and 23 percent of suspended

particulate matter. The majority of these emissions came from urban areas.

In 1988 more than 600 million people were living in urban areas in which sulphur dioxide levels exceeded World Health Organization (WHO) guidelines; more than 1.25 billion lived in cities with unacceptable levels of suspended particulate matter.

These global figures cover a broad range of local situations. Concerns about local air pollution emissions that were voiced in the first State of the Environment report by the United Nations Environment Programme (UNEP) in the early

Table 1. Sources of indoor and outdoor air pollution

<i>Pollutant</i>	<i>Source</i>
<i>Predominantly outdoor</i>	
Sulphur oxides	Coal and oil combustion, smelters
Ozone	Photochemical reactions
Lead, manganese	Automobiles, smelters
Calcium, chlorine, silicon, cadmium	Soil particulates and industrial emissions
Organic substances	Petrochemical solvents, vaporization of unburnt fuels
<i>Indoor and outdoor</i>	
Nitrogen oxides	Fuel combustion
Carbon monoxide	Incomplete fuel combustion
Carbon dioxide	Fossil fuel combustion, metabolic activity
Suspended particulate matter	Resuspension, condensation of vapors and combustion products
Organic substances	Petroleum products, combustion, paint, metabolic action, pesticides, insecticides and fungicides
Ammonia	Metabolic activity, cleaning products and agriculture
<i>Predominantly indoor</i>	
Radon	Building materials (concrete, stone), water and soil
Formaldehyde	Particleboard, insulation, furnishings, tobacco smoke
Asbestos, mineral wool, synthetic fibers	Fire-retardant; acoustic, thermal, or electric insulation
Organic substances	Adhesives, solvents, cooking, cosmetics
Aerosol of nicotine and other organic substances	Tobacco smoke
Mercury	Fungicides in paints, spills in dental-care facilities or laboratories, thermometer breakage
Aerosols of varying composition	Consumer products
Viable organisms	Infected organisms
Allergens	House dust, animal debris

Source: UNEP/GEMS 1991.

Box 1. Health effects of major air pollutants and associated WHO health effects criteria*Sulphur dioxide*

- Respiratory irritation, shortness of breath, impaired pulmonary function, increased susceptibility to infection, illness in the lower respiratory tracts (particularly in children), chronic lung disease and pulmonary fibrosis
- Increased toxicity in combination with other pollutants

(500 $\mu\text{g}/\text{m}^3$ for 10 min; 350 $\mu\text{g}/\text{m}^3$ for 1 hour)

Respirable particulate matter

- Irritation, altered immune defense, systemic toxicity, decreased pulmonary function and stress on the heart
- Acts in combination with SO_2 ; effects depend on the chemical and biological properties of the individual particles

(No health effects criteria)

Oxides of nitrogen

- Eye and nasal irritation, respiratory tract disease, lung damage, decreased pulmonary function and right heart stress

(400 $\mu\text{g}/\text{m}^3$ for 1 hour; 150 $\mu\text{g}/\text{m}^3$ for 24 hours)

Carbon monoxide

- Interferes with oxygen uptake into the blood (chronic anoxia)

- Can result in heart and brain damage, impaired perception, asphyxiation; or, in lower doses, weakness, fatigue, headaches and nausea (100 mg/m^3 for 15 min; 60 mg/m^3 for 30 min; 30 mg/m^3 for 1 hour; 10 mg/m^3 for 8 hours)

Lead

- Kidney disease and neurological impairments
- Primarily affects children (0.5–1.0 $\mu\text{g}/\text{m}^3$ for 1 year)

Photochemical oxidants (e.g., ozone)

- Decreased pulmonary function, heart stress or failure, emphysema, fibrosis, and aging of lung and respiratory tissue (150–200 $\mu\text{g}/\text{m}^3$ for 1 hour; 100–120 $\mu\text{g}/\text{m}^3$ for 8 hours)

Toxic substances

- Can result in cancer, reproductive problems, and birth defects
- Benzene and asbestos are known carcinogens linked to leukemia and lung cancer

Source: Faiz and others 1990; Tolba, el-Kholy, and others 1992.

1980s have intensified, as levels of sulphur oxides, photochemical oxidants, sulphate and nitrate oxides, and airborne toxic substances such as lead remain high. And a growing body of evidence suggests that the synergistic effects of these pollutants in combination may be far more serious than the adverse effects of any one air pollutant alone. At the same time, air pollution at the global scale continues unabated—acid rain, the accumulation of chlorofluorocarbons in the stratosphere, expanding areas of gas concentrations, and the routine emission of a wide range of toxic trace metals and synthetic organic compounds. And adding to this grim depiction of the quality of air from the local to the global level are accidental releases of hazardous materials such as occurred at Bhopal, Chernobyl, and Seveso.

The emission of all these pollutants is beginning to have disastrous consequences not just for the air we breathe, but also for the world's ecological resources, particularly water and vegetation. Of course the environmental repercussions are

exacerbated by the severe, long-term consequences for the health of people worldwide (box 1). In turn, the damaging effects of air pollution on the environment and human health impose significant social costs. According to OECD estimates, the social cost of air pollution due solely to transportation in developing countries varies from 0.16 percent to 0.5 percent of GDP—and this estimate is extremely conservative.

Air Pollution Problems Have Changed

Rising air pollution levels in developing countries are not expected to slow. On the one hand, continued poverty in some areas will perpetuate the already heavy reliance on biomass, coal, and oil for domestic heating and cooking, and the concomitant risk of indoor air pollution. On the other, rapid economic development in other areas means that emissions from industry and motor vehicles will increase, exacerbating ambient air pollution. Air lead levels in urban areas of 1.5 to

3 $\mu\text{g}/\text{m}^3$ are not uncommon; an Environmental Defense Fund (EDF) study found increased blood lead levels in children and adults.

Many industrial regions of the world have introduced “clean air” legislation to control the emission of traditional pollutants from stationary sources, such as sulphur dioxide and suspended particulate matter. In Europe and North America, a change from domestic coal burning to electricity and natural gas for heating and cooking purposes has significantly reduced low-level emissions of these two pollutants, noticeably improving air quality.

Yet at the same time that emissions and concentrations of these traditional urban air pollutants have declined, the emission of pollutants from motor vehicles—primarily nitrogen oxide, carbon monoxide, and hydrocarbons—has escalated in many cities of the industrial world. The spread of these pollutants can be attributed to the rapid growth of economic development and personal wealth, which has dramatically increased both the number of vehicles and the number of miles traveled. The benefits of technology for controlling these emissions—the introduction of three-way catalytic converters and more fuel efficient engines—have largely been offset by the growth in motor vehicle traffic. But as lead additives have progressively been phased out in North America, the European Union, and Japan, lead pollution in industrial countries has dropped to between 0.2 and 0.8 $\mu\text{g}/\text{m}^3$.

Emissions from the transportation sector are quickly constituting the largest share of overall emissions from human activities the world over. In OECD countries emissions from the sector have increased by an average of between 20 and 75 percent since 1975. In industrial countries between 70 and 90 percent of all carbon monoxide emissions originate from the sector, primarily from motor vehicles. Moreover, between 40 and 70 percent of nitrogen oxide emissions and almost 50 percent of all hydrocarbons emitted into the air come from motor vehicles. Approximately 80 percent of all benzene emissions come from gasoline-powered motor vehicles, as do at least 50 percent of atmospheric lead emissions. And in the urban areas of many developing and industrial countries in which an increase in road traffic continues unabated, photochemical

pollution from chemical reactions among nitrogen oxides and reactive hydrocarbons in the presence of sunlight is becoming increasingly acute.

In 1992 WHO and UNEP joined forces to publish *Urban Air Pollution in the Megacities of the World*, a study covering 20 of the world’s 24 megacities. The study was the first global examination of the state of the atmosphere in such a large proportion of these vast urban areas. Each of the megacities examined—either with a current or a projected (by the year 2000) population of 10 million people—had at least one major pollutant that exceeded WHO health guidelines. Fourteen cities had at least two, and seven cities had at least three (table 2). Of the specific air pollutants, levels of suspended particulate matter, in particular, are dangerously high in all of the megacities except London, New York, and Tokyo.

Policy Responses

Some countries have responded constructively to their air pollution problems. Indeed, many countries throughout the world have now established nationwide urban quality networks for monitoring and assessing pollution levels in their major cities. But these systems must be improved, and additional efforts must be made to gather and interpret data on related health risks and effects. Eighty cities are now participating in a coordinated global effort to improve and share information on air quality monitoring under the WHO/Global Environmental Monitoring System (GEMS) Urban Air Quality Monitoring Project.

A Broader Strategy

More drastic, innovative, and courageous measures must be adopted. Governments—both local and national—must establish an overall policy and strategy for addressing urban air quality, but they must also engender the participation of industry and the public in formulating this strategy. Air quality management policy must include three critical steps:

- Finding a shared vision and building consensus among the key stakeholders and institutions
- Understanding and assessing existing systems so as to identify the changes that must be made in specific areas and sectors

Table 2. Status of pollutants in megacities, 1992

City	Sulphur dioxide	Suspended particulate matter	Lead	Carbon monoxide	Nitrogen dioxide	Ozone
Bangkok	Low	Serious	Moderate	Low	Low	Low
Beijing	Serious	Serious	Low	—	Low	Moderate
Bombay	Low	Serious	Low	Low	Low	—
Buenos Aires	—	Moderate	Low	Serious	—	—
Cairo	—	Serious	Serious	Moderate	—	—
Calcutta	Low	Serious	Low	—	Low	—
Delhi	Low	Serious	Low	Low	Low	—
Jakarta	Low	Serious	Moderate	Moderate	Low	Moderate
Karachi	Low	Serious	Serious	—	—	Low
London	Low	Low	Low	Moderate	Low	Low
Los Angeles	Low	Moderate	Low	Moderate	Moderate	Serious
Manila	Low	Serious	Moderate	—	—	—
Mexico City	Serious	Serious	Moderate	Serious	Moderate	Serious
Moscow	—	Moderate	Low	Moderate	Moderate	—
New York	Low	Low	Low	Moderate	Low	Moderate
Rio de Janeiro	Moderate	Moderate	Low	Low	—	—
São Paulo	Low	Moderate	Low	Moderate	Moderate	Serious
Seoul	Serious	Serious	Low	Low	Low	Low
Shanghai	Moderate	Serious	—	—	—	—
Tokyo	Low	Low	—	Low	Low	Serious

— No data available or insufficient data for assessment.

Serious: WHO guidelines exceeded by more than a factor of two

Moderate: Moderate to heavy pollution; WHO guidelines exceeded by up to a factor of two (short-term guidelines exceeded on a regular basis at certain times).

Low: WHO guidelines normally met (short-term guidelines exceeded occasionally).

Source: WHO/UNEP 1992

- Moving forward from the assessment to the implementation stage, by developing a prioritized, multifaceted approach, with the most appropriate mix of legislative, economic, and policy tools available.

A Tool Box of Policies

Both national and local governments have a range of policy tools available to accelerate the process of improving urban air quality (boxes 2 and 3). Some of these tools have already been adopted successfully; some must still be developed. Some are regulatory—such as ambient air quality standards, emissions standards, permits, licenses, and land-use control—and some are economic—such as charges, fees, tradable permits, and subsidies. But support measures are also important for implementing policy—training and education for industry, government agencies, and the public, as well as greater coordination among institutions.

These extensive measures for managing the air pollution problems in our cities and urban areas may be expensive, but their costs still fall far short of the health costs that society must

bear if nothing is done. This conference provides the appropriate forum for developing and industrial countries to exchange the information that will be critical to pursuing a healthier urban environment for those who live and work in our cities. But, after this conference, we must all get

Box 2. Tools to reduce urban air pollution from stationary sources

To prevent emissions at source

- Ambient air quality standards
- Emission standards
- Emissions phase-out (VOC)
- Restricted use of certain types of energy sources
- Development of an overall cleaner production approach in housing and industry, through improved environmental management tools and clean technologies
- Economic incentives (tradable permits, taxes)
- Education and training

To treat emissions

- Emission standards
- Economic incentives

Box 3. Tools to reduce urban air pollution from transport

To reduce use of motor vehicles

- Adequate public transport systems
- Land-use planning
- Car-sharing
- Public information
- Economic incentives (taxes, fees, tolls, pricing of transport and energy)

To improve traffic conditions

- Planning and traffic management programs (control of on-street parking, control of traffic lights)
- Land-use and town planning
- Public information

To improve vehicle performance

- Automotive exhaust and gas regulations
- Vehicle technology (electric cars, light cars, etc.)
- Fuel selection (reformulated fuels, alternative fuels, indigenous resources)
- Vehicle inspection and maintenance
- Training
- Public information

down to the real task of putting our words and knowledge into action. To echo the old Zen saying often quoted by Elizabeth Dowdeswell, UNEP's Executive Director: "After enlightenment, the laundry."

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Mexico City: The Air Pollution Control Program

Manuel Guerra

As we saw in Ms. Aloisi de Larderel's presentation, Mexico City has the dubious honor of being one of the most air-polluted cities in the world. As shown in table 2 from her discussion, our city suffers from serious conditions in more categories of pollutants than any other megacity—an irony at best.

The ongoing pollution control movement in Mexico City is of global interest not just to cities in the developing world, but also to the current and emerging megacities of all countries. It provides a valuable lesson on how a major city confronts and attempts to resolve environmental and air pollution problems—why some control measures prove effective, while others do not. But it is not just a story of the technological aspects of program implementation; it is a story of the social and political forces that have shaped the program and in turn the current quality of air in our city today. The message here is that the difficulties with program implementation are not necessarily technical or financial—they are the complex interaction of responses by those who mobilize the program, those who control it, and those who are affected by it.

Impetus for Pollution Control Came from the Outside

In 1983 newly formed environmental groups in Mexico began demonstrating forcefully in Mexico City against the pervasive air pollution problems that were adversely affecting the population of that rapidly growing metropolitan area. The immediate reaction of federal and city authorities was to deny the problem. These authorities

claimed that it was an exaggeration, or that any pollution that did exist had nothing to do with mobile or fixed sources of pollution, but rather was the effect of climatological conditions, humidity, or ambient particles. And, as in many cities throughout the world, the government started a defensive campaign that blamed the air pollution alarm on irresponsible political activists, enemies of the state, or sensationalist journalists.

At the same time, however, the United States embassy in Mexico began to study the possible effects of air pollution on embassy personnel, in an effort supported by the Environmental Protection Agency. When its results were released, the study engendered an instant response by such activist organizations as the Group of 100 in Mexico, comprising intellectuals, painters, and writers. And other embassies—including those of Canada, Germany, Japan, and Sweden—began conducting their own studies; their results indicated that the quality of air in Mexico City was disturbing enough to warrant granting special health risk bonuses for diplomats and their families.

This spate of activity from the “outside” provided a political impetus for resolving the problem in Mexico City. Yet as late as November 1986, the then secretary of Urban Development and Ecology declared to the press that the air pollution problem of Mexico City was totally under control and was being vastly exaggerated. But as of 1992 the city still had one of the worst levels of ozone pollution ever to be registered in the world, surpassing 400 percent, which is the maximum concentration allowed under the country's standards.

Impetus Shifts to the City

In 1985 our institute, INAINE, started to measure air pollution in different parts of the city and began broadcasting the results daily on a Mexico City radio station with a morning audience of around 8 million people. Shortly thereafter, the federal undersecretary for the environment started publishing those data in the main newspapers, exerting enormous political pressure to reduce air contaminants and to protect the health of the population.

In 1988 air pollution in Mexico City became one the primary issues of the presidential campaign. After winning the presidency but losing the capital city to the opposition, the new administration of President Salinas realized its political stake in resolving air pollution problems in the valley of Mexico City. Mexico City's appointed mayor seized upon the more moderate political climate by making the control of atmospheric contaminants the top priority on his policy agenda; he then actively sought and received important support from multilateral lending institutions. In fact, in the first two years of the current administration, more than US\$4 billion have been provided by external sources to combat air pollution in the valley of Mexico City.

The mayor also initiated a no-cost program in Mexico City called the "No-Car Day," in which drivers were asked to refrain voluntarily from driving automobiles into the city. The program was implemented as a temporary measure, to have lasted from November 1989 to March 1990. But the response by car drivers in Mexico City in the first few months of the program was so phenomenal that the authorities wanted to make the program permanent. Indeed, in the early days of the program, you would not have recognized Mexico City. One could drive from the outskirts of the city to downtown in just fifteen minutes, a drive that normally takes an hour to an hour and a half.

Other political pressures—and the recognition that the no-car policy would not by itself contain the pollution problem—led federal and municipal authorities to create a metropolitan commission on pollution. The commission, which consists of a technical council of pollution control experts and a consortium of politicians, industrialists, academicians, public representatives, environmentalists, and government officials, devises

integrated strategies to combat (mainly air) pollution and then follows up on their implementation. By including this broad array of groups, the commission captures the views of all relevant stakeholders and thus offers a sound communications infrastructure, respected both in government circles and by the public.

The Commission Takes Constructive Steps toward Solving the Problem

The commission promoted several broad measures for controlling air pollution from motor vehicle activity. The most immediate measure called for changing the composition of gasoline sold in the valley of Mexico City—reducing its lead content and supplementing it with performance-enhancing oxygenated substances, which is critical in such a high-altitude city as Mexico City. In fact, a large share of the US\$4 billion in external funding has gone toward the installation and construction of plants to produce lead-free and oxygenated gasoline in the country. Today, unleaded gasoline constitutes approximately 35 percent of the total volume of gasoline being sold in the city. And even the leaded gasoline that is still sold today contains less than 0.5 grams of lead per gallon, well below international norms.

The commission also initiated three other measures to control air pollution: a state-of-the-art emissions control program for vehicles, based on the stringent standards set by the California Bureau of Air Resources, a mandatory requirement that all new cars produced or sold in Mexico have a catalytic convertor, and a mandatory requirement that heavy-duty public-private (minivan) transport convert to liquefied petroleum (LP) gas.

Levels of the three major air pollutants in Mexico City—sulphur dioxides, carbon monoxide, and lead—have been reduced dramatically. In particular, airborne lead levels in Mexico City, which were some of the worst worldwide and were causing dangerously high concentrations in the blood of children, are falling, due to the use of low-lead and lead-free gasoline. The situation has stabilized, in the sense that Mexico City is no longer prone to accidents or catastrophes as it was even in 1992, when high concentrations of photochemical smoke were endangering the entire population.

Improvements in Air Quality Mask the Continued Severity of the Problem

Despite these constructive interventions, photochemical smoke concentrations have indeed increased since their implementation, and the number of days with ozone concentration violations has risen sharply. The reason pertains not to the thrust of the measures themselves, but to how the public and program operators responded to them.

Pollution Control Measures Have Been Manipulated

While the emission control program is a promising vehicle for reducing the level of motor vehicle pollutants, rampant corruption has mitigated its effectiveness. At the start of the program, the German technicians who were implementing the emissions controls standards advised City Hall officials not to concede control of the program to the private sector, citing a conflict of interest between verifying whether emission levels are met and tuning the engine to meet those standards. But under the regulatory control of certain public officials, drivers can easily purchase emission-control validation stickers illegally from controllers in the City. According to a study undertaken by our institute for City Hall, 30 percent of all stickers are purchased illegally. So emission levels from 30 percent of all cars that are circulating in Mexico City are unverified despite a sticker that indicates that they meet the standards. It is not uncommon to see old, heavily emitting cars with a current validation sticker in their windshields.

Also unsuccessful was the mandatory conversion of heavy-duty public-private transport to LP gas, as owners tried to circumvent regulations by converting their minivans themselves at home. Indeed, what happened was that these makeshift conversions caused several accidents that prompted City Hall to halt the program.

Public's Response to the No-Car Program Eroded Its Success

The no-car program has not helped reduce air pollutants in Mexico City because, when it was

made permanent, many of the car drivers in the city simply bought another car, and left one of them at home. Thus, most of the car users in Mexico City did not choose to use the public transport system; they just used another car. According to our institute, 90 percent of all car users keep using their cars, and just leave an extra car at home.

But the reason that the public rejected the no-car program pertains also to the inefficient, clunky, and even dangerous public transportation system. Indeed, the 16 percent of Mexico City's car users who are considered the social elite will never leave their cars if they are not able to get into comfortable, efficient, and secure public transportation.

How Can the Program Be Changed?

Is a no-car program viable? Should other cities copy it? Athens, Caracas, and Santiago have implemented a similar type of program, and all have failed. Two things are clear. First, the program must be modified. One recommendation has been forwarded by Mexico City's mayor, now at the end of his administration. He has proposed that only cars with three-way catalytic converters be allowed into Mexico City each day. Cars without catalytic converters or those with only a two-way catalytic convertor that would fail emission standards would have to be kept at home one day a week. At the very least, the expectation is that people with old extra cars will replace them with the newer cars that have three-way converters, helping to reduce emission levels.

Second, an effective car restriction program must be accompanied by improved public transportation services—even if at greater short-term costs.

But perhaps the most critical element for making any pollution control intervention successful is to make the public understand the necessity for it. Indeed, for every dollar that is spent on technical aspects—such as providing credits for catalytic converters or emission control systems—the same amount of money should be spent on educating, instructing, and training people. This is the key to any successful air pollution control program.

Katowice, Poland: Industrial Air Pollution and the Air Protection Program

Wojciech Beblo

Hazardous air pollution in Katowice Voivodship (province) of Poland, stemming from an excessive concentration of industries, rapid urbanization, and a densely concentrated population, had reached alarming proportions. Pollution in the form of suspended particulate matter, noxious gases, and lead and cadmium had wrought the entire range of damaging responses: a greater risk of most diseases and various pathologies, exorbitant cleanup costs, the deterioration of buildings and residential structures, and damage to vegetation and agriculture. But these hazards are steadily being eliminated under a broadly based policy and implementation strategy that seeks to restructure the overall economy of the *voivodship*.

Intensely Concentrated Pollution

Katowice Voivodship is the most populated and industrialized area in Poland; although it occupies about 2.1 percent of the entire territory of Poland, it contains about 10 percent of its population. Manufacturing in the region contributes about 18 percent to Poland's GDP, and represents about 25 percent of Poland's industrial production.

The region is located in the south of Poland, between two large industrial regions—Ostrava to the south in the Czech Republic and Krakow to the east. With prevailing south-southwesterly and northwesterly winds, industrial emissions flow largely from Ostrava to Katowice to Krakow. But the range at which the pollution is transported is estimated to be 1,000 miles, and combined pollution from the three areas reaches

Scandinavia, Russia, the Baltic countries, and countries to the southeast, including Slovakia.

Katowice Voivodship manufactures 97 percent of Poland's coal, 71 percent of its coke, 59 percent of its crude iron, 57 percent of its rolled steel, and 23 percent of its electrical power. In 1993 emissions from Katowice Voivodship amounted to 19 percent (114,000 tons) of dust pollution and 24 percent (704,100 tons) of gas pollution in the country. The emission of suspended particulate matter, sulphur dioxide, and nitrogen oxide comes primarily from the power sector, industrial technologies, and municipal heating; a large share of nitrogen oxide pollution comes from automobile traffic. The majority of emissions come from reliance on "dirty" fuels such as crude oil, coal, and lignite. Still other pollutants include pitch substances, benzo-a-propene, lead, and cadmium from industrial and other sources.

Impetus for a Program Response

The Air Protection Program was enacted in response to several alarming health trends in Katowice—shorter life expectancy and greater mortality among men, a high rate of upper respiratory tract diseases among the population, and a greater risk of cancer. But of greatest concern was the effect of industrial pollution on the rate of infant mortality, caused particularly by heavy metals emissions. In 1992 infant mortality was higher in Katowice (at 16.1 per thousand) than in Poland overall (at 14.4 per thousand). And the *voivodship* contains areas whose rates are much higher, especially those located near zinc and lead

smelters. Although Poland's rates are now half their 1970 levels, they are still alarmingly high. International comparisons are insightful here—ratios are 3.8 in Sweden, 6.5 in the Netherlands, and 8.9 per thousand in the United States.

Air Protection Program

Voivodship administrators, local governments, nongovernmental organizations, academia, technicians, and industrial management agreed to set up a mutually beneficial program for economic restructuring that would account for the effects of industrial pollution. The Air Protection Program was created in 1985 to implement the environmental component, with a mandate to control the effects of pollution on human health, plant life, and material infrastructure within the limits of existing financial, technical, and personnel resources. The program consisted of four broad measures.

Limiting Low-Stack and Industrial Emissions

The primary vehicle to limit these emissions was to make natural gas and electricity more accessible as fuels for cooking and heating. Other, more targeted strategies included supplying fuel storage facilities with coal that contains a low sulfur concentration and ash-generation rate, and constructing installations to remove dust and sulfur from exhaust fumes. Access to coal-bed methane as a fuel for communal heating plants was also encouraged.

Mandating Specific Repair Programs

The Minister of Environmental Protection, Natural Resources and Forestry, in cooperation with the Department of Environmental Protection of *Voivodship* Offices, prepared a list of 80 industrial establishments that posed the greatest hazard for the environment in the country, 22 of which are located in the area of Katowice *Voivodship*. The *voivodship* added another 65 establishments that cause serious environmental problems. These industries were mandated to implement certain repair programs to limit their air pollution encumbrances by a certain date. Failure to comply would risk severe fines and penalties, and the imposition of even stricter standards. All but one

of the industries that were issued a permit to continue operating under the repair program made the repairs stipulated for that industry.

The repair programs sought to limit industrial pollutants either indirectly or by encouraging cleaner technologies. For instance, to *induce energy-saving practices* the programs stipulated that all industry and municipalities utilize waste heat available in power plants, smelters, and some steel technologies. In some municipalities local "heat markets" emerged, using waste heat throughout the entire year and operating power plants only during the winter season. Another measure called for rationalizing heat distribution. In the *voivodship*, a program is being financed by the World Bank to modernize heat distribution in the entire core of the Katowice agglomeration.

To *induce cleaner technology*, the program obligated some industries to use alternative fuels in certain operational areas. To make this section of the program possible, the government implemented an investment program to support the construction of coal-washing stations. It also encouraged industries to operate small boilers with gas and even oil, rather than coal, and it recommended that smokeless fuels replace coal for home heating in private flats.

The "clean" technologies included supplementing coal with lime absorbents, introducing low-emission burners, constructing modern boilers to replace inefficient ones, equipping boilers with remote and automatic combustion control systems, modernizing dust collectors, and constructing desulphurization facilities to meet standards for emission as described in protocols and regulations.

Establishing a System of Operating Permits

Every facility that emits pollution to the environment is obliged by the EPA to have an emissions permit to operate. The permits allow for a gradual decrease in emissions, to meet the target standards by 1997. Charges for the permits are based on the amount of emissions being released into the air. Those that did not apply initially for a permit were charged double the original permit fee to obtain one. Those with a permit but in violation of standards are to be fined 10 times the amount of the original permit fee. Each year the system collects some \$150 million for the Environmental

Protection and Water Management Fund to spend on environmental protection. Special subfunds have been set up to work toward eliminating sulphur dioxide and nitrogen oxide emissions.

Creating Monitoring Systems and Undertaking Risk Studies

Assessments of air pollution emissions are conducted in Katowice Voivodship by the Monitoring Service, which operates a monitoring system that measures dust and gas pollutants at 10 stations. In addition, it takes samples of daily concentrations of gas pollutants at 26 posts, daily concentrations of dust at 24 posts, daily concentrations of aromatic polycyclic hydrocarbons at 6 posts, and monthly dustfall at 750 posts, and prepares a monthly index of gas pollutants at 212 posts. The monitoring system is coordinated with similar systems drawn up in Kraków Voivodship and the Ostrava region and in the individual towns of Katowice Voivodship.

The monitoring system in Katowice Voivodship is the largest in Poland. On the one hand, it is being used as an instrument of control, making it possible to react immediately to the changing state of the environment; on the other, it serves as an instrument to check the effects of repair actions already commenced. The system is being supplemented by health risk monitoring standards.

Obstacles to the Program— and Achievements

The program has not been implemented as smoothly as hoped for. For instance, coordination of policies among ministries and even within them has been lacking. The absence of coordinated activity has made provincial-level policy-making difficult, given the absence of the driving forces that would replace as yet nonexistent market forces. In addition, modern legislation is not yet in place to provide the administration with reasonable standards or effective enforcement instruments for their application.

Table 1. Dust and gas emissions, Poland, 1989–93
(tons)

Year	Dust	Gases	
		All kinds	Sulphur dioxide
1989	305.300	1.309.200	671.700
1990	227.100	1.003.300	482.200
1991	186.600	850.100	440.400
1992	127.100	738.100	366.000
1993	114.900	704.100	334.000

Source: Katowice Voivodship, Monitoring Service.

Another obstacle has been the centrally unresolved programs for the strategic raw-material industries (energy, metallurgy, and mining) that would assign them a role in line with an efficient market economy, especially important to ensure the profitability of coal extraction. Moreover, the inevitable changes in the capital structures of the affected industries have had economic and social effects, as some enterprises have been forced to liquidate, and others have cut down the number of jobs. Too, low public environmental awareness hampers environmental interventions, simply because the measures may cost jobs.

The problems notwithstanding, the program can claim some successes. The emission of air pollutants from all industrial sources has declined by more than was originally projected. Dust emissions since the start of the program have been reduced by 62.3 percent, and gas emission by 50.2 percent (table 1). Today the program is at its medium-term stage, in which more attention will begin to focus on low-stack emissions: a master plan is currently being developed, and is to be financed by the European Union's PHARE Program for Upper Silesia. By the end of this century the program will reach the long-term stage, in which traffic interventions, energy efficiency, and clean technology will be implemented on a much broader basis.

Long-term projects call for reducing suspended particulate matter by 10.4 $\mu\text{g}/\text{m}^3$ annually and the concentration of nitrogen dioxide by 0.8 $\mu\text{g}/\text{m}^3$ annually. Carbon monoxide levels are also expected to decline, as are the levels of other pollutants.

The Threat of Household Energy Pollution

R. K. Pachauri

One source of environmental pollution that is generally overlooked in developing countries is household cooking and heating energy. In fact, it appears that, given the wide variety of uses in the household and the community at large, household energy fuels pose the gravest health and environmental risks in many societies of the developing world.

Some Fundamental Facts

No country in the developing world has formulated a feasible, even modest plan to control the spread of pollution caused by emissions from crude cooking and heating fuels. Part of the reason for this gap is that this source of pollution has not really been the target of in-depth investigation by researchers, institutions, or, certainly, governments.

Energy Consumption Varies According to Income Levels

The household sector accounts for a substantial share of total energy consumption in most countries throughout the world. But in developing countries the proportion is generally much higher and more variable, ranging from 30 to 95 percent of total energy consumption. One fact is clear: household energy consumption as a share of total energy consumption in a country is lower as income levels rise and as households have greater access to modern commercial fuels.

Cooking Fuels Available to the Urban Poor Are Limited

The types and efficiency of cooking fuels used in urban and rural areas differ substantially in most developing countries. In India, for instance, 90 percent of the total energy used for cooking in rural areas comes from biomass fuels; in many of the larger cities with well-developed commercial energy distribution and infrastructural facilities, the share of biomass fuels in total energy use for cooking is generally between 10 and 15 percent (Tata Research Institute 1993). But this proportion does not mean that the urban poor are using more modern sources of fuel.

The interesting phenomenon of urban dynamics is the continued growth of poorer sections of cities with the influx of rural migrants, who bring with them their household cooking habits and patterns. In rural areas these migrants had access to a fairly wide range of fuels—from wood to dung to vegetable byproducts. But as they move to the urban area, they must adapt their habits to the realities of urban life; because they cannot afford the more modern fuels that the city has available, they must find alternatives. And that is why it is not uncommon to see people cooking with any type of burnable fuel, even used tires.

Indoor Pollution Depends on the Structure of the Dwelling

Environmental impacts vary according to the types of fuels used in the home. Smith and others

(1994) refer to a “household energy ladder,” depicting a progression from dung to crop residue to wood, followed by the transition to kerosene, gas, and finally electricity. “Climbing” this ladder is a function of development, and each step rises to a higher level of cleanliness, energy efficiency, and capital costs. Based on actual observation, however, the progression does not seem quite as simple, complicated by a host of factors that influence the choice of fuels and the technology underlying their use. For instance, a growing proportion of the population in many cities of the developing world are now living in slums. While some of these slum dwellers can earn fairly substantial incomes, their earnings are not enough to effect a material change in their living conditions; their dwellings remain no more than temporary sheds and feeble shelters—which is a major determinant of their fuel choice and thus the quality of their indoor environment. Such slums are often illegal and therefore have no access to regular energy sources. Illegal connections to power lines often provide electricity for lighting and television in these areas.

The design and structure of dwellings affect not merely the types of fuels and devices that are used for cooking purposes, but also what can be called the entire cooking system. For example, a household might indeed have a very efficient cooking stove, and might even have access to more efficient fuels. But if the dwelling itself is not ventilated properly, the cooking fumes and residue will not be drafted out of the dwelling, and will expose the family to high doses of pollutants. And in many cases, those who are affected to the greatest extent are the mothers and their children.

Outside Effects of Household Fuels

In several cities of the world, the dominant sources of pollution come from motor vehicle and industrial emissions; yet the combustion of household fuels also contributes substantially to the emission of pollutants—particularly suspended particulate matter. But the types of fuels used by urban households have a broader environmental impact. For example, a survey of monthly fuel consumption in the domestic sector of urban slums in the city of Delhi indicates that, although kerosene captures roughly 49 percent of total energy consumption—obviously just in the domestic sector alone—fuelwood captures a sur-

prisingly high percentage, at nearly 29 percent. In fact, the bulk of commercial fuelwood consumption in the household sector actually takes place in urban areas. One of the consequences of this heavy reliance on fuelwood is the deforestation of large areas that supply this cooking fuel. In fact, the fuelwood that moves through market channels is sometimes transported 400 or 500 kilometers to reach a particular urban center. Deforestation of course has longer-term environmental impacts—but its immediate impact is the deprivation of fuels to rural communities that rely on forestry sources for heating and cooking.

The range of exposure to suspended particulate matter varies enormously by country. But the important point in our discussion of suspended particulate matter emissions from cooking fuels is that unacceptable levels of suspended particulate matter concentrations are exceedingly higher in low-income countries. Although research is inconclusive, it would seem that, given the relationship between economic development and industrialization, and in turn disposable income for such purchases as motor vehicles, the major source of suspended particulate matter pollution in low-income developing countries may come from cooking fuel emissions. Thus, one thing is clear: income levels in different countries do make a difference in the extent to which people are exposed to suspended particulate matter levels.

Indoor Air Pollution from Cooking Fuels

Unfortunately, indoor air quality is not monitored systematically in developing countries. But a United Nations Environmental Programme publication, “The World Environment 1972-1992” (Tolba and others 1992) indicates that biomass smoke, in particular, contains large quantities of suspended particulate matter, nitrogen dioxide, sulphur dioxide, and carbon monoxide. Biomass smoke also emits several aldehydes (including formaldehyde), and contains high levels of polycyclic aromatic hydrocarbons (PAHs), many of which are known to be carcinogenic.

This range of dangerous pollutants from crude cooking fuel also has a range of health impacts on the population, including heart disease, respiratory infection, and lung cancer. And estimates indicate that, in urban areas in which average levels of suspended particulate matter are higher than WHO guidelines, at least

0.6 and perhaps up to 2.1 working days a year are lost due to respiratory illness for each adult in the workforce. But these adverse health impacts are particularly manifest in those whose daily activities center around and in residential dwellings—mothers, their children, and the elderly.

Mothers who have been exposed to indoor air pollution often have low-birthweight infants, and growing evidence suggests that high particulate concentrations increase infant mortality. Exacerbating these health effects among low-income individuals is the absence of access to treatment facilities. Rough estimates suggest that if unhealthy levels of suspended particulate matter were brought down to the annual average that WHO has established as safe, then between 300,000 and 700,000 premature deaths a year could be prevented in developing countries, amounting to between 2 and 5 percent of all the deaths in urban areas that currently have excess levels of particulates. Another estimate indicates that chronic coughing among urban children could be reduced by half, or by about 50 million cases annually, significantly reducing the risk of permanent respiratory damage throughout their lives.

Need for a Household Energy Pollution Control Program

The health and environmental impacts of exposure to indoor air pollution have received attention only in recent years. As this research has begun to unfold, it is clear that the problem is more severe than previously understood. Statistics indeed corroborate the health consequences of particulate emissions indoors. But a general consensus is emerging that the greater concern about emissions of suspended particulate matter from household energy use is their synergistic effect—that is, the base level of outdoor emissions of suspended particulate matter in many cities is so high that even a slight addition of suspended particulate matter from the household makes the dosage and level of exposure frighteningly higher. But the release of household suspended particulate matter is *not* slight—and all indications are that, as poverty continues to perpetuate the existence of slums and other low-income areas, household energy will continue to be a large source of urban air pollution. Two broad responses are clearly called for.

More Efficient Dwellings, Cleaner Fuels

The urban dwelling itself has a powerful influence on the design and efficiency of the cooking system. There is no point in providing a more efficient cookstove or superior fuels in an ill-designed structure in which the concentration of pollutants cannot be ventilated outdoors.

But because the pollutants do go outdoors, even structural or system modifications will not be enough to reduce levels of suspended particulate matter in the environment. What is needed—and what would prove to be the most difficult challenge—is giving the poor access to modern sources of cooking fuel.

Regeneration of Forests and Vegetation

While we tackle the problem of superior fuels, better housing design, and other measures within the household, we must also adopt strategies for greening the surrounding areas. We must do so not only to ensure, say, an adequate supply of lumber, but also to enhance the environmental health of our cities.

Collaborative Research

The amount of research on the effects of air pollution from cooking fuels—whether indoor or outdoor—is still modest. More research has been undertaken on the environmental effects of levels of suspended particulate matter, to which cooking fuels contribute; but research on health consequences, particularly for mothers and children, is inadequate. What we need is long-term research by a collaborative team of energy and medical science experts, with longitudinal analysis of cohorts of different types of fuel users.

The research must also be accompanied by widespread information dissemination; public awareness is a critical element of the public's acceptance of and participation in any restructuring program.

Technology: The Potential of Briquetting

In recognition of financial resource constraints, one of the technological solutions that has been proposed is to briquette biomass fuels, which are highly energy-inefficient. Briquetting would

concentrate biomass fuels into a form that not only would burn more efficiently, but would also release fewer emissions. For example, in China, where coal is used on a fairly large scale for cooking and heating purposes, a briquetting program has been encouraged, and it is estimated that by the turn of the century almost all the coal used by households will be "shaped coal." The same cow dung that burns inefficiently and generates pollution could also be converted into biogas through a very simple technology.

Building Capacity at the Grassroots

To implement these technologies, we must develop training programs at the grassroots level, so that any new technological devices can be monitored and repaired if necessary. Our own institute

in New Delhi has, for example, been involved in several programs that have trained women in the community to construct cooking stoves and to arrange to have biogas plants constructed. Thus far, their services have been in demand, and often according to market conditions.

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Floor Discussion

Question 1: What was the change in the political climate in Poland that allowed the enforcement of the 1980 industrial pollution laws, and what were the other changes that supported implementation of these laws?

Mr. Beblo: The political climate has a tremendous influence on day-to-day policymaking. Recently, the left has won the elections in Poland, and we are expecting changes in the industrial pollution control laws.

So far, industry, business, NGOs, and the self-government sector, which is pretty well developed in Poland, are more influential than the political forces in Poland. Since they support the industrial pollution control program, we hope that it will be completed successfully.

Question 2: The Mexico City case emphasized the importance of behavioral measures, and yet seemed to indicate that restrictions on automobile use—no-drive days—have led to people buying second cars and counterfeit stickers. Since they are so difficult to enforce, is it practical to try to implement behavioral measures?

Mr. Guerra: We have certainly been more successful with technical measures. For example, there has been a reduction in sulfur dioxide and carbon monoxide, and chemical smog has been stabilized.

However, technical measures alone will not accomplish our goals; one has to invest in the process of changing habits. We did not understand what was involved in getting people to change

their habits. We had expected them to change simply because it's good to have clean air, but in reality people were more concerned with having an efficient means of transporting themselves.

We have learned that technical measures must be combined with behavioral measures, such as sanctions. A tax on gasoline makes it more expensive to drive cars, and the tax revenues can be used to support public transportation.

The system must be flexible, however, and there must be alternatives. Without alternatives, people will simply find a way of getting around the measures. For example, the emission exhaust program is too expensive for many people. It costs \$12 to get your car certified, and it now has to be done twice a year. But people often prefer to pay a little bit more to buy the sticker, just to avoid the time and hassle of having to have the car tuned up, and then having it inspected and certified.

Behavioral changes must be reinforced by open and honest public messages. Rather than hiding the corruption in the system, it must be acknowledged and discussed on television, radio, and in the newspaper.

Ms. Aloisi de Larderel: Let me just note that while it is important to have a comprehensive approach, we can easily become overwhelmed by the magnitude and complexity of such a program. There should also be an incremental approach, with steps that can be taken easily and immediately. Dr. Pachauri raised a point on resources. Certainly there is a need for resources, but one must be careful about the ends to which the resources are put. For example, the World

Bank tends to put resources into big power plants, but perhaps some of these resources could be redeployed, into smaller, but effective programs, such as energy audits, or industrial plants. Some of the money should be spent in education, and in consciousness-raising, as has already been said. So it really is not a question of more money, but rather of using existing resources differently.

It is imperative to induce behavioral changes through consciousness-raising and direct communication with the public. And at the same time, as has been said, it is imperative to provide alternatives. If good alternatives are available, people will choose them.

Question 3: The Katowice Industrial Pollution Control Program has produced dramatic reductions in emissions over the past four years. What has been the average cost of these reductions and what will be the marginal cost of future reductions in emissions?

Mr. Beblo: Within four years the overall costs will be some 450 million U.S. dollars. The structure of the expenditure was such that 60 percent was national and provincial funds for environmental protection, from the collection of fines and fees. To this is added 30 percent from revenue funds raised within industry that go into the state budget. Five percent comes from credits from internal Polish banks, and 5 percent is from external aid, such as loans from the World Bank.

This was a very cost-effective approach, when one considers the amount of reduction in pollutants, such as SO₂, NO_x, and CO₂, that was achieved. The cost-effectiveness was achieved by relying mainly on organizational instruments, such as avoiding emissions at source by cleaner fuels, by better housekeeping, and also by replacing old-fashioned technology with more modern types.

These were first steps, which are nearly complete. The next step will be to undertake a medium-term strategy of major investments, such as building electropower stations, rebuilding major technologies in steel, industry, and so on. This will be some 5 to 10 times higher in cost, and will take 15 to 20 years.

In pursuing the medium-term strategy, we have time for studies to more efficiently use the resources we have in hand.

Ms. Aloisi de Lardere: Building an environmental policy is a kind of cycle. The developed countries started this cycle only 20 years ago, in the early 1970s.

The first step of this cycle is to build regulations and legislation. The developing countries are now in this part of the cycle.

The second phase is application of regulations and legislation. UNEP, with the U.S. EPA, and the government of Netherlands, are now undertaking a training program to raise the awareness of governments of the need to implement the environmental legislation. We are beginning with the Asia region. It is important that governments focus on compliance, otherwise regulations become just a paper tiger.

Question 4: On the issue of behavior versus technology as solutions for urban pollution, it is important to understand the basic model at work. This model is based on one core study of air quality from the United States, developed in the industrialized countries and applied in the developing countries. The model proposes setting emission standards, and then trying to monitor compliance with those standards by inspection and maintenance—basically a command-and-control approach.

But setting emission standards is a difficult exercise because we do not really know much about the costs of certain pollutants. Add to this the fact that inspection and maintenance do not seem to work in all cases, even in states like California.

As Mr. Guerra was saying, market-based incentives try to induce behavioral change. People, institutions, and companies are made to feel the pain, and also to feel the gain. A recent example in the *New York Times* told of companies asking for tax breaks for adopting alternative fuels—a market-based incentive approach.

A second comment. We ought to move beyond the rhetoric that the costs of environmental interventions will always be less than the costs of pollution damage. Sometimes the opposite is the case. For example, a recent study of the costs of transport-related air pollution in the Los Angeles region has estimated that the cost of both morbidity and mortality come out to three U.S. cents in 1992 dollars per kilometer. Of course, there are still other transport-related problems,

such as congestion and safety, but air pollution would not seem to be such a problem. Therefore, it is important to try to have an estimate of costs, at least as a means of comparing interventions.

Mr. Beblo: Estimation of costs as a managerial instrument in developing countries is important. Too often, however, the estimates are made by people from the consulting or economic institutes and are very artificial.

We should instead utilize instruments as applied in banks, as applied in normal market economies; and we must teach our experts regarding this particular issue

The cost of monitoring in our case is less than 5 percent of the collected fee. According to the books this is 6 percent of the environmental protection budget.

Ms. Aloisi de Lardere: We certainly need to know more about the environmental cost, or what is called the external cost. But I believe that in order to evaluate these costs, we must discuss and come to an agreement on what to take into account: the cost of land used, the cost of traffic jams, the time lost in congestion. I believe that this is a field in which the World Bank has an important role to play.

Chairperson Mboi: In figuring out these costs we must not forget the cost of the suffering from sickness and disease. It is imperative that we convince the economists about the human face of the urban environment.

Question 5: Cities will probably suffer disproportionately from global warming in terms of increased urban air pollution, and other effects. What, then, is the role of cities in reducing greenhouse gas emissions?

Mr. Flora: To reduce pollution from transport, there are essentially four major interventions that have to take place. We at the World Bank discuss with most governments that some of these interventions require national action, and some can be done at a local level. But not all of them can be done at a local level.

To effectively reduce air pollution from transport, the makeup of the fuels used for transport must be changed, just as in Mexico City when

they removed the lead from gasoline. However, this is a national action; it's not something Mexico City could have done by itself.

Another important intervention is to change the composition of the vehicles, the engines, and the engine technology. Once again, this is a national action. You can't allow a certain type of engine to be imported into Puebla but not into Mexico City. National coordination is needed.

Some of the other actions, such as inspection and maintenance programs, can be done at a local or a regional level. This is not to imply that these interventions are easy to do. But cities or regions can make an impact by having effective inspection and maintenance.

Various studies have said that the private sector cannot carry out inspection and maintenance effectively—that it requires centralized locations and has other requirements best handled by the public sector. This is a specious argument, because some of the finest technology in the world has been introduced by the private sector. Pollution in the Southern California Basin has been reduced 90 percent at the source, thanks to private innovations. Not to oversimplify, I must add that each automobile produces 90 percent less than it did in 1976, but pollution is worse because more vehicle miles are traveled. Therefore, demand management becomes a critical aspect, one that all of us have touched on.

Certain demand management instruments, such as no-car days, work temporarily, as was the experience in Santiago. However, to turn these into long-term solutions there have to be incentives to make people want to change their behavior. Economic incentives can be introduced on a local or a regional basis, as was done in Singapore, and as is being considered in Santiago. New technologies have been developed, and are being tested in Norway, that will strengthen demand management programs based on market incentives.

Dr. Pachauri: There are three sets of actions that cities could take in reducing greenhouse gas emissions.

The first has to do with the structure of the urban form itself. A city like Los Angeles, with huge distances to the suburbs, has a structure that makes residents excessively dependent on transportation. This has come about because of land

prices, subsidized commuting costs, and a whole range of economic factors that bring about this kind of development. However, urban structure changes gradually. We need to set in motion forces that would bring about such a change.

The second set of actions that cities can take is to switch fuels. Much can be achieved by using cleaner and less greenhouse gas-intensive fuel such as natural gas and renewable energy (solar and wind power). Here, both regulation and market mechanisms are required.

Finally, there is the whole issue of energy efficiency. In the case that we have heard about, Mexico, the importance of behavioral change is critical, and in a sense it is much easier to accomplish in a concentrated area like a city than over a large, dispersed area. If cities were to develop effective programs—even for simple things like labeling appliances or enforcing efficiency standards—these could be applied much more easily in a concentration like a city than over a vast area where the population is dispersed.

Thus, cities do have a very special responsibility and should develop strategies in these three areas affecting greenhouse gas emissions.

Mr. Beblo: I would like to add that in Poland we have taken several steps to diminish greenhouse gas emissions. The first is “Park and Ride.” Those coming to Kraków by car may park in the suburbs, and are provided with a ticket for public transportation, which can be used all day. Second, some towns offer lower parking rates for cars carrying more than one person, giving people incentives to ride-share.

We also have energy-saving programs, which include such measures as preheating. My colleagues have already mentioned solar energy. For example, batch heaters may be installed on the roof to heat water to a certain temperature almost year-round. Then, a smaller amount of electric power or gas is needed to heat the water further, if required, and less energy is consumed. At the same time, by saving energy at the source, the consumer saves money, providing an additional incentive.

Ms. Aloisi de Lardere: I would like to come back to Dr. Pachauri on the role of cities, and I would like to ask you who here is working for a city, or is directly involved in city management? No one.

I think that’s interesting, because it means that work has not yet been done to raise awareness about the role of city managers.

City managers are often providing services that pollute. In many cases this has been caused by ineffective town planning. Certainly here in the Washington, D.C. metropolitan area, it is difficult to go from one place to another without taking a car. It would seem that the design of this area has been promoted by the car, and by the car lobby as a whole.

It should actually be the reverse: area planning should be based on nonpolluting modes of transport, such as walking or clean public transport, and should discourage the use of the private car. This is an open field.

Mr. Beblo: A funny thing about using automotive transportation is that one day I drove to work, and was lauded by my supervisor for driving a used car. He felt it was a suitable example by a director.

Chairperson Mboi: Use of a private automobile is a status symbol as well. The next step should be education for city managers and city planners, as well as supervisors.

Audience observation: I don’t agree that to reduce pollution it is necessary to reduce the use of transportation. There is a strong link between transportation and economic growth, and developing countries may not want to risk their economic growth by hampering transportation. At present, there is also status in having “modern” motorized transport. The same holds for industry. Environmental standards that are too strict may hamper economic growth.

Of course, pollution does have an impact. It is important to monitor air quality, and to provide funding to maintain it at an acceptable level.

Mr. Beblo: The focus on particular modes of transport may be the result of observing what happened in Western countries and applying it to developing countries. However, we have a unique opportunity whereby, by educating people, by providing the possibility of public transportation, and by providing a set of instruments that encourage the public to use public transport, there will be interest in building a rational

network of roads and a rational transport system, and hence a way to reduce emissions. We can also diminish emissions by manufacturing smaller cars, not large ones as was done in the United States. A small car goes as far as a large one, but pollutes less, uses less fuel, and costs less.

This is the way we have to think. Of course we cannot shed human behavior and habits overnight. But things are changing. In Germany there is already a realization that private transportation is no solution. Because of traffic jams, employees are sometimes two hours late for work and have to work later to make it up. So they are looking for solutions. In the middle of the motorway they are building a super-fast train. In addition, "Park and Ride" is being implemented in Germany. We in Poland have just adopted this system, and it works.

Ms. Aloisi de Larderel: Another aspect to the question that we have not discussed is the problem of transport of goods. This is a challenge we have to face. The issue is not to reduce transport to nothing, but to have alternative transportation systems.

Questioner: When applied in developing countries, programs that reduce the use of transportation will reduce economic growth. The introduction of alternative transportation also means the reduction of jobs. Developing countries rely on many factors, many indicators, to stimulate the economic growth. These things are interrelated; a change in one means a change in another.

Alternative or reduced transportation may be an option for developed places like the United States or Europe; but developing countries are still at such a low level of economic growth and face so much unemployment. Of course pollution is a problem; but it is not the main problem. Other issues take priority.

In developing countries the main issue is how to stimulate economic growth, how to change the economic status in the country.

Chairperson Mboi: This is exactly why this conference is being held: to discover how to develop without endangering people. How to have economic growth without endangering and victimizing people, or victimizing the environment. How to achieve both economic growth and envi-

ronmental sustainability, rather than substituting one for the other.

Audience observation: We must not forget the implications of telecommunications, and the impact that providing alternatives could have in developing countries. A transport study conducted in Cairo in the late 1970s turned up a dramatic example. The initial finding of the study was that the telephone system in Cairo was so bad that most messages and communications were being lost. In fact, it was easier and more reliable to send a courier across town than to use the telephone. So communications do become an important part of the equation and should be considered in the question of alternatives.

Dr. Pachauri: Certainly one has to look at the possible of trip substitution through better telecommunications, but there are certain situations in which better telecommunication is not necessarily a substitute, but a complement. For example, a person equipped with a cellular phone may not need to be in an office and may actually take more business trips, not less, using more transportation. It is not a simple case of substitution. One needs to look at the nature of the trips and discover what travel can be substituted and what travel might actually end up increasing as a result of better telecommunications.

Mr. Guerra: I want to make a last comment and insist on the fact that air pollution is an integral problem and needs integral solutions. Solutions come not only from technology, and not only from awareness, but from a combination of these and other factors. The more the people participate, and the more open the authorities are to the voices of those that are interested, the better the solutions will be.

I have two observations on this issue of integrated solutions. No city in the world, that I know of, has established a ceiling in fuel consumption. We mainly consider individual source emissions, and base our standard accordingly. Cars should not emit more than a certain amount of carbon monoxide, nitrogen oxide, and so on. But what is the overall picture? What is happening in Los Angeles? They have the best gasoline in the world, they have the highest investment in streets in the whole world, and they have one of the

worst air pollution problems in the world. This is because they didn't start by considering the end result. Had they done so, they would have fixed ceilings for gasoline volume consumption, rather than just for emissions.

Another intervention that is needed is that, for every technical measure, for every invest-

ment in subways, in better gasoline, and in emissions verification programs, a certain percentage of the investment should be directed to build the awareness of the people. We take it for granted that awareness is building, but in fact, this will not happen without investment and effort.

PROTECTING PEOPLE FROM HAZARDS: MUNICIPAL AND INDUSTRIAL WASTE

Overview

Mohan Munasinghe

The 1992 Earth Summit in Rio de Janeiro and the Agenda 21 documents confirmed the universal acceptance of the goals of sustainable development. Although no specific definition of sustainable development has yet emerged, the strong consensus is that it should include a balanced consideration of the economic, social, and environmental dimensions of development. Unfortunately, economic growth and the increased pace of urbanization and industrialization in many countries have confronted cities throughout the world with the increasingly complex task of managing millions of tons of municipal and industrial solid and hazardous wastes that are being generated daily. Despite heavy municipal spending on waste management, most cities fail to provide efficient, reliable, and universal collection, or environmentally safe disposal. The cost to public health and the environment has been severe.

The growing volume of waste materials is particularly acute in developing countries, where improved waste management technologies have not yet been widely adopted, and where governments have not made waste management a policy priority—often because they fail to appreciate how harmful inadequate management is to human health and the environment. Each year millions of tons of a vast variety of wastes generated daily by residents, industries, commercial establishments, and institutions cause severe repercussions—the most

tragic of which are the millions of child and adult fatalities from disease caused by the improper disposal of human and solid waste. Indeed, throughout the developing world, less than 20 percent of solid waste is treated (processed), and only a small proportion of that waste meets acceptable standards. Experts predict that by the end of the century, more than 2 billion people will lack basic sanitation, and about half the urban population in developing countries will not have adequate waste disposal.

The World Bank has financed numerous projects in municipal solid waste and industrial hazardous waste—but each has been only a small component of much larger “urban” projects. They have had mixed success, and several represent missed environmental opportunities. Lessons from these remedial projects and other experience throughout the world prove that preventing pollution from inadequate waste disposal is more cost-effective than cleanup. Moreover, the fact that improper waste disposal and storage can cause irreversible environmental damage is inescapable. The lessons underscore the importance of integrated and more comprehensive policy approaches for improving municipal and industrial waste management. Furthermore, this broadly based pollution abatement experience provides the foundation for a new generation of Bank-financed projects that seek to protect people and their environment from solid waste management hazards.

What Types of Waste Are We Discussing?

Here, we discuss three types of urban solid wastes: *municipal solid waste*, *hazardous industrial waste*, and *clinical and medical waste*. Each category contains certain common features. *Municipal solid waste* normally contains paper, plastics, glass, metals, and various other household items, including street sweepings and general refuse from commercial and institutional establishments. In some countries sludge from sewage and water treatment plants are sometimes codisposed with municipal solid waste. *Hazardous industrial waste* (including heavy metals, dioxins, and polycyclic aromatic hydrocarbons) includes chemical and other industrial wastes whose composition can pose significant hazards to human health and the environment when managed improperly—acute or chronic infectiousness and toxicity to humans, ignitability and reactivity, and irreparable and expensive damage to ecology. *Clinical and medical waste* includes wastes generated by hospital and other health care services, including pharmaceutical, pathological, and infectious wastes; objects such as needles, syringes, and scalpels; and chemicals (aerosols, disinfectants) and low-level radioactive waste (X rays and radiation vials).

Environmental and Equity Concerns

Municipal solid waste collection services vary markedly throughout the developing world. Unlike the expanded, comprehensive collection services in OECD countries, collection, transfer, and disposal services in developing countries are sparse and ineffective. Municipal solid waste services are complicated by poor management, outdated collection and transport methods, scavenging, and a shortage of proper disposal sites. The uncollected waste then creates problems at the community level—clogging drains, releasing foul odors and toxic gases, and spreading disease.

But even when garbage and waste are collected in developing countries, they are often disposed of improperly. Uncontrolled, unsegregated dumping of municipal solid waste, hazardous waste, and clinical waste at sites in periurban areas and near squatter settlements poses grave equity concerns. Poor neighborhoods occupy the least expensive urban areas

that are next to industrial sites, dump sites, and areas with high pollution. As urban areas grow, the waste problems worsen, exacerbating the direct effects on health. The affected populations range from municipal workers who collect and dispose of the garbage to the scavenging families who live and work at the dump sites—but all affected groups represent the urban poor.

The rapidly industrializing regions of Asia and South America are increasingly facing the broader environmental contamination from hazardous industrial wastes that now pose complex problems in the industrial countries of Europe, North America, and the former Soviet Union. And as new chemical contaminants are created, new challenges for their disposal arise. Entire underground and surface water systems could become contaminated with hazardous substances, thereby making cleanup efforts more costly and less viable.

The Health and Social Costs of Poor Waste Management

Long-term exposure to hazardous substances has been linked to a host of diseases and medical problems, especially among sensitive populations such as children, the elderly, and pregnant women. They may suffer chronic, sometimes irreversible ill effects and the exacerbation of existing diseases from direct exposure to hazardous wastes, or from consuming waste-contaminated food.

Inappropriate waste management also has significant financial and economic implications. The income and productivity lost due to illness and premature mortality is staggering. Health care costs impose an enormous drain on the economy. The large bill for remedial action is a budgetary burden. If uncontrolled, these costs will handicap future generations, as they face cumulative budgetary costs, health risks, and environmental deterioration.

World Bank Lending Provides Valuable Lessons about Waste Services

In the areas of municipal solid waste and hazardous industrial waste management, past World Bank involvement has largely been through its lending program, and mainly as part of larger

urban efforts. The majority of municipal solid waste components have been limited in scope—targeted primarily at purchasing vehicles and equipment for municipal departments—with little impact on the quality or sustainability of services. As with municipal solid waste project components, hazardous waste management components have constituted only a small share of larger urban project resources; borrowing for hazardous waste management activities has become a priority for only a small number of nations, most notably Brazil, China, and India.

The Bank's agenda has more recently been expanded to include direct policy dialogues and technical assistance to member states. At the same time, both the Bank and its borrowers have learned valuable lessons from project components, refining waste collection and disposal strategies over time. Bank lending has moved from activities linked to individual projects to a more sector-oriented component of cross-media

pollution control projects. To reduce costs, the Bank is emphasizing pollution prevention, rather than treatment, consistent with the "waste management hierarchy" described in box 1.

Municipal Solid Waste Management

More attention must be given to effective and integrated operations, maintenance, management, and cost recovery. Experience shows that piecemeal approaches lead to only marginal improvements in municipal solid waste management. Limited funds have usually been invested in new vehicles or scattered infrastructure, exacerbating the fragmented nature of municipal solid waste management systems. Consequently, the quality of services quickly reverts to its poor original condition. For example, 30 tipper truck collection vehicles were procured in 1987 for Dar es Salaam, Tanzania, a city of 2 million people. Two years later 20 of the collection trucks were

Box 1. Waste management hierarchy

Conceptually, a waste management hierarchy involves the mixing and matching of a variety of waste management practices to safely and effectively handle solid waste streams with the least adverse impact on human health and the environment. On the one hand, it is the evolving strategy for conserving natural resources and energy, as well as abating, minimizing, and mitigating pollution across all media. On the other hand, it is an integrated waste management system where each component is designed to complement rather than compete with other components in the system. Specifically, it provides a scheme for municipal solid waste management intended to form a complete system for the proper management of waste. Waste stream constituents are matched to the management practices that are best suited for them in order to reduce toxins, and quantity of discharge, and safely extract any useful energy or material from waste prior to final disposal. Although many variations exist, all systems include the following elements:

- Source reduction (sometimes called waste minimization) should be the first option, to reduce the amount and toxicity of wastes. It can be accomplished through changes in design, technology, or input mix. Waste source reduction is part of a pollution prevention strategy.
- Waste reuse, recycling, or recovery is proposed as the second-best option, because it reduces both

waste management problems and the amount of new input needed. Reuse, recycling, and recovery can take many forms, depending on the source: at the factory, measures may include water reuse, and the recovery of chemicals in wastewaters and ashes; at the household level, composting of food and yard wastes is typical; and at the disposal site, options include energy production, and metal, glass, and paper recovery.

- Appropriate collection and disposal to handle the remaining wastes should be the third step in a waste management program. While collection schemes offer a continuum of alternatives (for example, containers, vehicles, transfer stations, and system operation), disposal offers two major alternatives: incineration or landfill. Incineration is useful in reducing the bulk of wastes and disposing of some highly toxic or hazardous wastes. On the other hand, it can be 10 times as expensive as a sanitary landfill and is much more complicated to operate efficiently. At a minimum, landfills will always be necessary to handle noncombustible wastes (demolition and construction wastes) and the ashes from incineration. Furthermore, when land availability is not a constraint, a well-operated sanitary landfill is an appropriate alternative to handle most municipal solid wastes.

still operable; four years later only 10 were operable, and five years later only 3. Today only a small fraction of the 1,400 tons of municipal solid waste generated each day in Dar es Salaam is collected, and serious health problems have recurred (UNDP 1992).

Strategic solid waste plans must be implemented. Cities should formulate strategic solid waste management plans that address the full range of solid waste services and related management activities. For large cities, the plans should focus on the requirements of the metropolitan area and the constituent municipalities; a national or regional strategic plan may be more appropriate for smaller cities and towns.

Collection services must be improved. Both primary and secondary collection operations universally require remediation. Collection system decisions should be based on analyses of solid waste, local conditions, and labor. To provide greater coverage for low-income areas and to maximize the sustainability of improved municipal solid waste management systems, projects should incorporate the use and development of low-cost, community-based technologies within broader solid waste management schemes.

Transfer, resource recovery, and disposal services must be refined. All investments in expanding collection capacity should be accompanied by corresponding investments in nonpolluting disposal practices, and the development of institutional and financial capacity for such operations. Where haul distances are greater than 15 to 20 kilometers or travel times exceed 30 minutes, transfer stations should be considered. In most low-income or less industrial cities, the most appropriate disposal facilities will continue to be sanitary landfills. Where a market for compost can be demonstrated, composting plants may be an option that should be promoted and supported. Greater support and emphasis is also needed for clean, efficient, job-creating resource recovery and recycling activities, often involving the informal sector.

Private sector participation should be increased. While many previous municipal solid waste management programs have focused on new transport or infrastructure needs, only in the past decade has there been a growing understanding of the importance of waste management issues. For example, a recent study of Indonesia's

Surabaya municipal waste system found that savings due to improved management and operations were 15 times greater than savings brought about by procurement of new equipment. In this regard, several Bank studies have shown the potential for private sector participation in municipal solid waste management, and, in particular, made clear that private sector operation of municipal solid waste services is more efficient and more economical than direct provision by the public sector, provided that the requirements of contestable markets are met.

Successful collection activities begin with an awareness campaign and the provision of start-up equipment. Devices for facilitating collection often enhance the process of collection, such as bags for separating biosolids, plastics, paper, and glass, and small carts for neighborhood collection. The provision of more accessible sites is also a key element. Incentive programs can also be initiated—for example, a reward for the cleanest street or community. In Peru a campaign of this nature was highly successful. After collection, several locally hired employees (who were given the necessary masks, gloves, and boots) took waste to a sanitary landfill site, which they covered over daily with a clay surface.

The livelihood of waste scavengers must be accounted for. In cases involving a decision to close, relocate, or centralize dump sites, the social and economic effects on waste pickers who make a living off the waste must be considered. Obviously, the optimal solution is to provide a more promising livelihood for these populations—for example, by employing them to separate waste at the source, at a transfer point, or preferably in small recycling industries. However, this option is not always viable; unless care is exercised, the danger exists that these communities will be pushed onto increasingly marginal lands around the city.

Hazardous Industrial Waste Management

The environmental threats posed by hazardous industrial waste has been recognized only recently. As concluded by the U.N. Commission on Sustainable Development in May 1994, there is a dearth of environmentally sound hazardous waste treatment facilities, information and

expertise, preventive practices, and financial resources to cover the enormous costs of treatment and remedial action. Illegal traffic in hazardous waste both nationally and across boundaries still exists in many countries. As with any new area of concern, hazardous waste management confronts Bank borrowers with difficult choices. Hazardous waste system management is also a new focus for environmental lending adjustments and a rapidly growing set of policy guidelines evolving in Bank operations and dialogues with borrower countries and other international agencies. As with other major pollution control policies, hazardous waste management is a long-term countrywide initiative that requires collaboration among regulatory agencies, the private sector, and the community.

A cradle-to-grave inventory of hazardous substances and wastes is a policy priority. International experience shows that these inventories are an important component of any hazardous waste management policy and can by themselves provide industry with incentives to reduce hazardous waste generation. A program of inventory and assessment of old sites should be part of any national hazardous waste management policy, with priority given to assessing the most dangerous sites. These inventories can be used to support decisions about both short-term remedial actions and future reclamation activities.

In the collection of industrial waste by municipalities, all potential sources of hazardous waste should be identified and targeted for appropriate management. Hazardous and chemical waste must not be commingled or dumped with municipal solid waste. The separation of hazardous, clinical, and municipal solid waste should be a universal practice, applied from the point of generation to the point of disposal.

As in other pollution control areas, international cooperation is vital to a national hazardous waste management program. Neighboring countries must agree on hazardous waste management in relation to shared resources. Ratification and participation in such international treaties as the Basel convention—on international movements of hazardous wastes—or the Marine Pollution (MARPOL) convention—on ocean dumping—will help shape national hazardous waste management policies. International collaboration,

including human resource development, information exchange, technology transfer, and training in hazardous waste management has been a growing activity among UN agencies and the international community.

Clinical Waste Management

Clinical waste collection and disposal is particularly problematic in developing countries, some of which have high incidences of AIDS and hepatitis, and where a shortage of virgin materials and high foreign exchange costs place a premium on high-quality medical plastics. Plastics from syringes are especially valuable, and sell for as much as five times the cost of lower-quality plastics. (Incidentally, evidence indicates that health care facility staffs are usually so underpaid that the sale of these materials is an attractive, if not vital, supplement to their income.) Drip bags and bottles, both plastic and glass, are also reused. Even bandages are sometimes reused as stuffing for bedding or sold as cleaning rags after being washed. A secondary hazard is created when recyclers clean the bottles with highly acidic chemicals.

Given the current state of health care delivery, privatization of clinical waste may have much to offer. The availability of private clinical waste collection would mean that smaller clinical and medical waste generators will dispose of waste properly rather than allow it to enter the local landfill along with household waste. Furthermore, local officials can play a major role in safe clinical waste disposal practices, either by earmarking taxes or by encouraging the private sector to pay its own way. Encouragement may also take the form of adequate zoning regulations, or the dissemination of information on clinical and medical waste disposal to the public.

Differences in Waste Collection and Disposal Needs

Differences in the nature of solid waste collection and disposal needs are linked to differences in the degree of industrialization, community size, and personal consumption habits. These differences are reflected particularly in the contrasts between industrial and developing countries, and strategies and procedures for efficient solid waste management must account for these differences.

The key concerns in industrial countries are high labor and land costs and the difficulties of finding locales to accept all forms of waste, as consumers grow increasingly affluent and influential. The effect of high labor costs is seen in the use of more convenient, throwaway materials for cooking, cleaning, and so forth, and the higher salaries of waste collection employees. With increased affluence comes an awareness of the possible risks of waste handling, and with the availability of alternative employment and a welfare net, the only incentive to accept such work is a relatively high salary. Combined with relatively low production costs and low costs of resources in industrial countries, the critical issue is how to deal with an increasing volume of waste that is expensive to process and discard.

In developing countries the high cost of virgin materials and production processes, combined with the opportunity cost of foreign exchange, makes recycling and reuse a more desirable option. The lower-income consumer base and low labor costs make recycling and reuse the less expensive option. Low labor costs mean that domestic help is a more viable option, even in middle-income homes. Thus, source separation is a less expensive option in the South, and the use of disposable items is less important.

In many developing countries a socio-religious taboo still exists about handling waste. This is particularly the case in the Indian Subcontinent, where waste was traditionally handled by the "Untouchables." This practice continues, although many have converted to Christianity or Islam. This attitude toward waste disposal degrades the value of the service provided by such people, and creates an unwillingness to clean up areas on a community basis.

Climatological conditions in developing countries also mean that waste putrefies at a faster rate, making efficient, timely collection and disposal services more vital. The common incidence of extreme weather conditions, such as typhoons and monsoons, means that disposal sites must be sufficiently guarded against landslides, the potential of mixing with high water tables, and so on. The benefit of the climate in most developing countries is that it makes landfill gas recovery more efficient, as highly organic waste decays faster, thereby increasing methane production. Moreover,

higher organic content favors composting—if markets are available.

Policy Strategies: Helping Borrowers Address the Problem

Governments should identify high-priority curative actions required to safeguard public health in the short term and to address existing problems—inadequate domestic wastewater treatment and disposal, industrial water and air pollution from urban transport sources, and inadequate solid-waste collection and disposal. But partial interventions should be avoided (for example, water supply without sanitation, or storm drainage without solid-waste management). Given the high cost of investment required for pollution abatement, service standards should be designed in accordance with affordability and willingness to pay in different areas of the city.

However, preventive policies are also required to control irreversible damage to resources and ecosystems. For example, improved urban planning and enforcement are often necessary to protect environmentally sensitive areas. A protection program for marginal lands may require using a balance of economic incentives and urban planning regulations. These would include policies to improve the functioning of land markets (for example, appropriate land-use and land-development regulations and more effective land-tenure and land-registration systems) and to improve access by the poor to serviced land, thereby reducing the pressure on marginal land.

Using Pricing Policy as an Economic Incentive

Given the difficulties of enforcing environmental regulations, incentive systems should be considered to encourage good environmental behavior. For example, pricing land, water, energy, mineral, and food use might encourage conservation by urban consumers and help protect resources. And in the context of more traditional solid waste disposal, where the focus should be on reducing the amount of waste generated, economic instruments could be a more cost-effective solution to waste collection and disposal. Such services could be charged on the basis of their social costs (including environmental costs). However, much more research is necessary to understand the

effectiveness of incentive systems for protecting the urban environment.

Improving Collaboration and Mechanisms for Regulatory Enforcement

Because local governments are normally responsible for enforcing environmental protection regulations established by the central government, the design of environmental regulations requires close collaboration between central and municipal governments. In many countries achievement of effective local-national coordination on standards and enforcement has proved difficult. And because standards must also be accepted by the public, public cooperation is required. Building a broad public awareness of environmental issues is essential.

Although more analysis is required in many countries to design realistic environmental standards and effective enforcement mechanisms, four steps are key to improving regulatory enforcement performance:

- Developing codes and standards that are easy to understand in order to minimize disagreements about compliance or enforcement. The codes and standards must also be supported by the resources necessary for effective implementation.
- Upgrading the status and pay of the civil servants responsible for enforcement, thus attracting more competent people to the job.
- Working with industry, communities, and NGOs to increase awareness and shared responsibilities for environmental resources.
- Using international expertise when local capacity cannot be developed quickly or effectively.

Setting Appropriate Taxes, Fees, and Charges

Waste can be reduced by minimizing its generation in the design and manufacture of products, and by encouraging the recycling and reuse of products. Market-based instruments or incentives are some of the measures that can be implemented to reduce waste in the presence of market failure. These instruments range from product charges or taxes and deposit refund systems, to recycling credits, material levies, and the licensing of landfill sites. The possibility of using a mar-

ketable permit system for paper recycling has also been discussed.

The effectiveness of these methods depends on the size and volatility of the markets for recovered materials, the adequacy of information, and the extent to which management is integrated across geographic and administrative areas. The instruments should have low bureaucratic and monitoring costs; and any taxes imposed should not be regressive, and must be kept simple. Pearce and others (1993) have suggested that charges be based on the weight and volume of the waste, and that they be lower for commonly recycled materials. Consumer participation costs should also be simplified as much as possible.

Involving the Private Sector

In planning municipal solid waste management improvements, more emphasis should be placed on financing, pricing, and cost recovery. Most of the new generation of Bank-supported municipal solid waste management projects seek efficiency gains by involving the private sector more heavily in service delivery through the introduction of competition. The scope for encouraging private sector participation ranges from contracting for collection and street sweeping services all the way to granting concessions for financing, building, and operating transfer stations, sanitary landfills, and resource recovery facilities. In Indonesia a special project seeks to promote a full range of private sector participation models in cities across the country. The informal sector and microenterprises also have an important role to play, especially in community-based primary collection and recycling activities. All forms of privatization require strengthening the management capacity of municipal authorities to prepare performance specifications and tender documents, manage the tender process, and contract monitoring and supervision. Finally, the introduction of service cost accounting and financial management is an essential feature of all projects.

Increasing Public Outreach

Enhanced institutional arrangements must include active public participation, NGO outreach, practices for protecting the environment and human health at dump sites, new sanitary

landfills, and waste treatment facilities. The success of any system depends on public concern for and willingness to participate in the management process. Furthermore, informing the public about health and safety issues and the risks associated with hazardous materials in solid waste should be communicated judiciously, without raising undue alarm. An enlightened and more rational public would be more willing to pay the additional costs for lower-risk systems.

Increasing Urban Research

A last item on the urban municipal solid waste management agenda for the 1990s is increasing our understanding of urban issues. Previous research has yielded important operational benefits, increasing worldwide awareness of the necessity of preventive approaches that seek cleaner production, waste minimization, and, more broadly, pollution prevention and a more efficient use of raw materials. Environmental management tools are also now available to promote an integrated approach, such as auditing, lifecycle analysis, and reporting. However, progress has been made primarily in large industries, while small and medium-size enterprises have not yet addressed cleaner production. The diffusion and widespread use of cleaner production is limited by many factors, including inadequate government policies; an absence of capital for major investments, resistance to change, the absence of expertise and skills, insufficient dissemination of information on cleaner technologies and products, and insufficient awareness of the economic benefits associated with using cleaner technologies.

Enhancing Capacity-Building Programs

Capacity-building programs must involve a wide range of officials, professionals, NGOs, private

sector institutions, and the public at large. Developing countries should seek more technical cooperation and assistance in setting priorities so that they can deal with long-term challenges while handling immediate results.

Global harmonization of policies and standards can be best achieved with collaboration between the multi- and bilateral organizations, which can combine their various areas of expertise and institutional knowledge to identify and implement a cohesive strategy for preventing, minimizing, and mitigating hazards at all stages of waste management—collection, transport, storage, and disposal.

Finally, a strategy of waste prevention, minimization, and reutilization should become the foundation of all future solid waste management support activities. Environmentally sound management of solid waste requires integrating all interrelated priority areas. The mix and emphasis given to each strategy will vary according to local socioeconomic and physical conditions, and the rates and composition of waste generation. Each country has its unique set of variables—its absorptive capacity as a waste sink, its level of economic development, the effectiveness of its regulatory bodies. Thus, it is essential that all policies be adapted to the specific economic, environmental, and social objectives prevailing in each country.

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The Superfund Experience: Hazardous Waste Cleanup in the United States

Robert T. Watson and Julie A. Roqué

Across the United States thousands of former industrial sites, municipal landfills, and government facilities are contaminated with oil, solvents, other industrial chemicals, and radioactive wastes. This problem is so pervasive that, on average, one in four Americans lives within four miles of a "Superfund" site—an abandoned or inactive hazardous waste site significant enough to be slated for cleanup by the federal government. Many of these sites threaten ecological systems and both the human and economic health of the communities in which they are located. The size of these sites and the magnitudes of the risks they pose vary, as do the anticipated costs to clean them up—ranging from millions to hundreds of millions of dollars.

Of particular concern is the disproportionate effect of hazardous wastes on certain communities. Poor and racial or ethnic minority people bear disproportionately higher and multiple risks from hazardous wastes in both urban industrial settings and rural locations. Farm workers, for example, often live in or adjacent to the fields in which they work, exposing them to toxic pesticides in their homes as well as in their work. Discriminatory practices, such as red-lining in housing, have exacerbated these disparities by preventing certain segments of society from escaping heavily contaminated areas. These risks are compounded by other social conditions, such as inaccessibility of adequate medical care and poor nutrition.

Federal Laws to Clean up Hazardous Wastes

The major federal laws that address the cleanup of hazardous wastes in the United States are the

1976 Resources Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)—commonly known as Superfund. The U.S. Environmental Protection Agency (EPA) is responsible for implementing both laws. RCRA addresses hazardous waste contamination at active treatment, storage, or disposal facilities by regulating ongoing management practices. CERCLA's authority applies to emergency situations and inactive or abandoned facilities. State laws may also require cleanups of contaminated sites.

CERCLA was enacted in 1980 in response to public outcry about the huge hazardous waste sites that were discovered in the late 1970s, particularly Love Canal in upstate New York and the Valley of the Drums in Kentucky. In several of these cases uncontrolled hazardous waste dumps threatened human health and safety, as well as groundwater and other valuable natural resources. CERCLA established a trust fund—the *Hazardous Substance Superfund*—to clean up abandoned sites that posed immediate threats.

How Does Superfund Work, and How Is It Financed?

Abandoned sites often are first identified and brought to the attention of EPA by state or local governments, property owners, or neighbors. Available documents on the history of the site are reviewed, the site is inspected, and soil and water samples may be collected and analyzed if EPA determines that contamination is a potential problem. These data are used to score sites

according to EPA's Hazard Ranking System. Sites with higher scores are listed on the National Priorities List—EPA's register of the nation's most contaminated sites. Superfund stipulates that EPA take action at hazardous waste sites that pose "a substantial endangerment to public health or welfare or the environment" (CERCLA, Section 104(a)).

Superfund was founded on the "polluter pays" principle—that those responsible for hazardous waste contamination should pay for its cleanup. Superfund monies are to be used to address imminent hazards, and EPA pays for cleanups with Superfund when responsible parties do not contribute voluntarily. EPA can subsequently pay for up to as much as three times the actual costs of cleanup; polluters can be held responsible for the costs of identifying hazards at the sites, containing and removing or treating wastes, and closing and monitoring sites.

The Hazardous Substance Superfund is financed primarily with earmarked taxes on the petroleum and chemical industries and other corporate taxes (figure 1).

Cleanup Costs Are Far Higher Than Anticipated

When Superfund was written, it was believed that only a few hundred sites would require federal attention and that cleanups would be paid for largely by the parties responsible for the

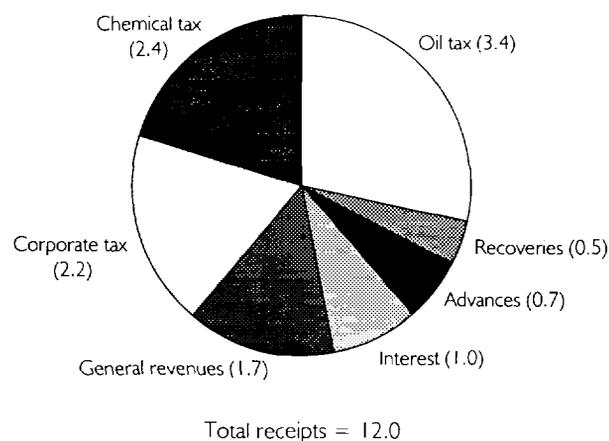
contamination. Superfund, then, was intended to be a revolving fund and expenditures from Superfund for extensive cleanups were expected to be recovered from the responsible parties—the polluters. Only the cleanups of abandoned sites were to be covered by Superfund alone.

During the early years of the Superfund program, however, EPA did not recover cleanup costs as was intended. According to the General Accounting Office, EPA excluded from its recovery efforts about US\$3.3 billion of program-related costs because of limitations on the interest and indirect costs that EPA can recover. But since 1980, EPA has obtained more than US\$8.3 billion in commitments from responsible parties, and in 1993, 70 percent of all remedial actions were paid for by private parties. This is more than double that for all cleanups undertaken in 1987.

Under Superfund, EPA has undertaken more than 3,500 emergency actions at 2,700 different sites. The actions include cleaning up chemical spills and removing leaking barrels of hazardous substances. The National Priorities List, however, already contains approximately 1,300 sites across the country, three times more than was envisioned when Superfund was written. Just 40 permanent cleanups had been completed by 1992, and another 1,100 are in various stages of response. The Congressional Budget Office has projected that somewhere between 2,300 and 7,800 abandoned sites will require federal intervention.

On the average, cleanups cost US\$25-US\$30 million per site, and complete remediation takes 10 to 12 years. Agencies have estimated that the total cost to the federal government for cleaning up National Priorities List sites may eventually reach US\$75 billion, but other researchers have estimated that the cost will be much higher. A recent study from the University of Tennessee, for example, estimates that the cleanup of all National Priorities List sites under current EPA policy could cost US\$151 billion; all environmental remediation (including federal facilities) might cost nearly a trillion dollars. In addition, thousands of other sites across the country are not listed on the National Priorities List but are the responsibility of state and local governments.

Figure 1. Cumulative trust fund resources, fiscal years 1981-92
(billions of dollars)



Source: Congress of the United States, Congressional Budget Office. *The Total Costs of Cleaning Up Nonfederal Superfund Site*. 1994.

Federal Facilities Pose an Especially Daunting Problem

Portions of more than 3,300 square miles of land at 137 sites in 34 states have been contaminated by decades of Department of Energy (DOE) research and development of nuclear energy or weapons. These activities have left surface and groundwater, soil, and structures contaminated with radioactive, hazardous, and mixed wastes. In 1992 DOE estimated that decontamination and decommissioning costs alone for 1,700 surplus buildings would exceed US\$54 billion. In addition, billions of dollars will be required to clean up contaminated soil and groundwater at inactive facilities. The University of Tennessee study estimates that DOE's total cleanup costs could be as high as US\$360 billion.

Other federal agencies also face significant cleanup responsibilities. In 1991 the Department of Defense estimated that it would cost US\$24.5 billion for its long-term cleanup costs; however, these costs may be as much as 70 percent higher, because the Department's estimate did not accurately reflect its full liability and because additional sites may also require cleanup.

The U.S. Department of Interior and the U.S. Forest Service face the largest potential for cleaning up hazardous waste contamination at inactive landfills and mines, with 25,000 to 300,000 mines on lands under their jurisdiction. As of November 1993 agencies and bureaus under the Department of Interior had listed 428 sites or facilities that may require cleanup. Furthermore, most Department of Interior agencies have investigated only a fraction of their properties. Lands owned by the Agricultural Research Service under the Department of Agriculture also will contain a significant number of landfills contaminated with hazardous substances that will require remediation. Other federal agencies, such as the Department of Transportation, also anticipate fulfilling significant hazardous waste cleanup responsibilities.

Why Did Problems Emerge in the First Superfund?

Superfund provides for joint and several liability, meaning that each party associated with contamination at a site may be held liable for the entire

cost of cleaning up that site regardless of its contribution to the problem.

Legal Liability Encourages Polluters to Battle in the Courts

Joint and several liability establishes incentives for reducing hazardous waste generation, but it also promotes the use of legal tactics to delay action and to shed financial responsibility. As EPA investigates the scope and cost of a permanent cleanup, it attempts to identify "potentially responsible parties" who were the most significant contributors to the problem. EPA then attempts to negotiate cleanup agreements with these parties for them to perform the work. If these negotiations fail, EPA may fund the cleanup and then sue the potentially responsible parties to recover its costs.

Potentially responsible parties may file legal suit against their property and casualty insurers to attempt to have them cover some share of the cleanup costs. Insurance firms often refuse to pay, arguing that the liability preceded their coverage or was not included in it. They also may even countersue to establish that they are not liable for the cleanup. Potentially responsible parties or their insurance firms, or both, also may sue other potentially responsible parties to get them to pay part of the costs, which can be particularly burdensome to small businesses. Potentially responsible parties have even gone so far as to sue EPA in efforts to make the agency accept a cheaper method of cleanup.

Forty percent of the total costs of Superfund have gone to legal fees for litigation over who should pay for cleanup. The House Banking, Financing, and Urban Affairs Committee of Congress estimated in 1990 that the annual legal costs to the insurance industry and its clients for determining Superfund liability were approximately US\$500 million. According to the Rand Corporation, the transaction costs to the private sector totaled US\$9.3 billion between the inception of Superfund and 1991.

A recent *Los Angeles Times* article illustrated the legal quagmire that the current Superfund liability scheme permits, and even encourages. One of the cases it cited was a four-acre chemical storage area that leaked dangerous chemicals into groundwater and seawater on Long Island,

N.Y. EPA identified 257 polluters that it determined should pay for the US\$7.7 million cleanup. At least 136 law firms were hired initially, and 4 of the 257 polluters sued 442 different insurance companies that then engaged the work of 72 more law firms. The owner of the site sued another 101 parties that he believed contributed to the pollution.

Redevelopment Disincentives

Superfund currently contains provisions for strict liability, enabling the courts to hold property owners responsible for cleaning up their land, even if they did not dump hazardous wastes or otherwise contribute to the contamination. Superfund also provides for retroactive liability. Generators of hazardous wastes can be held legally and financially responsible for harm due to the wastes they produced and disposed of before the law was passed, even if their actions were legal when undertaken.

In response, prospective buyers of industrial properties are hesitant to become involved with properties that may be contaminated and burdened with Superfund liabilities. Similarly, lenders do not want to finance the purchase of contaminated property. And even after urban industrial sites are declared clean, many purchasers will not take the deed for the properties because current law mandates that they assume liability for previous pollution. Thus, many of these sites remain fenced off, while surrounding neighborhoods lose jobs to outlying areas where new developments are constructed. In Toledo, Ohio, for example, a survey of real estate transactions found that 62 percent of the area's commercial and industrial properties are encumbered by environmental problems. Almost 20 percent of all Superfund projects are located in urban areas, often older metropolitan centers with decreasing property values, higher unemployment rates, and lower investment rates.

Lenders and prospective buyers avoid the reuse opportunities of these contaminated properties, referred to as "brownfields," given the added costs for cleanup and legal liability. Some owners, including large corporations, prefer to leave sites idle than to risk liability for cleanup. Instead, developers and investors turn to undeveloped locations ("greenfields"), eating up open

space for new industrial complexes. The costs of attempting to promote industrial redevelopment are falling on local communities that are subsidizing cleanups in hopes of attracting new industries to old sites. The state of Michigan, for example, has dedicated US\$45 million for remediation and reclamation, and Pennsylvania's Department of Commerce has spent US\$20.5 million.

Community Participation Has Been Lacking

Hazardous wastes impose the highest costs on the disaffected. While the environmental justice movement has expanded its focus to a wide range of environmental and occupational hazards, it began with the recognition that hazardous waste treatment and disposal facilities were located disproportionately in low-income and primarily racial or ethnic minority communities. Environmental justice activists argue that hazardous waste sites in these communities are added to the federal cleanup priority list more slowly, and that their sites are not cleaned up to the same degrees of protection.

Community advocates want not only stronger protection from all environmental hazards, but also a greater level of participation in most governmental decisions. There has been a movement in the United States toward relinquishing federal authority back to lower levels of government, and this has been an especially important issue in Superfund controversies. Since its inception, Superfund has been a response to local activism, and communities generally continue to view hazardous waste sites as a local problem around which they must organize to gain action.

Reinventing Superfund

The government's proposal to revise Superfund responds to the problems outlined above. The proposed legislation reflects the administration's commitment and dedication to striking the most appropriate balance among environmental quality, community development, and economic growth.

One guiding principle of the administration's proposal is to promote arbitration, not litigation. EPA will fund an "orphan share"—the portion of cleanup costs that cannot be attributed to identified polluters—rather than hold single parties

responsible for the entire costs of cleanup. And rather than have potentially responsible parties file legal suits against other polluters, the federal government will pursue other options. To provide an incentive to settle out of court, the federal government will impose joint and several liability only on parties that do not accept their allocation of costs. Furthermore, EPA will allow early settlements for *de minimis* parties (those that contribute only minimally to hazardous waste contamination) and will not pursue *de minimis* parties.

To encourage the redevelopment of brownfields, EPA will account for future land uses in cleanups. Sites that are industrial and not located near residential areas may not require cleanup to the same levels because hazardous exposures are expected to be much lower at these sites. Prospective buyers and investors would be exempt from previous liabilities with the condition that they not exacerbate the contamination and that they allow previous owners and the federal government access to clean it up. EPA also will exempt lenders and financial trustees from liability under certain conditions as a means to encourage them to provide purchase financing.

The administration recognizes that the community must assume an enhanced role in defining future land uses and cleanup strategies. Community World Groups will be created at each site to provide input into these decisions, and Technical Assistance Grants will be awarded to support their involvement. Furthermore, EPA would fund state Citizen Information and Access Offices to disseminate information about existing sites and their cleanups.

Moving toward the Future

Increasing expectations about quality of life and changing perceptions about the role of our government over the past 40 years have left much of the American public frustrated with our slow progress in cleaning up hazardous waste sites. The federal government can no longer meet all of these expectations, and we now confront difficult choices and changes.

Setting Priorities and Allocating Resources

One challenge today is setting both short- and long-term priorities among existing sites slated for

federally funded cleanup—both sites listed on the National Priorities List and those at federal facilities. In 1994 the White House formed an interagency Federal Facilities Policy Group to address this issue. Some of the questions it faces are:

- How clean is clean, and what is our goal for cleanup?
- What values should guide cleanup priorities and decisions?
- How should uncertainty be weighed into cleanup decisions?
- How much should be spent for safety at hazardous waste sites?
- How should local concerns be balanced against efficiency at the national level?

Coordinating Hazardous Waste Institutions

Although the United States has the most comprehensive environmental management system and some of the most stringent pollution control standards in the world, significant shortcomings arise from the fragmented structure of our regulatory system. Most of our environmental laws are media-specific—for example, the Clean Air Act, the Clean Water Act, and RCRA. Each of these laws regulates hazardous wastes discharged to different environmental media. And each was written at a different point in time as a response to perceived problems of the day.

A holistic approach must be adopted for managing and disposing of hazardous wastes. The government should continue to enforce media-specific laws, but should also subsume enforcement efforts under more comprehensive, multimedia laws that, for example, require pollution generators to minimize their use of toxic or hazardous substances in manufacturing or other industrial processes.

Promoting Environmental Technologies and Clean Manufacturing

The most significant lesson from the Superfund experience in the United States is that we must emphasize waste reduction and pollution prevention over waste generation, treatment, and disposal. It is clear from financial, public health, and ecological perspectives that we cannot afford to repeat our history of generating hazardous wastes and managing them in ways that are not

safe or environmentally sound. While we may never complete cleanups of all hazardous waste sites across the country, at least not to levels that we deem "safe" for any use, we can move away from production systems that create future problems such as those we face today.

The administration is developing a comprehensive strategy to promote the development and diffusion of environmental technologies. Currently, much of our focus is on developing more effective and efficient technologies for remediating hazardous wastes. But the initiative also emphasizes a shift toward pollution prevention over time. "Clean products" offer opportunities to begin balancing environmental, economic, and energy goals by reducing risk, improving process efficiencies, and creating products and processes that are environmentally benign.

On July 15, 1994 Vice President Al Gore released *Technology for a Sustainable Future* (National Science and Technology Council 1994). This document was the result of a multiagency effort to establish a national dialogue on promot-

ing environmentally sound technologies. Workshops since have been held across the country to gather recommendations, and on Earth Day in April 1995, a national environmental technology strategy will be released to outline a more comprehensive agenda for the future.

The administration already has under way several environmental technology efforts. In fall 1993 the administration entered into the Partnership for a New Generation of Vehicles to work with the American automobile industry to produce family cars that are three times as energy efficient as today's vehicles. On another front the administration's Climate Action Plan is mobilizing federal, state, and local agencies, private firms, and citizens across the nation to use existing technologies to reduce greenhouse gas emissions.

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Community-Level Waste Management: Experience in Poor Urban Areas of India

Sheela Patel

My organization, the Society for the Preservation of Area Resource Centres (SPARC), which is now about 10 years old, works with people who live in informal settlements. We started in Bombay, and we now work in about 10 cities in India. A large proportion of the poor people in each city have, at some point or the other, scavenged or sorted waste at dumps or worked on municipal garbage collection crews informally. I use them to illuminate my discussion of waste management at the community level.

One hard reality is evident in our work: the communities of India's cities—especially those pockets that consist of the poor—have been completely left out of all areas of decisionmaking. So when we speak of community participation and the ability to make informed choices—all these are words that we are struggling to give meaning to in all the survival strategies to which poor people are clinging.

Urban Development Is Eroding Traditional Recycling Practices

About 25 to 30 years ago in all areas of India, whether rich or poor, our cities had one man who ran a collection center for paper, plastic, glass bottles, wood, and other refuse items. Today real estate development has begun to choke off these shops, and they are rapidly disappearing from the cities. For example, Dharavi—a large slum area in Bombay—contains about 1,300 units that process plastic and paper and package it for recycling—all of which is completely financed by the informal sector. But as part of the city's develop-

ment in this area, these recycling units stand to be evicted and their industry usurped.

These informal shops and units—which had historically provided efficient waste collection management—have been supplanted by a chain of about 5 to 10 levels of waste pickers whose intensity of waste collection depends solely on how much money they need for their pockets. The chain goes all the way up to the city-level collectors, who must negotiate prices and fees with what is considered to be the 1 percent part of this industry that is formal—the metal laundries, or the glass recycling units, or the paper factories. They are the ones who decide collection prices today.

The Relationship between Cities and People Prevents Workable Partnerships

As part of an attempt to modernize Bombay, development authorities are in fact looking into forms of waste disposal management—and specifically how it can involve communities. But their actual efforts fall far short of what is necessary.

A public campaign is being initiated to train poor communities to keep their settlements clean—but the reality is that the city garbage collection unit sometimes lets work go for 15 days at a time. So the people can be very conscientious about clearing all their domestic waste and piling it up for collection, but then the city does not bother with it for 15 or 20 days.

So we have a city-level educational campaign for poor people who, in any case, do not generate more than 5 to 10 percent of the waste in the entire urban area. The campaign is not targeted

at the middle class or the elite. It is not attempting to train *them* to sort their garbage or to use less plastic.

This situation captures the entire contradiction of what is happening at the local level. This is how an international development strategy ultimately filters down to the local level.

Another example comes from Kanpur, where about 200 tanneries are located on the Ganges River, upstream from a huge informal settlement area. Seven years ago a joint India-Dutch project was initiated to clean up the Ganges, and specifically to address the problem of pollution created by the tanneries. It proposed putting a purification plant between the tanneries and the settlements, under the presumption that all the water pollution was emerging from the tanneries. But we found that the actual processing of leather—which is the most polluting part of this process—was actually being subcontracted out to the settlements, creating groundwater pollution in these communities. But this same project team decided that it was going to construct tube wells in the settlements with the polluted groundwater.

As part of the project, some of us were asked to design the community participation component, and we attended the design meeting at which these proposals and plans were discussed. We mentioned the undesirability of their plans—their folly—but we were ignored—ostensibly because we had no technical background, but tacitly because we were representing the poor. And so this huge, not totally logical project continued, and wound up having terrible impacts.

But we are now a large network, a large federation, with very vocal and articulate leaders, and international consultants and experts come to visit us to ask us to be part of this committee, or that. We are initially pleased and excited about the opportunity. So we attend the kickoff meetings, sitting down with our mayors and our commissioners—all of us at the same table. But then, invariably, that is the only meeting in which we participate—either subsequent meetings are scheduled at times when we are unable to attend, or the agenda at the meetings we can attend has nothing to do with us.

We are then often asked as a nongovernmental organization whether we wish to monitor the

project. This request makes even less sense than asking us to sit down at the table, because we simply are not experts in the technical or operational facets of projects; and even when we do have an expert available from the community, we rarely get to see any of the documents that would be pertinent to the monitoring process.

We Need Hands-on, Community-Level Research

So how do people's organizations and community groups build their skills? How do they get an education that informs them?

A basis for the answers to these questions is the work our federation has done in the past seven years to demand that community toilets replace the individual toilets that had been part of a policy plan to give poor people a toilet inside their tiny (10-foot by 10-foot) homes to enable them to keep their homes clean. But what no one on the design, planning, financial, and technical team seemed to acknowledge was that we have no water, no proper drainage, and no sewerage system. So the toilet is bound to be dirty, whether it is inside or outside the house.

But no one has been accountable to us. It has taken us seven years to get a policy review in the communities that want toilets outside, a request they have the right to make. In seven years we managed to get community toilets in just five settlements.

What we in the poor communities need is to create information bases of how systems are being planned, designed, and operated within communities—knowledge from our own perspective on and opinions about project work and experience. Armed with this community-based research, we can independently assess and monitor what goes on in our communities and not be forced to depend on the propaganda of the state machinery, which the people discount anyway.

And finally, we must also have a say in how this community-based research should be organized and located. If it is to be truly *participatory* research, then we do not want to be relegated, as is usually the case, to being just the poor people participating in rich people's research.

Solid Waste Management: Experience in Alexandria, Egypt

Olfat el-Sebaie

Alexandria is the second largest city in Egypt, with a permanent population of three and half million. Located in northern Egypt on the Mediterranean Coast, it also attracts an additional million tourists every year.

The city generates approximately 1,720 tons daily of domestic solid waste alone, not to mention thousands of tons of industrial waste and construction and demolition debris. But because waste collection service covers only about 60 percent of the population—and is irregular at best—refuse routinely piles up in the streets, and is periodically burned. Compounding the problem is the rapid population growth in the city, which is increasingly expanding to new urban areas to the west. But because migration to these areas has largely been unplanned, the inadequacy of waste collection—and its detrimental effects on the environment, public health, and the aesthetic quality of the city—is following the population, and is now making the waste problem much more pervasive for city administrators.

It is clear that several changes are called for. Unfortunately, we have reached only the point at which we have identified the problems. Resolving them will require a coordinated effort by government and the communities, as well as ample financial resources.

Harmful Consequences of Inadequate Solid Waste Management

A solid waste management scheme was first proposed and implemented by the Alexandria Governorate in the early 1960s. The plan divided the

city into four districts, each of which comprised several divisions. In turn, each division was responsible for cleaning its streets of solid waste and for collecting solid waste from households, using its own personnel and vehicles. At first the community itself took charge of these functions. Later, Public Cleansing Departments emerged in the districts, and began managing street solid waste almost exclusively, giving responsibility for these services to more local-level organizations under their supervision—Community Development Associations. But later, the Public Cleansing Departments began taking responsibility away from the Community Development Associations, and began supplanting domestic solid waste services with more efficient community-based operators that had historically operated as private contractors in the community—known as the *zabalin*. The *zabalin*, using baskets and donkey carts, had long been responsible for collecting waste, sorting through it for such valuable items as paper, glass, and bones, selling these valuables to certain industries, and disposing the rest (mostly food garbage) as feed for animals, compost material, or refuse for the dump site.

As of 1994 the solid waste management system has been centralized to the Department of Public Works in the Alexandria Governorate. Besides administering the activities of the Public Cleansing Departments—which are one step above division-level, or community-level, responsibility—the department is the central force for city beautification. The roles of both the Community Development Associations and the *zabalin* have diminished considerably in the past five years.

Inefficient Public Cleansing Departments Crowd Out Community-Level Efforts

Available data indicate that the capacity of Public Cleansing Departments' trucks is greater than the amount of solid waste generated from houses and streets. Yet solid waste continues to accumulate in the streets. One of the primary reasons is that the Public Cleansing Departments seem to be diverting their trucks away from community needs toward collecting waste from construction and demolition operations, industries, and restaurants and hotels. In each case, they are circumventing licensing and fee laws. Moreover, evidence indicates that only about 70 percent of the fleet of available trucks are in fact being used, and those that are being used are in disrepair. The daily amount of collected solid waste transferred to the final disposal sites is thus only 60 percent of the amount generated per day. The Community Development Associations in the evening shift and the *zabalin* can handle only a small part of the waste piling up in the streets.

Labor for Collection, Hauling, and Street Sweeping Is in Short Supply

There is a personnel shortage of more than 40 percent, making areas to be covered per worker much larger than normal. And extensive absenteeism and the diminishing role of the *zabalin* exacerbate the problem. New and inexperienced private companies are beginning to appear in the districts, and none of them has been successful at managing the collection and sweeping processes properly. The only successful cleansing company in Egypt at present is the Care Service Company. The Alexandria Governorate signs a contract with this company each year to sweep and collect garbage from the Corniche, the beaches and the beach access streets. The governorate's payment to the company increases each year. It has risen from 200,000 Egyptian pounds (£E200,000) in 1989 to £E2 million in 1994. Unfortunately, the contract extends only throughout the summer months (July to September), and it covers only collection and sweeping. Moreover, the company uses its own equipment, workers, and vehicles, none of which is suitable for garbage collection.

End Disposal Options Are Limited

The only two methods available for solid waste disposal are waste tipping and uncontrolled burning and dumping. Alexandria is running out of tipping spaces and, while it would seem obvious to locate landfills in the desert areas, the distance involved makes this option cost-ineffective. Although the land required for landfills should be allocated by the Alexandria Governorate, the process will be both complicated and expensive, since the Alexandria Comprehensive Master Plan, completed in 1982, did not include a plan for available land to be used as dump sites or sanitary landfill sites.

Financial Resources Are in Short Supply

The financial resources of the Department of Public Works, which administers municipal solid waste, come from the governorate budget and the income of the Cleansing Fund (the revenue of the fund comes from a 2 percent cleaning tax on the value of rental properties). The total annual budget for the Public Cleansing Departments is £E6,433,000. Expenditures for wages, bonus incentives, and the operation and maintenance of vehicles are first channeled through the local governments. But these resource expenditures are not enough. Although the city sometimes seeks loans from various sources to defray the costs of equipment, these loans of course carry interest charges, increasing expenditure burdens. The basic problem is that the city lacks legal mechanisms to charge service recipients directly for municipal collection and disposal services. Cleansing Department records indicate that the total cost per ton of solid waste collection has reached £E30, including collection, sweeping, maintenance, and final disposal in landfill.

Industrial and Hazardous Solid Waste Is Commingled with Domestic Waste

Forty percent of Egypt's industries are located in Alexandria and are distributed among six industrial complexes, comprising such industries as food, metallurgy, petroleum, paper, textiles, and chemicals. Industrial solid wastes are those generated by manufacturing facilities and are regarded as "no man's land" in municipal solid

waste management. Although the respective industries should be held responsible for disposing their own wastes properly, some industrial solid waste is merely disposed of with municipal solid waste or is thrown into streets, to be handled by the municipality (see Saleh 1975). These wastes may contain such hazardous substances as ash, slag, sludge, and heavy metals that originate from printing, tanneries, and the ceramics and metal industries. One common waste from all industries is the empty metallic or plastic containers in which different chemicals are shipped. Not only does this industrial solid waste endanger solid waste workers during handling, but it also seeps into the ground and into groundwater after it is dumped, and is aggravated by the lack of proper measures for sealing the bottom of the dump, collecting the leachate, and treating it. In addition, a pilot composting plant being operated by the Alexandria Governorate (discussed later) might be affected by the quantity and quality of industrial solid waste, which may add toxic compounds to the final product.

The potential hazards of these industrial wastes may be short-term—such as toxicity by ingestion, inhalation, and skin absorption or corrosivity—or long-term, such as carcinogenicity from polluted underground and surface water. The toxic substances and heavy metals that affect the composting process may damage soil and crops when applied to land as fertilizer, a widespread practice in both Alexandria and the neighboring areas. Finally, the disposal of industrial solid waste in water bodies may affect aquatic life and, in turn, food production. For example, evidence indicates that industrial solid waste pollution in Lake Mariout, on the outskirts of Alexandria, has reduced fish production by about 80 percent.

Waste Collection and Disposal Processes Pose Severe Risks

Each process of waste collection and disposal poses severe environmental and health risks.

Uncollected Garbage Attracts and Breeds Flies

The high percentage of domestic waste as part of the total solid wastes (68.3 percent) creates problems because of its high moisture content, which

attracts flies and causes odor from decomposition. This problem is of course much more severe in the summer months and is particularly exacerbated by the irregular waste collection schedule (el-Sebaie 1990 provides an in-depth discussion of this problem).

Improper Transfer and Open Dumping Release Airborne Particles and Noxious Gases

When transferred in open carts and trucks, light items, such as paper and plastics, may be blown by the wind and scattered all along the route to the disposal sites. The transfer of highly moist wastes may create spillage on the roads, especially if compactor trucks are used, in which the compaction squeezes the water content out of the waste.

In Alexandria all dump sites are located adjacent to residential areas. The practice of open dumping scatters paper, plastics, and dust. Settled and airborne dust were measured by the Japanese International Cooperation Agency (JICA 1986) at different locations in the city and at the dump site. The results showed that the amount of dust is higher at the dump site as the solid waste trucks come and go. According to the prevailing wind and humidity, the residential areas around the dump site were affected by soiled laundry from fly ash and skin and eye irritation from noxious gases, all of which have both a psychological and a physiological effect. The major dump site located close to Alexandria Airport is also a potential danger to aviation because the dust and smoke emanating from its smoldering wastes diminishes visibility.

Disposal at landfills, with subsequent compaction and decomposition, creates a large amount of leachate and explosive gases. The leachate may contaminate nearby water bodies, used in Alexandria to raise water fowl and to farm fish (el-Sebaie 1988). Evidence indicates that the incidence of infectious hepatitis among those living in Abbis and Karmouz sites, which are close to the dump sites, are higher than among those who are living further from dump sites, such as in Khorshed.

The dump sites are also breeding grounds for vermin and pests. Animals caught in the Moharram Bey area close to the dump site were found to have a much higher percentage of

Trichinella spiralis than those in other areas (el-Sebaie 1990). These animals included 21 percent *Rattus norvegicus*, 13 percent *Rattus rattus*, 2 percent *Mus musculus*, and 18 percent stray dogs, all of which are known to pass trichinella to other mammals and then to humans.

Resource Recovery Items Are Stored Too Close to Residential Dwellings

Domestic solid wastes and industrial solid wastes that are collected by the private sector are sorted by these same collectors. Sorting is performed manually in streets, on vacant land, and at dumping sites. Salvageable items, such as glass, metals, high-density plastics, wood, paper, rag, leather, and bones, are baled for resale. Although this recycling process is beneficial, since it provides industries with raw materials at low prices, current procedures have many side effects, on both the public and the workers. The baled salvable items are generally stored within residential areas—despite laws and regulations that stipulate that these secondary materials be stored at a distance of at least 250 meters from stores and residential buildings—and are a menace to safety and to the public health of the neighborhood.

The rejected materials, such as dust, low-density plastics, and worthless paper, are thrown into streets, or into water bodies, mainly the Mahmoudia Canal, along which most of the sorting operations take place. The workers carrying out the sorting are exposed to many hazards because of the manual handling of these wastes. One of the most hazardous practices for health is the use of empty containers discarded by industry to carry and store water, grains (rice, beans, etc.), and sugar. In this respect, it is recommended that the authorities establish sanitary resource recovery facilities at the dump sites and/or encourage citizens to separate recoverable items at source, with fixed weekly or monthly collection days for each item type.

What Solutions Should Be Implemented?

Composting plants should be encouraged as a means of treatment and disposal for domestic solid waste. A high-level committee of experts was convened at the Ministry of Local Affairs in 1978, with participants from the Ministries of

Agriculture, Industry, Public Health, Planning, Economy, and Electricity; from several research institutes; and from the governorates of Alexandria, Cairo, and Giza. The committee investigated and studied 35 international projects from different countries in which different techniques were used to convert domestic solid wastes into organic fertilizers, among other useful products. The committee made several recommendations—the most important of which was that incineration be discontinued given its high cost and its immense contribution to air pollution, and that composting be adopted as the most economical and hygienic method for disposing domestic solid wastes for use in land reclamation. To that end, the committee also recommended that simple low-cost technology and maintenance methods be used, rather than sophisticated technology, and that the initial mechanical separation of resource recoverable materials account fully for safety and sanitary conditions prior to composting.

In 1984 a pilot composting plant was built in the middle district with a capacity of 160 tons a day (box 1). The plant was financed by a loan

Box 1. Abbas pilot composting plant

The plant started operating in November 1984 and was officially opened and handed to the governorate in March 1985. The plant capacity is 10 tons per hour (or 160 tons daily). The processing technology is *windrow-type fermentation*. The technology is simple, the process can easily be maintained, and it is the least-cost option available. The compost plant ran an operating deficit in 1985 but rebounded to a surplus by 1987 as the price of coarse compost rose from £E5.5 to £E7.5 per ton and that of fine compost from £E7.5 to between £E11 and £E19 per ton. In addition, the prices for some of the reclaimed materials increased (for example, the price of plastics increased from £E100 per ton to £E320 per ton).

Compost samples of nitrogen, carbon, carbon-nitrogen ratio, phosphates, and sodium chloride have been analyzed, and in each case their content complies with Law 100/67 for agriculture organic fertilizers. In addition, pathogenic indicators, bacterial counts, and fungi counts were measured, and their concentration is the same as their concentration in ambient air; and compost was free from nematodes. Given the success of these measures, demand for this compost for fertilizing agricultural land has increased.

from the World Bank. Recently, JICA has agreed to build another plant with a capacity of 300 tons a day as assistance from the Government of Japan. Also included in this agreement is a supply of waste collection vehicles, and equipment needed to undertake final disposal in a sanitary landfill.

But great demand for compost exists in Egypt, as it does in most countries with arid lands. Estimates put potential land reclamation area at about 800,000 *feddans* west and east of the Nile Delta and in Sinai. Based on the application of about 10 tons of compost for each *feddan*, the required amount would be about 8,000,000 tons in total. If all the domestic solid wastes collected from the cities of Egypt were converted to compost, the yearly amount produced would not cover more than 10 percent of the actual demand for organic fertilizers. Selling material recovered in the pilot composting plant may be considered a source of revenue and would cover some of the costs of maintenance and operation.

Industrial and hazardous waste should be collected separately from domestic solid waste. It is clear that proper management of industrial solid waste is mandatory. The Alexandria Governorate should create a special landfill for toxic and industrial solid waste and must enforce industrial disposal of hazardous wastes in sealed barrels to facilitate transportation to the specific landfill for hazardous wastes.

The government must formulate a strategic plan. Several items should appear on a strategic agenda by the government:

- Planning and management for urban environment must account for development in unplanned areas. Waste management can be used as a starting point for organizing community-level action in these areas, so that other improvements, such as drainage and pit latrines, can be implemented and maintained.
- Public consciousness about the solid waste problem should be strengthened. Education is essential to motivate people to improve their environment and reduce health hazards; it will also give them confidence to organize collective action.
- A solid waste management system must be established, consisting of domestic waste collection stations that should be set up with the consent of the communities affected. The system should also establish "fixed place and fixed time" collection, which must be enforced by the authorities.
- A financial basis must be established to strengthen the cleaning budget. Authorities must also encourage and support resource recovery from solid wastes as one effort to hold down costs.
- Rural areas should be developed more effectively to improve living standards, housing, and facilities, to slow the migration from rural to urban areas.
- Industries and governorates must control the collection and disposal of hazardous, toxic, and special solid wastes to prevent public health hazards and environmental damage.

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Floor Discussion

Question 1 (Mr. Munasinghe): Mr. Watson mentioned costs in excess of \$75 billion to clean up hazardous waste sites in the United States. Over what period of time is this expenditure to be incurred? Second, are the costs so much higher at some sites that it is not even worth cleaning them up?

Dr. Watson: On the first question, at the moment cleaning up abandoned civil sites is costing Superfund \$1 to \$2 billion a year. The Departments of Defense and Energy together spend approximately \$10 billion a year. If the figure were only \$75 billion total, we would be able to clean up our hazardous wastes in six or seven years. However, these numbers are in the hundreds of billions of dollars; we are looking a long while into the future. Some of the sites, especially nuclear waste sites, pose a real challenge to technology.

As to whether it is worth cleaning up the worst sites, here we cannot apply a straight cost-benefit analysis. The general measure is that even the most susceptible in society is protected from toxic waste. We need to protect human health. If the most susceptible are the elderly and children, that is the standard that should apply.

However, we need to prioritize. Rather than having cleanup efforts be top-down from government, we believe it is much more appropriate for government to give an overall framework but to have states and local governments work with citizens groups.

Question 2: Is there some indication of the capital costs for the Eastern Bloc countries to clean up their hazardous waste sites? What is the forward

thinking on cost for cleanup of sites in other industrializing countries?

Mr. Munasinghe: We have no estimates, but we have some numbers for the nuclear facilities because they are part of the power sector. But we do not have numbers for polluted sites, per se, or the military sites. But relative to the GNP of the former Soviet Union and Eastern Europe, the costs are much higher than in the United States.

Dr. Watson: These are serious issues for all countries, which is why it is essential to try to build preventive measures, such as waste and energy minimization, into the design of industrial plants right at the beginning. In the short run, and without considering environmental costs, one might well be able to design plants that are cheaper without this technology. However, looking at the implications of design over the complete life cycle of the plant and bringing in the cleanup costs, there is no question the movement toward pollution prevention will pay over the long haul.

Audience observation: The problem is that the people who make money today are not worried about the costs for later on.

Question 3: Since hazardous waste is not necessarily a local problem, how can local and regional and national interests be balanced? In particular, given the problems of incomplete information and "not in my backyard" (NIMBY), might not public participation be more costly than the actual solution?

Dr. Watson: The idea behind Superfund is that cleanup should be the responsibility of the industries that caused the pollution. The federal role is to help to identify the polluters; and if we cannot identify the polluters, we believe it is up to the federal government to pay for the cleanup as a last resort. As mentioned earlier, these funds come from taxes on the chemical and oil industries, and through other corporate taxes, in addition to "polluter-pays" fees.

We believe that local participation must be part of the pragmatic decisionmaking process. Insofar as there is only a limited amount of money, local residents themselves will have to be aware of the limitations of funds and of the approaches to cleanup; and they must take an active part. Hopefully, there will be a level of pragmatism in the community participation, and they will not have unrealistic expectations of what can be achieved.

This may well be difficult to implement. But in the interest of environmental justice, it is important for the community to have information on the issues, the funds available, the cleanup options, and future land-use options. There is no question our poorer communities in urban areas tend to be the most disadvantaged by hazardous waste sites. We must recognize this and resolve the issue. Most Superfund sites are not in the rich neighborhoods. They are in the poor neighborhoods, and that is something that we have got to come to grips with. The current administration feels strongly that community participation is important and there is going to have to be a level of pragmatism on all sides.

Dr. el-Sebaie: Continuing on this question, priorities and options are highly technical issues. How will the community decide on this? There must be a program of awareness for the community before they are asked to participate.

Dr. Watson: Absolutely correct. There must be information first about the dangers of the sites, where they are located, the chemicals present, and the implications for human health, for water contamination, and for ecological damage. The communities need a means of independent evaluation of the system. The first step has to be information. But the program should not be from the federal government down. It will be the local and state

governments working with the federal infrastructure, which will provide broad guidelines and ensure that money is available so that cleanup is performed and information flows to local community groups.

Audience observation: New York City has an example of federal and state action in a highly industrialized area that has a lot of oil spills and is home to a lower-middle-class community. The Department of Environmental Protection in New York is setting up a GIS system to inform the community, and a technical advisory committee works with the community. Although the program is two years old, it is not well known. And because funds are being slashed, it is one of the first programs being cut.

Audience observation: Currently in the United States, in areas affected by high levels of nuclear waste, money is being made available to some local governments to do their own research into disposal options. Some are taking advantage of this, and are coming up with their own experiments that they want to perform to collect their own data.

Question 4: What are the results of the World Bank's Mexico Project? Part of the project is based on experience from a 1986 World Bank pilot project. That pilot project had problems due to the lack of some of the overarching issues mentioned here: the lack of a framework, of standards, of policies on cost recovery and pricing. Mr. Munasinghe mentioned the Mexico Project as a successful one, but to the best of my knowledge it has not been implemented yet.

Mr. Munasinghe: Rather than a successful project, I believe I said it was a good example of the new, integrated approach, as opposed to our earlier piecemeal approach. Most multilateral and other aid institutions tended to go for small technological components in the past. The integrated approach is a new one that focuses on prevention.

Question 5: What are the World Bank's current research priorities in the area of waste management?

Mr. Munasinghe: In terms of solid waste management and energy cogeneration, the two

energy crises in the 1980s generated a lot of technical literature on joint power production, in addition to other schemes. The present emphasis is to look at technology as one element of a total package. The package must include policy instruments, of which pricing, pollution taxes, cost recovery, and regulatory measures are very important elements. In addition, community participation and the empowerment of stakeholder groups has become very important.

In a sense, our current research publications are less purely technical, and the focus is now more on prevention. For example, our recent industrial pollution management and control guidelines are, in effect, preventive measures. For each of 80 categories of industry and economic activity, such as cement production, the guidelines point out things to look out for, available pollution control technologies and other measures, and an estimate of costs. We do not go so far as to specify the actual emission standards because such things depend on local conditions. But we give choices.

To be clear, we are not funding pure research in solid waste; rather, through pilot projects and studies, we are developing practical applications and alternatives.

Question 6: Mr. Munasinghe, one of your slides places combustion as an option for solid waste disposal, alongside recycling and recovery. This is surprising because combustion is often an expensive option, especially for poor countries. Should it not be evaluated alongside such options as composting, with caveats as to its cost and controversiality?

Mr. Munasinghe: You are absolutely right. This was just an example; by listing it I did not mean to give it undue priority.

Audience observation: In the case of medical waste, sometimes combustion is the best option. Even if it is an expensive way of generating energy, it is the most effective way of disposing of a very hazardous substance safely.

Question 7: What about the institutional arrangements necessary to involve community participation?

Audience observation: In the Mexico Project the Ministry of Social Development is the federal

agency that sets standards and serves as the technical agent for the project. The municipalities execute the projects.

Mr. Munasinghe: This is a key point. To the extent that the project has elements from the different levels—federal, state, and local—we are trying to get down to the grassroots.

The new institutional mechanisms must promote a bottom-up approach. Let me stress that making people aware of the options and the choices, the costs and the technologies, is a very important part. In the Bank we are developing a tool called “decision support system,” which is microcomputer-based. Although it may sound very “high tech,” it is designed to be user-friendly, and to help an urban community understand the likely pollution scenario, given industrial location, infrastructure, and growth. It gives the community a tool by which they can make reasonable judgments. Part of the new institutional arrangement has to be community education, so that community members can participate more effectively.

Audience observation: Following on Ms. Patel’s presentation, a Global Environment Facility (GEF) project in Pakistan has an interesting result with respect to community participation. The project was designed to look at the environmental and social impacts of a “waste-to-energy” plant. Our initial concern was that the waste pickers would be displaced by this activity. In fact, we found that both the waste pickers and the project would benefit: by presorting, the waste pickers increase the energy intensity return that would be generated in this plant. Although the project is still in development, we are trying to include the waste pickers in the process. The Bank is looking further into this approach.

Ms. Patel: The issue is to start with a constituency of people and redesign the system to benefit them. Then you can incorporate their interests and concerns. We work with a community of people who have other jobs but also pick waste. We have a huge savings and credit program, and we have found that many of these people take out loans to buy into specialized recycling goods.

But when we spoke to those designing the municipal waste program, they saw no relationship to this. They only wanted to know whether

we could give them 10 women to do composting. That is the sort of problem we face.

Dr. el-Sebaie: In Cairo the informal garbage collectors, the *zabalin*, are organized in an association. They live in poor environmental conditions, but they are making improvements. They have started to use their income to replace their donkey carts with tractors to collect the garbage.

They now have a health center, a composting plant, a small plastic recycling plant. The experiment has been successful because the city government found that they could not get rid of the *zabalin*. They must be in the system. More than 4,000 *zabalin* are working in the system, which is quite different from Alexandria's.

Question 8: The composting project Ms. Patel mentioned sounded quite negative. Would she elaborate on that?

Ms. Patel: I did not mention the composting plant as a negative example, but rather to illustrate the fact that the city needs to look at alternatives to handle and treat different kinds of waste. Instead of looking at the issue from a holistic point of view and engaging communities in its different aspects, the person planning the project only thought of engaging poor people by hiring 5 to 10 of them to do composting. The other problem in large cities is that there is no space within the city to do composting; this means that people would have to go outside the city to compost.

But again, this is a symbol of how poor people can participate—to send 200 of them to a middle-class area to collect the waste. I was not focusing on whether the activity was good or bad, but on who decided what was to be done.

Question 9: Ms. Patel, what is the dialogue between your NGO and governments and how do you bolster the image of waste pickers and their viability in society? How did you convince the government that they have a very respectable role?

Ms. Patel: We are still in the process of convincing the government. The whole issue of setting up this negotiation, undertaking this process, is something which is very recent in our city. Bombay is said to generate about 4,000 tons of

domestic garbage and one of the city's largest budget items is for garbage collectors.

Until very recently, the attitude of the municipality has been that it did not need the waste pickers. The city had its own staff and equipment to collect the garbage. The first thing we did was to bring to their attention that this "workforce" does not work most of the time, that garbage in poorer areas is not being picked up, that there is collusion between the contractors hired and the conservancy department not to complete the work but to allow the price of collecting garbage to increase, and that nobody is holding the city accountable for it.

Another problem is that while the NGO movement on the urban front, especially in India, is very weak, the rural NGO movement is much stronger. The whole issue of looking at city and city development is something that is a much more recent phenomenon. Most urban NGOs are involved in social services, such as health care, education, and day care. Only recently have NGOs begun working on basic amenities such as shelter and sanitation. We are just beginning to grapple with these issues, and don't have set solutions.

Question 10: Concerning Alexandria's composting facility, how many collection streams do you have, and what has been the demand for the compost?

Dr. el-Sebaie: There is only one collection stream. Both residents and street sweepers dump their waste in the municipal dumpsters at the collection points. Before, the dump sites were in residential areas, which were served by the *zabalin*. But now the dump sites are so far away that the *zabalin* cannot reach them with their donkey carts. Instead, they go to the nearest collection point. They pick out what they want, and they leave the rest at the collection point. So they add to the problem.

I want to be clear that the composting plant is only a pilot project. We produce 1,800 tons of waste per day, but the pilot composting plant can only handle 160 tons a day, which is less than 10 percent of the total. It is not enough. There is a waiting list for compost; people come and take new compost before it is fermented because they are afraid that it will run out. It is in high demand.

The price is currently 26 Egyptian pounds per kilo—about \$8.

The high demand is causing another problem. Farmers bring their produce to the city, and on the return trip they fill up their vehicles with compost. Because of the shortage, they often take immature compost, which has serious health implications. Even after complete fermentation, we find scarab eggs, and some fecal coliform if the temperature was not right in the fermentation process. The director of the plant said that he gets the farmers to sign an agreement that they will leave the compost on the land until it has matured.

Question 11: Informal recycling itself can result in environmental hazards. Often industries, be they large-, medium-, or small-scale, recycle incorrectly, and end up being some of the worst polluters. They wash the waste materials to use them, then they discard the polluted wash water. They burn what they do not use. The products that they produce are of low quality and are soon discarded. Do you find that is also a problem in Alexandria?

Dr. el-Sebaie: The composting plant is working with industries that already are polluting. For example, the paper industry disposes its waste directly into the sea or into a drain. The paper industries in Alexandria use rice straw to get pulp, and this results in terribly polluting wastes. So the substitution should help here.

With plastic, there really is no problem, because plastic recyclers simply melt it and make pellets of different colors for reuse. Glass recycling is not a problem either.

Problems have arisen with recycling of food items, which were being sold as livestock fodder. This brought rats, so they stopped separating out food for recycling.

Question 12: What happens with household hazardous waste? What about occupational safety when waste pickers separate garbage by hand?

Dr. el-Sebaie: Household hazardous waste is disposed of with regular household waste and goes to the plant. This, of course, is a problem, but one that is of the same magnitude as in other countries. As for the safety of the workers, unfortunately our workers do not follow any rules. They

have gloves and masks, but they do not wear them. They like to use their bare hands. This is still a problem.

We did a health assessment of government and industrial garbage collectors and of the *zabalin*; we found that each of them has one to three diseases, mainly parasitic. They do not practice hygiene on the job: they eat without washing their hands, since no water is available at the dump site.

Question 13: In the pilot project, how do you mobilize the people to separate waste materials at source—especially when they have not done this before?

Dr. el-Sebaie: The pilot project is still in the planning phase, and we are looking into the financing. We want to involve women, but first we need to organize the system. We need to set one day a week when we will collect all the newspapers; one day a month to collect glass and take it to the dealer to sell the recyclables. And we have to set the appropriate incentives. The project should work in the poorer areas because it is a way of generating income. And if it works in the poorer areas, perhaps it can also be extended to middle-income and wealthy areas. We would also like to target the youth. Many cannot find work after graduating from university. If we organize them to do this work with us, along with the housewives, we can achieve something. But this is something we are still studying and looking into.

We did something similar in a village. We provided the villagers with a small cart and a mule, organized a garbage collection system, designated a dump site, and found a dealer to sell the recyclable items. In fact, the villagers helped us because they liked to have clean streets in the village. They separate all the waste. Based on this success, I think this kind of project will succeed in the city.

Question 14: A key factor in the success of your composting has been what is obviously a strong market. What is the compost being used for?

Dr. el-Sebaie: The compost is being used for the cultivation of vegetables and fruit trees. It is needed for the newly reclaimed desert land because it is more a soil conditioner than a

fertilizer. It helps the soil to hold more water, and is therefore good for desert agriculture. As for the demand, an acre of land needs at least 8 to 10 tons of compost, and the alternative soil conditioners are too expensive.

Farmers also use manure on the land. But as I mentioned before, we need to give an awareness program on how to compost this manure and how to practice good hygiene when handling it. We are doing an experiment on composting manure with agricultural waste to get a richer compost, and comparing this mixed compost with compost from the solid waste.

Actually, the composting of agricultural waste is quite promising as an integrated waste management approach. Agricultural waste cannot be composted alone; it needs an addition of manure or other material such as sludge from sewage treatment plants. So a needed agricultural input is provided from integrated wastes. In fact, this technology is thousands of years old and farmers are already doing this themselves: they heap all this waste and cover it with mud to have the anaerobic digestion for this fermentation. All we are adding is the hygienic aspect.

Question 15: Is there a difference in the gender aspects of the pilot project?

Dr. el-Sabaie: In Alexandria waste management is mainly handled by men. The government started to hire women to sweep the streets, but this is not an easy job for them. In the villages there is no difference—men and women work together and do the same work. But in the city the work is all done by men, and that is why we thought to involve women in the waste separation effort.

Audience observation: These are the kind of local initiatives that the international community should be supporting. The technology is old, but it is working.

Dr. el-Sebaie: In poor areas a few years ago, all kitchen waste was used to raise poultry. So in the poor areas there was no waste—it was either sold

or used to feed poultry. But the people have stopped doing these things because the Ministry of Health has issued a regulation to prevent raising poultry in the house, and it is enforced.

Question 16: Do you have compost standards?

Dr. el-Sebaie: Yes, but for some time the standards were only for the carbon-nitrogen ratio, the sodium-chloride content, and the particle size. However, we have added standards for metals. Certain metals, such as zinc, iron, and copper, are good for the land, but there are others, such as cadmium, chromium, mercury, and arsenic, that are toxic. If they are present in the compost, they go into the soil and into the produce. So standards for organic fertilizers have been set by the Ministry of Agriculture.

Sandra Cointreau-Levine, the rapporteur, summed up the major issues in solid waste management that came out in the session. Mismanagement of human excreta, pathological medical wastes, and hazardous chemicals are undoubtedly the leading causes of disease and environmental degradation throughout developing countries. Solid waste prevention, minimization, and reutilization were the watchwords of this session on waste management. Presenters agreed that sustainable solid waste systems require that cities generate as little waste as possible, and that they segregate recyclable, hazardous, and general wastes at the source for accountable and cost-effective handling. The presenters covered a wide range of waste management experiences, ranging from the neighborhood experiences of NGOs in India with recycling of secondary materials such as plastics and paper, to the countrywide experiences of the United States federal government with remediation of hazardous waste disposal sites.

The presenters also agreed that to sustain improvements, there needs to be political commitment to change, as well as development of revenue bases that are dedicated to covering the investment and operation costs of appropriate solid waste systems.

SHARING AND CONSERVING COMMON RESOURCES: WATER SUPPLY AND WATER RESOURCES

Introduction

Sandra Postel

We face some enormous challenges in meeting water needs as we move into the twenty-first century, as human demands for food production, industrial goods, and household commodities continue to move forward. Already, scarcity and unsustainable water use are problems in many parts of the world, as groundwater is being over-pumped and stream flows are being depleted to unsustainable levels.

In keeping with the theme of this year's conference on the urban environment, we are discussing water allocation and conservation in expanding urban areas. Although municipal water use accounts for less than one-tenth of all the water that we use worldwide, the process of

storing, treating, and distributing water that is safe to drink, and of recollecting, treating, and disposing of the wastewater is difficult and expensive. As we confront rapid population growth and urbanization in the years ahead, implementing this process while also ensuring the sustainability of the urban environment will pose some difficult social, technical, ecological, and institutional challenges. In short, we want to work toward giving all people—rich and poor—access to a healthy and hygienic supply of water, while at the same time protecting regional lakes, rivers, and estuaries from depletion and pollution. Efforts at striking this balance will be the focus of our discussions at this conference session.

Overview

Guy Le Moigne

As a colleague of mine has recently suggested, water—water management—is essentially politics. All the rest follows. That is a key starting point for any discussion about sharing and conserving water, because governments have been involved from day one in the history of water resource management.

Governments Need a New Approach

When we look at major progress in water resource management, we should start in January 1992 at the Water and Environment Conference held in Dublin, which laid the groundwork for the first summit in Rio—where, in turn, an entire chapter of Agenda 21 recommended that new water management strategies be adopted to address all the challenges that lie ahead. The new strategy can be summarized with two realities: water is both a basic need and a scarce economic resource. But to go further, the time to adopt this approach is now, because the long period over which water investments and policies play out will affect future generations. As such, we must not speak merely of decades. We must take a much longer view, particularly because we have to account for rapid population growth and continued economic development in our urban areas.

Water Consumption in All Sectors Is Rising Dramatically

Per capita water use has increased 30 times in the past three centuries. Water withdrawals have recently been increasing by about 8 percent annu-

ally, with the bulk of the demand arising in the developing world. Worldwide today, 69 percent of water withdrawals today go to agriculture, 23 percent to industry, and 8 percent to domestic users. And as economic development continues to raise living standards and as the world's population continues to expand, the demand for water will increase dramatically; certainly, feeding an expanded population alone will place exorbitant demands on the world's irrigated agriculture.

Agriculture Will Be a Fierce Competitor for Water Resources

One-third of the world's food production comes from irrigated land; since 1950 irrigated area has grown by about two and a half times, and we have met about half the growth in food demand in the past 35 years. Sustaining even this level will be difficult, because the costs of irrigation projects are rising rapidly, and the environmental consequences of large projects and the overexploitation of groundwater are growing concerns. Irrigation will also be competing with other water supply users for affordably priced water resources. Obviously, we will have to manage our water resources much more effectively, so as not to crowd out irrigation needs totally.

Industrial and Environmental Needs May Be More Acute than Domestic Needs

With the growth of the population and the urbanization of developing countries, demand by domestic and industrial water users, and associ-

ated costs, are expected to rise very sharply—possibly by as much as two or three times the previous cost, as new supplies of water are being tapped. But, in this connection, a recent study by Gershon Feder indicates that, with the increase in population and the increase in income, the needs for water by industrial users are growing much more rapidly than the demands for domestic water supply.

Environmental water requirements are also one component of this equation. Fisheries and wetlands depend on continuous river flows, and they are threatened by growing extraction. Chairperson Postel referred to the groundwater over-exploitation and contamination by both urban industrial and agricultural pollutants, but also by saltwater intrusion. The overmining of groundwater may deplete a source that will increasingly be required for water supply.

Current Water Management Practices Have Severe Economic Consequences

Water today is grossly misallocated—low-value water use consumes a significant share of water consumption, while high-value use faces shortages. Water supply inefficiencies abound. Evidence indicates that unaccounted-for water amounts to 58 percent of Manila's water supply and 40 percent of the water supply in most Latin American cities, compared with only 8 percent in Singapore. Some of these losses are due to poor design and management, while others are due to the low price charged for water. For instance, a recent Bank review of financed projects showed that the effective price charged for water supply was only about 35 percent of the average cost of the supply; for irrigation water, the effective price is even much lower.

Waterborne diseases cause 900 million cases of illness each year. But a safe water supply is not only a matter of life and death; it also makes sound economic sense. For example, in the first 10 weeks of the cholera epidemic in Peru, losses from reduced agricultural exports and tourism were estimated to be \$1 billion, which is more than three times the amount that the country had invested in water supply and sanitation services in the 1980s.

Current water resource management practices suffer from three major shortcomings:

- Fragmented management that leads to environmental degradation, poor water quality, human suffering, and wasteful investment
- Overcentralization of and absence of incentives in water service delivery, and absence of involvement by communities and the private sector, thereby creating a vicious cycle of unreliable service, little willingness to pay, and deteriorating capacity to provide services
- Underpricing of water and the absence of cost recovery, creating excessive and wasteful water use, and misallocation.

Holistic Water Resource Management and Market-Based Pricing

The World Bank has been active in water resource management. Its first loan for water was in 1946 for an irrigation project in Chile. By the end of fiscal year 1994, the Bank had lent about \$40 billion for water projects, about half of which was for irrigation. And today our lending program envisages ongoing involvement in water resource management, with projected loans of about \$20 billion by the end of the century.

To prepare Bank policy, we have held meetings with key policymakers in developing and donor countries. We have had abundant contributions from all U.N. organizations that oversee water resource practices, and we have had several intensive consultations with environmental and professional nongovernmental organizations. And as I mentioned earlier, we essentially embrace the recommendation of Agenda 21 of the Rio declaration.

At the core of this policy is the adoption of a comprehensive management framework that calls for treating water as an economic good with multiple potential uses. Our policy recommends a more decentralized system of service delivery, greater reliance on pricing, and fuller participation by water users in managing the water supply system. We encourage countries to develop national water strategies to implement coherent and consistent policies and regulations across sectors. The presentations made at this conference session will clearly illustrate the importance of these principles and their promise for enhancing the lives of people in our cities.

Comprehensive Water Resource Management

All the cases discussed at this conference session will demonstrate that providing adequate water supply and sanitation services, particularly to the urban poor, demands a fundamental consideration of cross-sectoral and environmental forces in investment and policy decisions. Each recognizes the interactions that must be effected among the various elements that encompass a river basin ecosystem.

Each case will show that governments can and must take an active role in protecting, enhancing, and restoring water quality and water-dependent ecosystems and in controlling water pollution. For example, the case from Turkey shows how a simple wastewater treatment strategy would be insufficient by itself to improve water quality in an important and fragile coastal zone, but, rather, that a comprehensive multisectoral regional approach is necessary for improving the quality of Izmir Bay.

The study of Asia's cities pinpoints the importance of considering both surface and groundwater together, of considering both quality and quantity, and of accounting for all water-using sectors when assessing the situation in a city.

Improving Institutional Arrangements for Water Resource Management

Bank policy and the Rio summit recommend greater emphasis on developing a more appropriate set of institutional arrangements—establishing a strong legal and regulatory framework to deal with market failures, including monopolies and environmental protection, and supporting the principle of action at the lowest appropriate level. Thus, we must promote government efforts to decentralize water service delivery and support the participation of stakeholders in the formation of policy at all levels; we must also focus more heavily on efficiency and financial accountability by promoting autonomous water entities, private sector participation, and community ownership, and by using pricing as a management device that captures the scarcity of water and encourages its efficient utilization. For example, the Asian case discussed at this session will show how overlapping and ill-defined institutional arrangements hamper the rational management of water

resources. In São Paulo, Brazil, watershed decisions about basic management are made by a “water parliament” that comprises industries, local authorities, community leaders, and non-governmental organizations; it is modeled after the successful approach developed for managing river basins in France and Germany.

Managing Water as an Economic Resource

The notion of the opportunity cost imposed on others when water is used for a particular purpose or when the quality of water is degraded is receiving greater attention. It is easier said than done, but we are now making a major effort to determine how we can approach opportunity cost.

The role of pricing as a management device that reflects scarcity by encouraging consumption efficiency while also addressing the needs of millions of poor is also a major part of this economic approach. Today, we will hear about São Paulo's introducing an institutional fund system that is financed with user fees and that will finance watershed management investment.

We will hear how Turkey's government is assessing the role that economic instruments can play in complementing administrative control in Izmir Bay. We will also hear about a study in Mexico that has pinpointed inappropriate pricing policies as a fundamental cause of both environmental degradation and the inadequate quantity and quality of services available to the poor.

The Asia study highlights several innovative and effective charging systems that account for both the needs of the poor and the role of pricing and resource management. For example, Manila has a water rate, plus a sewer rate, plus an environmental rate, all rolled into one bill. Dhaka and Jakarta have private user fees for groundwater extraction.

Water Users Have an Important Role

Meeting future demands for irrigation, hydropower, water supply, and sanitation in developing countries is projected to cost from \$600 to \$700 billion over the next decade. The Bank will be able to finance only a small share of these required funds, and governments will be unable to fill the remaining part to which donor countries will

contribute. Thus, the users themselves will have to participate much more actively in capital formation, which in turn requires greater emphasis on cost recovery and private sector involvement—an absolute necessity if countries are to meet their domestic water needs in the next century.

Implementing our policies will require a strategy for closing the current gap between policy formulation and practice in the area of water resource management. In most countries imple-

mentation will be gradual, dealing with priority issues that differ from country to country. In many cases capacity-building will need to be enhanced, and this takes time.

But the presentations to be made at this conference session are an encouraging sign that many developing countries are now addressing the challenges that are required to meet tomorrow's demand for satisfying basic human needs and raising the living standards of the population.

The Guarapiranga Waterbasin Environmental Sanitation Program: São Paulo, Brazil

Ivan Maglio

The São Paulo Metropolitan Area (hereafter São Paulo) occupies 8,000 square kilometers and contains 15.6 million inhabitants—representing only 0.001 percent of the area of Brazil, but more than 10 percent of its population. That concentration represents the third largest megacity in the world. And recent studies indicate that the population will grow to 18 to 20 million people by the year 2010.

The Guarapiranga watershed reservoir supplies drinking water to 3 million inhabitants of São Paulo and is a recreational site. It is a sub-basin of the Tiete river basin that collects most of the storm runoff and wastewater of São Paulo. Originally built in 1908 for flood control and electric power generation, the reservoir has since become one of the most important, and also the cheapest, sources of water supply for São Paulo. Projections indicate that the Guarapiranga reservoir will supply water for nearly 37 percent of the total area by the year 2010, given an increase in transbasin water coming from rivers flowing to the sea.

Rapid urban expansion in São Paulo in the past 60 years has had severe environmental consequences for the quality of the water from the reservoir, despite several regulatory and technological interventions. In particular, the urban network has expanded progressively into its catchment area. Although a few higher-income residential developments have been built near the reservoir, 33 percent of families living in the area reside in low-income *corticós* or slum districts, which are concentrated heavily along the main transportation axis and lateral streams.

In a city already plagued by deficiencies in sanitation infrastructure, the urban poor in the Guarapiranga watershed area are particularly ill-served: only 40 percent of the population is served by sewerage, and much of the domestic solid waste is dumped directly onto the river banks. Compounding the problem in the watershed area are the regional wastes from São Paulo: 7,000 tons of industrial waste that are generated daily (3 percent of which contains hazardous waste) and 4.9 million automobiles emitting 4,000 tons of carbon dioxide daily. These high pollution loads have in turn propagated several different species of algae in the reservoir at different seasons of the year, none of which has been controlled successfully by the water sanitation authority, SABESP.

Policymakers and planners had foreseen the environmental impacts of the pollution levels on the reservoir by implementing the Springwater Protection Law in 1975, which provides the general basis for watershed protection and provides an important tool toward water resource management. But the shortcoming of the law is that it was not complemented with institutional, regulatory, and financial commitments to induce appropriate occupation of the land: although polluting industries were not allowed into the basin, illegal low-income housing was allowed to swell, and, more important, economically feasible activities were not encouraged. These and other regulatory and institutional inefficiencies in the Guarapiranga watershed have prompted an innovative institutional approach for watershed management.

An Integrated and Collaborative Management System

Increasingly severe algae bloom events in 1989 and 1990 led to a joint action by state and municipal governments to prepare a program to be discussed with the World Bank. Following loan agreement, the Guarapiranga Waterbasin Environmental Sanitation Program was initiated in January 1993 at a cost of US\$262 million. It was designed as both a corrective and preventive strategy for ensuring that the reservoir remained a reliable, healthy source of water for the metropolitan area:

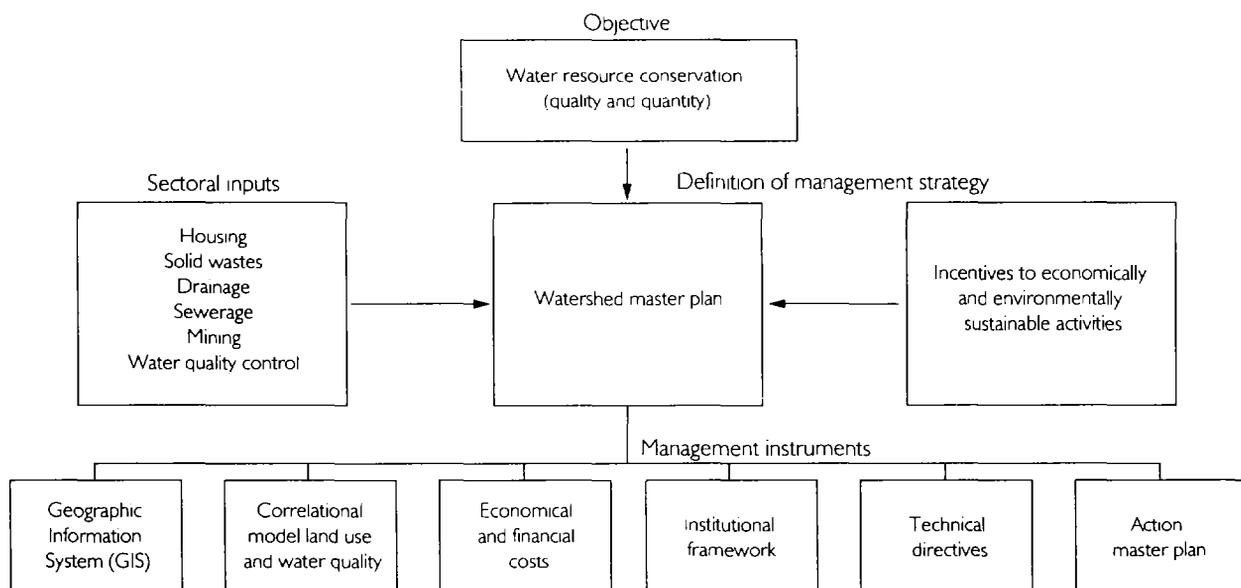
- *Emergency, corrective measures.* Expansion of the sewer system; improvements in solid waste collection and disposal services; the rehabilitation of the urban areas affected by solid waste disposal; the modernization and rehabilitation of urban drainage systems; the construction of basic sanitation and other infrastructural facilities in low-income developments; the reurbanization of slums; the resettlement of residents from at-risk areas; the forestation of river banks and public areas; and the creation of parks and leisure areas.
- *Medium- and long-term preventive measures.* A basin management strategy that combines corrective mechanisms with a long-term prevention strategy according to an Environ-

mental Protection and Development Master-plan; the creation of a watershed operational unit; the adoption of improved managerial instruments; more effective fiscal and monitoring activities; the promotion of environmental education and environmentally safe activities; and sectoral studies and projects in housing, solid waste, sewerage and drainage, mining, and water quality control to assess how private sector investment can be attracted to the area.

To strengthen the thrust of these measures, the program also calls for three sets of operational instruments:

- *Information bases and assessment tools.* A geographic information system; a water quality model that relates land uses and water quality in the reservoir; economical and financial mechanisms for sustaining watershed assessment; and technical directives for land use and infrastructure systems operation.
- *Program monitoring.* Ongoing technical verifications of water quality, and oversight and enforcement of operational and financial responsibilities of the institutions and agencies involved.
- *Reorganization of the institutional framework.* The heart of the program is a new management paradigm that consists of an integrated network of several institutions at the state and municipal levels, including local authorities, community leaders, universities, research

Figure 1. Guarapiranga watershed management system



institutes, and nongovernmental organizations (figure 1).

Water quality indicators to measure the effectiveness of the program at controlling pollution have also been established: a reduction of phosphorus loads from 192 kilograms (kg) daily to 87 kg daily, or by 45 percent.

Successes and Difficulties

Several measures have already been undertaken in the first year of program implementation to begin rehabilitating the quality of reservoir water, its operational management, and the concentration of residents in at-risk areas.

Corrective and Preventive Measures to Improve Water Quality

Emergency, corrective measures have been made in two areas: the installation of new sanitation facilities and the implementation of remediation standards for the existing system. Both measures are targeted at improving sewerage operational actions by the SABESP. The first measure entailed the construction of infrastructure to divert pollutant loads from the Guavirutuba and Itupu rivers away from the water-withdrawal point and into the existing sewer system; this measure alone has reduced total pollution loads into the reservoir by 20 percent. The other corrective measure entailed an operational optimization of the existing sewer system, elevating it to different operational standards.

The preventive measure entailed the preparation of a descriptive model of water quality, based on an analysis of existing data and unit pollution charges obtained in bibliographic sources. This model has been improved by the Program Management Unit into a decisionmaking model that will be complemented with data collected and systematized by the geographic information system proposed in the masterplan.

Management Framework to Strengthen Program Implementation

The innovative characteristic of the Guarapiranga Waterbasin Environmental Sanitation Program—the attempt to integrate the management of water resources—necessitated an institutional frame-

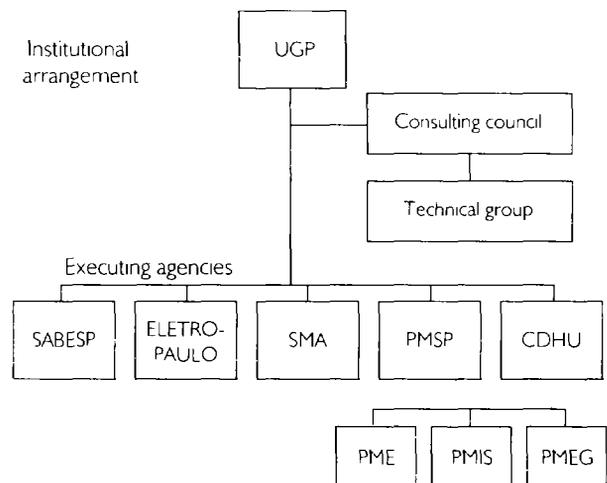
work both for coordinating program implementation and as a consultative mechanism for resolving more comprehensive problems affecting watershed environmental assessment.

The institutional framework consists of several agencies and authorities (figure 2). Overall management is vested in the project management unit. The executing agencies are the water and sewage authority; the electric power authority, Eletropaulo, which owns the reservoir; the housing and urban development company; the environmental state secretariat; and the São Paulo municipality. The consulting board comprises 42 institutions of state government, municipalities, nongovernmental organizations, and research institutions. The board will anticipate the final institutional arrangement that will be created for the watershed integrated management.

Planning Work on Resettlement Issues

Preliminary work on the resettlement component of the masterplan has culminated in a carefully designed plan for removing about 4,000 families from slums and geologically at-risk areas to new state-built housing projects or to houses bought in local markets and financed by the state. The project provides complete planning for all resettlement activities, including social procedures, the physical movement of the families to the new site, and the construction of the housing projects.

Figure 2. Guarapiranga watershed management implementation



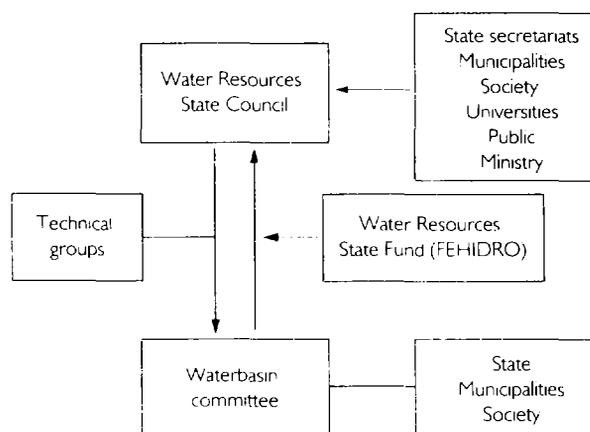
Some Institutional and Bureaucratic Difficulties

The major constraint on launching the program quickly and smoothly has been the institutional complexity of the conceived arrangement. Although the sheer necessity of an improved management framework has compelled its implementation, preparation phases have been slowed as the different institutions "get on the same page," creating a cross-institutional culture of technical and operational skills. Externally, changes in legal procurement procedures in Brazil in the past few years and persistent problems with conforming to World Bank procurement procedures have delayed the launching of several bidding processes, which are being initiated only now. Moreover, political changes at both the state and municipal levels—particularly as they pertained to many of the command posts in the executing agencies—have interrupted the formulation of some program components. Finally, the implementation of some project components are being obstructed by the entrenched environmental licensing process for project actions, creating conflicts between the cleanup actions proposed by the program and the actual legal framework (Springwater Protection Law) that prohibits the implementation of these actions.

Water as an Economic Resource: Studies of Cost Recovery

In 1991 the São Paulo state constitution was amended to include legislation pertinent to reforming the State Water Resources System. The amendments represent a modern approach to water management policies. In particular, the legislation imposed a payment tax on water use, and created an Institutional Fund System for supporting waterbasin management assessment, an innovation in Brazilian legislation. Reform of the Water Resources System also included the creation of a waterbasin committee to establish a water resources integrated management system (figure 3), located within a Watershed Agency that exercised financial and administrative autonomy. The managerial restructuring of the system into the agency is conditional on implementing a water-use payment and tax system; a feasibility study of the user-pays principle as a revenue-generating instrument has been conducted.

Figure 3. Water resources integrated management system



Tariff Mechanism Is Inadequate for Full Cost Recovery

An economic evaluation of the Guarapiranga Program sought to develop a base of information to support an overall assessment of the financial implications of the current payment system for sustaining program activities and waterbasin operations. The user-pays mechanism is founded on two principles:

- That it be used as a regulatory instrument, working as a control element of both water demand (rather than as a function of the elasticity of demand) and pollution contribution. Payment is to be proportional to the levels of demand and the level of pollution.
- That it be used as a tax on the costs of operating, maintaining, and administering the basin.

The evaluation was predicated on the rationale that water is an economic resource. It thus endeavored to capture how water resources are used and by whom, the costs and losses incurred in operating the system, and the environmental gains and benefits of the various pollution control measures. The evaluation consisted of four components:

- *Assessment of the cost recovery potential of various projects.* The return on investment in program components, and the costs associated with their implementation, operation, and maintenance. The optimistic scenario indicated that 85 percent of the costs of program components could be recovered, and particularly the costs of investments in the water quality and sanitation components.

The pessimistic scenario indicated a cost recovery rate of 59 percent, given the huge investment in the urban recovery and environmental protection components.

- *Study of the economic feasibility of the sewer system of the Guarapiranga basin.* The analysis indicated that the tax return from investments in improving and upgrading the sewer system would be much lower than the minimum required by the Bank for its feasibility studies
- *Social cost-benefit analysis.* Costs and benefits were quantified according to society's willingness to pay. According to this indicator, the social return on investment in the program justifies its implementation.
- *Assessment of opportunity costs.* A base scenario in which the absence of any measure to halt the progressive degradation of the water within five years would terminate the current water flow of 10.5 cubic meters a second from the reservoir itself and of an additional 2.7 cubic meters a second from an adjacent basin. The analysis indicated that the alternative costs of replacing this volume of water in order to supply the São Paulo Metropolitan Area would be 1.8 times the costs associated with implementing pollution control measures for the program, thus justifying program implementation.

The overall results of the analysis indicated that, when compared with their marginal costs, the current tariff mechanisms would be insufficient for recovering costs adequately. Steps are under way to modify the tax and payment structure, and to develop other mechanisms for improving resource efficiency.

An Appropriate Cost Recovery Configuration for the Future

Another financial-economic study has been undertaken to define adequate mechanisms for generating, collecting, and allocating revenue. It is predicated on guaranteeing the financial autonomy of the agency and on integrating the current tariff mechanism with other revenue-generating mechanisms throughout the state of São Paulo—for example, the Water Resources State Fund and another user-pays mechanism being developed in a unit of the State Water Resources System. It is also defining an action

plan for creating the institutional arrangements necessary to identify revenue sources and to implement revenue collection instruments. Still another study will be implemented to define other, nontariff-based mechanisms to complement the revenue scheme, such as linking land use with water resource use. Indeed, the master-plan recognizes that stimulating and promoting land use to create an environmentally sustainable watershed will yield longer-term cost recovery, given the strategic importance of this water resource for the São Paulo Metropolitan Area.

Valuable Lessons

Environmental protection of the Guarapiranga reservoir is being implemented under an integrated pollution control approach that focuses on watershed management results rather than technical aspects. The new institutional configuration thus represents a new way to solve environmentally complex problems—specifically, comprehensive involvement by multiple diverse levels of government and the community, with a focus on cultural concerns and social equity considerations. The paradigm is a new, dynamic form of public-private decisionmaking management within conservation strategies for natural resources and water policies. What is the foundation for this paradigm?

- *Political decisionmaking must encompass all concerns.* Planners must ensure that the political decisionmaking process accounts for emerging social concerns and demands. The government's role is to develop new working relationships and to effect the tradeoffs necessary among parties to create equitable project plans. Centralization and bureaucratic decisionmaking are not parts of an effective global project strategy.
- *The coordination necessary for integrated water management is unparalleled.* The cooperation required of such a diverse set of actors can be likened to emergency management operations during natural disasters or wars. The intense concentration on a single goal demands that socioeconomic and political barriers be crossed efficiently and effectively. The configuration of current management strategies for watershed protection are insufficient for mobilizing the governmental, institutional,

academic, industrial, and public forces on such an unparalleled scale.

- *All actors must have a command and appreciation of the technical issues, and must be committed to their role in resource conservation.* The complexity of information management and the scope of experimental manipulations necessary to gauge the desirability and feasibility of technical solutions often exceeds the capac-

ity of institutions. Intra- and interagency inconsistencies in environmental regulations must be corrected. Promotional and educational programs must also be implemented to ensure that community participation in watershed policies—whether conserving water resources, recycling products, or using cleaner technologies—becomes a cornerstone of ecosystem protection.

Managing Water Resources in the Megacities of Asia

Arthur C. McIntosh

A regional consultation, "Managing Water Resources to Meet Megacity Needs," was held at the Asian Development Bank August 24–27, 1993. Its objective was to develop appropriate strategies and action for managing water resources in order to sustain the supply of affordable, safe water to megacities in Asia. The participating cities were Bangkok, Beijing, Delhi, Dhaka, Jakarta, Karachi, Manila, and Seoul. Overviews were also provided from London, Singapore, and Tokyo.

The consensus that emerged was that combating water crises and shortages in the megacities of Asia will require a comprehensive water resource management system, better consumption management, or better management at its lowest level, and a water management strategy that treats water as an economic resource. In short, sound management principles and operational procedures will ensure funding for development.

Water Resource Management in Asian Megacities Is Complicated

Water resource management in a megacity is a complex interaction of impacts and determinants, some of which can be foreseen and some of which cannot. Adaptability and flexibility are thus important, but planning based on a sound knowledge of the reasonable alternatives is even more crucial. The greatest challenges now, in addition to economic needs, are the social, environmental, and institutional problems that must

be overcome, which imply that politics will inevitably be a factor, especially in megacities.

The need for comprehensive water resource management is illustrated by a comparative review of the eight megacities (table 1). In water supply and sanitation coverage, we found that competing uses were a problem in six of the eight cities, and that severe groundwater depletion was a problem in six of the eight. Major water pollution was a problem in seven out of eight. There were major flooding problems in four, and in three of the megacities sewerage coverage was less than 15 percent. Interbasin water transfer was also planned in three of those megacities.

On the financial side, we found that costs were not being recovered in five of the eight megacities. Intermittent water supply—that is, less than 24 hours a day—is prevalent in five of the eight megacities, and water losses were more than 50 percent in three of the eight cities. The number of utility staff was also excessive in six cities. And three of the cities have only partial water metering.

To illustrate how water is being managed as an economic resource, we found that excessive consumption is prevalent in five cities and that the tariff structures of five megacities do not penalize high use. Unit cost to the poor—that is, high water vending costs—are prevalent in two cities. In three cities, the cost to the poor for water was zero. In other words, there was a cost to the utility, but it was not being paid for by the poor. Finally, major water pollution is affecting seven of the cities.

Table I. A comparative review of water resources management in Asian megacities

Indicator	Bangkok	Beijing	Delhi	Dhaka	Jakarta	Karachi	Manila	Seoul
Population (millions)	6.0	11.0	10.0	5.0	8.8	10.0	9.0	11.0
Population growth (%)	2.5	3.0	4.0	5.1	2.4	4.5	2.8	2.0
Urban poor (%)	20		47	40	15	40	35	0
Water service coverage (%)	75	95	69	65	44	83	70	100
Sewerage coverage (%)	10		37	28	6	42	12	90
Water supply service (%)	24	24	7	6	19	4	16	24
Connections (millions)	1.0	0.2	1.1	0.1	0.3	0.6	0.7	1.8
Public taps (thousands)	0		14.0	1.3	2.0	21.0	1.7	0
Water losses (%)	30	7	40	50	52	-	58	38
Metered (%)	100	99	53	68	100	1	100	100
Domestic water use (liters/person/day)	240	190	225	120	157	124	116	198
Water tariff structure	Block	Flat	Various	Various	Block	Property tax	Block	Block
Staff/1,000 connections	5.5	17.0	8.9	21.3	8.7	11.7	9.0	1.9
Groundwater depletion	Serious	Serious	Significant	Significant	Serious		Significant	
Major flooding	Significant			Serious	Significant	Significant		
Water pollution	Serious	Significant	Significant	Significant	Serious	Significant	Significant	
Competing uses	Significant	Significant	Significant		Significant	Significant	Significant	

Note: The figures should be viewed as indicative only. Operating ratio is annual operating and maintenance cost divided by annual billing. The net figure does not include the costs of depreciation, interest charges, or amortization.

Source: *Water Utilities Data Book* (1993) and *Case Studies for the Megacity Regional Consultation* (1993). Asian Development Bank.

Specific Problems Encountered by Asia's Megacities

Several specific problems with water resource management have been identified for Asia's megacities:

- *Groundwater is overexploited.* A groundwater resource available to a large city represents the most economic water supply, but it is a finite resource that can be completely lost if overexploited. Bangkok, Beijing, Delhi, Dhaka, Jakarta, and Manila have all suffered from the overexploitation of groundwater. There has been a lack of control, especially over the private users, including industries. In most cases, the absence of control has led to declining groundwater levels, saline intrusion, and land subsidence. Groundwater as a permanent but limited resource has in many cases been destroyed.
- *Water metering is sporadic.* Water use could be measured only in Bangkok, Beijing, Jakarta, Manila, and Seoul. In the other megacities, where metering is not universal, water use can only be estimated. Jakarta and Manila—with around 55 percent unaccounted-for water—appear to have the worst metering systems, but Seoul with 38 percent and Bangkok with 30 percent water losses also have far to go. As one of the consultants noted at the consulta-

tion, "If you can't measure it, you can't manage it," and nearly all megacities must strive to provide not only universal metering but also to replace meters regularly to ensure accurate water use measurements.

- *Tariff levels are set too low.* The tariffs for water use are set too low in all of Asia's megacities, particularly for domestic water supplies. Even Bangkok, which has been known to have an annual "profit" of more than \$50 million, does not charge a tariff that is sufficiently high to discourage domestic consumption below 200 liters per person per day. The extra revenues could go toward drainage, sewerage, and wastewater treatment. In Delhi, Dhaka, and Karachi the urban poor are given free water, and yet it costs the utility a great deal to supply it. Thus, legitimate revenues are denied the utility. Low tariffs also discourage water conservation and reuse, which in some cases would otherwise be a viable option.
- *Water supply service is intermittent.* Water supply in Karachi is as low as four hours of service daily. The impression given on the subcontinent is that 24-hour water supply is impossible. People are also unaware of the health risks associated with trying to make illegal connections (which leak), and with the vacuums in supply that can come from intermittent service. Intermittent supply is itself given as a reason against

metering, but it also points to an opportunity to attract more revenue from the sale of water.

- *City planning and pollution control are inadequate.* Land-use planning seems to exist, but without actual control. In Bangkok, Jakarta, and Manila industries are allowed to flourish without control, and only more recently have industrial estates and their locations been controlled. With population growth rates still well above 3 percent annually, Delhi, Dhaka, and Karachi appear headed for trouble in the future. Population control through such techniques as family planning is still relatively ineffective. The same three megacities have very high proportions of urban poor, and Manila is not much better.
- *Jurisdictions of water resource management agencies overlap.* The water resource management systems of all eight megacities have overlapping jurisdictional responsibilities among the relevant agencies. This problem is compounded by the involvement of three and sometimes four management levels of government—international, national, regional, and local. Where there are focal coordinating agencies, such as the National Water Resources Board in Manila, such agencies do not appear to have the requisite power or the resources to monitor and control water resources effectively. In Karachi the influence of the Karachi Metropolitan Corporation over the activities of the Karachi Water Supply and Sewerage Board makes it difficult for the latter institution to function as an autonomous body.
- *Sewerage coverage is inadequate.* In Dhaka, Jakarta, Karachi, and Manila open drains are often clogged with garbage, and recurrent flooding spreads the garbage widely throughout residential areas. Viable alternative garbage disposal systems are required, together with a public awareness and hygiene education campaign. The absence of investment funds and an inability to sustain operations through cost recovery are cited as the main reasons for low sewerage coverage in the megacities.
- *Government agencies are delinquent on water payments.* In most of the megacities (including Bangkok, where the water authority has a sound financial position), government agencies are major defaulters on water bill pay-

ments. Defaults are especially prevalent in cities whose governments provide a subsidy to operational expenses, since they treat the issue as a mere paper transfer. Water utilities must be operated as a commercial entity if it is to be successful. The Singapore Public Utilities Board is the best example of that. Yet many of the water utilities in the megacities are staffed by unqualified people on low government salaries who are not motivated to provide high-quality service. This deficiency is greatest in the financial and management staffing areas.

- *New water sources are becoming increasingly distant.* A common finding is that as the demand for water increases in the megacities, water utilities have to look farther and farther afield for new sources to develop. The obvious result is higher costs in the long run—but it also means greater vulnerability and the existence of stiff competition with other existing and future users.

Regional Consultation Provides Insightful Lessons

The evolution of the megacities is notable largely for the lack of planning, so responses have been primarily the product of perceived chaos. In Beijing, as in Singapore, condominium-style housing provides controlled high-density living. In Delhi, New Delhi was created and industrial estates are now clearly identified. In Karachi the emphasis is currently on the planning process. Dhaka has decided to focus its attention on the city itself, rather than its growing environs. The concept of buffered satellite towns (*jabotabek*) is being developed outside of Jakarta, which has already adopted an integrated urban infrastructure development planning approach. In Manila the private sector has taken its own initiatives in major commercial developments. Seoul may be one of the better examples of a planned megacity, but its success might not so much reflect good planning as it does the ability of managers to make decisions. One such decision, for example, was to remove all government agencies en-bloc outside of Seoul and create a much larger Seoul Metropolitan Region.

To meet the needs of the urban poor, the megacities must first provide them with safe

potable water. In particular, the connections that are made illegally to an intermittent piped-water supply service pose a serious health risk, and the public should be made aware of it. A concerted effort must also be made to ensure that the poor are not exploited by water vendors. For example, in Manila, it is not uncommon for the poor to pay up to 100 times the unit cost of water paid by those with house connections. At the least, a water utility should provide a bulk supply of water to slums and squatter settlements and then allow the community to distribute that water, assisted if necessary by a nongovernmental organization. Water connection fees should not be prohibitive to the poor; they should be allowed to meet these costs in monthly or annual installments.

Environmental, Economic, and Social Concerns

Interbasin transfer of water has been initiated in Bangkok, Jakarta, and Manila. An Indus River Accord has been signed by the Province of Sindh on behalf of Karachi to guarantee water to that city. Conjunctive use of surface water and groundwater is being implemented in Beijing and London. Bangkok has introduced *demand management* through public awareness campaigns and revised cropping patterns—but has yet to allow pricing as a demand management tool. Water reuse is strongly promoted in Beijing, Karachi, Seoul, and Tokyo. In Jakarta, where raw water is charged at source, a river cleansing program is under way, and canals are being lined to limit water transmission losses. Rainwater collection is being proposed in Delhi and Tokyo. Seoul has successfully embarked on several environmental improvements, such as cleaning up the Han River. Dhaka operates wastewater treatment lagoons that discharge only during the wet season.

There is no universal solution to water resource management. Whereas in the past water was available on a first-come first-served basis, it is now a scarce resource, and proper allocation is required. It may be reasonable to vary the standards of design so that water resources are shared more equitably. But it will also be important to consider water supply and wastewater disposal as an integrated development approach, where solutions in one area must account for solutions in other areas. The environmental impacts of alternative proposals must be evaluated at the same

time that their economic and social implications are assessed. Financial and human resources must be found to undertake the necessary data collection and monitoring to provide a sound basis for future decisionmaking, which inevitably will become a much more dynamic process. On the technical end, planners must consider increasing catchment yields, recharging aquifers, controlling water pollution, implementing demand management (especially in the industrial and agricultural sectors), reducing water losses, and increasing water reuse. Planners should also consider both public and private water supplies in the overall scenario of water resource management.

Unified Control of Policymaking and Regulatory Institutions

The institutional challenge in megacity water resource management far exceeds that in the agriculture or hydropower sectors. Security and dependability of supply are critical. From a legal perspective, four components must be integrated and reviewed regularly—policies, laws, organizations, and implementation mechanisms. Megacities are constantly evolving in response to the environment. The challenge is to provide a better balance between the more static aspects (laws and organizations) and the dynamic aspects (policies and implementation). To address the recurring problem of overlapping jurisdictions, governments should require written agreements among the agencies responsible for water resource management, identifying functions and capacities. To counteract the influence of politicians in water resource management, permanent multisectoral monitoring and advisory committees should be established. One of their tasks should be to see that specific policies are developed to address the needs of the poor.

Fee Schedules and Maintenance to Increase Efficiency

Manila and Bangkok have employed a tariff increase tactic very successfully. The tariff is marginally increased each month for a period of up to 18 months. Manila has the best tariff package—a water rate, plus a sewer rate, plus an environmental rate, all rolled into one bill. Bangkok has innovative collection methods, where a customer

can read his own meter, work out his own bill, and pay it through local banks. Delhi has a very successful community public toilet and shower that is run as a private concession on a pay-per-use basis. Dhaka imposes a private user fee for groundwater extraction. Amnesties for illegal connections have been successfully undertaken in Manila, where 15,000 illegal connections were revealed during one amnesty period. Decentralizing operations has been successful in Bangkok (zones of about 2,000 connections are being isolated), a step that is now also being taken in Manila to reduce unaccounted-for water.

Regular meter replacement is critical to ensure accurate measurement of water losses. Singapore has led the way, and Bangkok and Seoul have followed. Only now have Jakarta and Manila begun to concentrate on this key area. Beijing is unique in having its own water meter factory. The success of Bangkok at reducing unaccounted-for water from more than 60 percent to less than 30 percent in 10 years is a model that others could follow. Beijing helps keep water losses at a minimum by lowering the water pressure in the distribution system between midnight and 5:00 AM. Seoul has introduced water-conservation public awareness campaigns, and in its own housing construction projects in the city uses such water-saving devices as dual-flush toilets, low-flow showerheads, and one-touch faucets. Delhi, which previously operated a water supply and sewerage “undertaking,” has converted to a water supply and sewerage “board,” which is expected to provide greater autonomy for water resource management. Tokyo has replaced lead service pipes with stainless steel ones to reduce losses from leaks.

Demand Management

Why are we looking at demand management now? The first reason is the rapid growth of the megacities; second, tapping new sources has become more difficult and certainly more expensive than in the past; third, water has become more scarce, with competing uses; and fourth, investment funds have started to dry up. Another factor is that demand has consistently been overestimated in the past, partly because alternative sources have been ignored, and partly because people’s willingness to pay for the new service has not been assessed. It is finally being recog-

nized that water is an economic good and that the relationship between consumer price and consumer volume is elastic. Current tariffs in most of the megacities encourage excessive consumption. They largely fail to cover not just financial costs but also long-run marginal costs and economic costs. Excessive consumption increases pollution and premature investment.

A demand management program may include willingness-to-pay surveys, water conservation campaigns, pollution charges, groundwater charges, assistance with consumer plumbing systems, and most important, a tariff structure that penalizes excessive consumption. Demand management will also account for equity concerns, because the water saved can be diverted to the unserved poor. Demand management tools can be either mandatory instruments (which are usually for crisis interventions) or market-based instruments (for crisis avoidance). But in any case, it must be recognized that until a utility has universal metering and meters are maintained to ensure their accuracy, not a great deal can be done in the area of demand management.

Better Sewerage and Wastewater Treatment

Piped sewerage systems are the preferred solution to wastewater disposal in megacities because they are unobtrusive, avoid the garbage problem, protect the human and physical environment, and provide opportunities for water reuse. While investment costs may be high, the megacities offer economies of scale and high benefit-cost ratios. Moreover, the investment costs are only a fraction of that required to provide adequate housing to the same people. And the compelling argument for providing effective sewerage and sewage treatment systems cannot be ignored—that inadequate facilities increase the risk of human disease and widespread environmental damage of the aquatic organisms serving the food chain.

Separate bureaus or offices for water supply and sewerage seem to operate well in Seoul and in Singapore. The Metropolitan Water Authority in Bangkok is facing pressure to at least provide financial support for the proposed new sewerage/wastewater disposal facilities. Karachi has a successful example of low-cost piped sewerage in the Orangi Pilot Project, where communities

and nongovernmental organizations combined to show what appropriate design and community self-help can do. Dhaka is proposing “district” sewage treatment facilities in an effort to minimize investment and operating costs. Interceptor sewers, which are used along the Han River in Seoul, provide a staged practicable alternative to the final fully sewer solution. Ironically, megacity sewerage systems, which work best in densely populated areas of the urban areas, have been provided initially to the less densely populated high-income areas. Remote-controlled micro-tunneling is becoming a popular technique for installing piped sewerage schemes, without the high cost and inconvenience of disturbing the surface.

Sewage treatment in megacities normally follows the activated sludge process, rather than the oxidation pond approach, which is highly land intensive and thus expensive for a megacity. Tokyo and Singapore use more sophisticated treatment processes, and have located the facilities below ground for aesthetic reasons. Although sewage treatment is often double the cost of water treatment, a solution that involves only screening and discharge through a marine outfall can be as low as 10 percent of conventional treatment for sewage. Stabilization ponds located in the sea are being considered now for coastal environments as a low-cost solution. Water reuse possibilities exist when water sources are located more than 60 kilometers from the megacity. In the meantime, case studies have indicated that a great deal of improvement can be made in the desludging of existing septic tanks.

Where to Go Next

Government policy statements on water resources management, particularly for tariffs and water utility staff, will be a useful resource for water management agencies. For tariffs, governments should state clearly the objective of revenue generation (for example, to meet operation and maintenance costs, for debt servicing, and to contribute toward capital works), and then allow the utility to set the tariff to achieve it. For staff, the utility should be free to hire and fire personnel and pay what is necessary to attract the best staff on the open market. The policy statement should also stipulate the functional responsibilities of

agencies whose jurisdictions overlap, require demand management approaches for operating water utilities, promulgate government policy toward subsidies or cross-subsidies in tariff structures, require water utilities to reduce unaccounted-for water (preferably by using more sociological approaches), require industries to adopt water reuse policies, and require water resource management agencies to monitor and revise policy, laws, and regulations, and to establish permanent advisory and monitoring committees. Some other important steps:

- *Continue efforts to reduce water losses.* A more sociological approach to the problem of unaccounted-for water is necessary, one that is modeled after the Bangkok Water Authority decentralized approach, but goes one step further—from zones of 2,000 connections down to zones of 500 connections, and incorporating individual caretaker responsibility for each zone. The caretaker should become the utility’s daily interface with the people, helping them remedy any problems that are creating water losses, such as leaking plumbing systems in their homes. The caretaker should also be able to respond to the existence of any visible leaks in the distribution system, by making regular monitoring rounds. Utilities and governments must also take a new look at what is represented by operations and maintenance (O&M) costs. For too long, reducing unaccounted-for water has been considered a capital investment expenditure—but it is not, and it should be part of annual O&M budgets, and not part of a one-shot project.
- *Launch public education campaigns.* The collection and disposal of garbage requires commitment by the public. Hygiene education and public awareness programs on water use, water conservation, and water pollution need vigorous and ongoing promotion. And because many of the urban poor have low literacy levels, we have to devise methods for communicating effectively with them.
- *Make water utilities more dynamic.* Agencies must acquire the ability to attract and retain competent professional staff. Utilities should also be encouraged to learn from similar agencies with successful experience in other countries. Financial viability must be the first consideration of every utility, for without that

it cannot begin to provide a satisfactory service to its customers.

- *Conduct more research.* There is considerable scope for university postgraduate research assignments on intermittent water supplies, unaccounted-for water, water metering, and water quality monitoring. It is important to learn how much water people would use when the amount they are required to pay for it is varied.
- *Involve funding institutions.* Major funding institutions should require a government policy statement on water resources management before beginning to consider a loan for new development in that sector and if necessary have it modified before proceeding with a loan appraisal. They can also help by providing appropriate tools to government agencies, such as the *Water Utilities Data Book*.

A Pilot Project: Environmental Management Study of the Izmir Bay

Nuran Talu

Recent environmental policies seek to integrate environmental and economic concerns into an overall equation for sustainable development. The contemporary meaning given to protecting the environment implies that ecological assets should be treated in harmony with economic, commercial, social, cultural, and political forces as part of an integrated water resource management system. The classic concept of Management and planning—strong centralization and bureaucratization—is no longer valid. Management systems demand a more flexible, adaptable, and inclusive approach to policy development, decisionmaking, and technical planning.

Turkey began implementing an integrated water management system in the 1990s in response to environmental management shortcomings in Izmir Bay that were failing to halt the progressive degradation of one of the most vital economic and environmental resources in Turkey. In the course of determining how environmental management could be enhanced, program planners and policymakers have focused particularly on the institutional mechanisms that can be used to distribute regulatory, administrative, and operational responsibilities between central government and local administrations. Thus, a study to assess current efforts at transforming water management at Izmir Bay has focused not only on their success at reducing rampant pollution in the bay, but also on whether they offer constructive field experience that can be pursued by other cities in Turkey and elsewhere.

Factors Contributing to Pollution of the Bay

Izmir Bay is one of the great natural bay areas of the Mediterranean, comparing favorably to similar coastal areas in the world. It consists of three bays—the inner, the middle, and the outer—with a total surface area of more than 500 square kilometers and a water capacity of 11.5 billion cubic meters. It runs for a total of 64 kilometers out to the Aegean Sea, and the hinterland contains relatively fertile agricultural land, watered by several rivers. The climate of the bay is relatively mild, with an annual temperature of 17 degrees centigrade. But this productive, appealing setting has also attracted several different concentrations of bay water users—urban settlements, industry, fisheries, agriculture, and tourism—each with competing needs that are nonetheless intertwined economically.

Rapid Urbanization Has Strained Land Resources

As in most urban areas of Turkey, population pressures in Izmir are enormous. The existing population of approximately 2 million is projected to double in the next 30 years. Izmir has also become one of most popular destinations for illegal settlements of land and housing. Indicators show that the extent of immigration and the prevalence of shanty dwellings are higher than average for Turkey overall. Each year around 10,000 families migrate to Izmir. Today the coastal belt of the Izmir Bay is heavily urbanized, with an average population density

of more than 2,500 people per square kilometer, 10 to 20 times higher than the density in other districts of the province. Moreover, Izmir now contains more than 100,000 illegal housing units, spread widely throughout the area. The primary impact on the environmental integrity of the bay is the absence of sewerage systems in many of these illegal dwellings, as well as the inaccessibility of other appropriate infrastructure.

As this rapid urban development continues throughout the bay area, it is increasingly consuming the scarcest of resources—the land. Land exploitation is having the following impacts:

- Accelerated and irreversible loss of valuable agricultural and other land resources
- Population concentrations in hazard-prone and erosion-prone areas
- Destruction of green spaces both within and around the city
- Rapid increases in domestic waste, which has now become one of the major sources of Bay pollution.

Industrialization Has Usurped the Environmental Resources of the Bay

Izmir, together with several “satellite” cities in its vicinity, is a major industrial area. In addition to large industrial establishments, several small- and medium-scale enterprises (primarily leather and textiles) have flourished in and around the city. Industries in the metropolitan area of Izmir are:

- Heavy users of land and fresh water
- Heavy users of low-heating-value lignite for energy needs and thus heavy polluters of air
- Heavy generators of industrial residue that is being discharged into numerous streams running to the Inner Bay
- Heavy transportation users, contributing to traffic congestion, and thus to noise and air pollution.

Plans to establish new industrial areas within the boundaries of the metropolitan area (either to expand existing capacity or to move away from the city center) have exacerbated the situation. Some of the industries are being situated in watershed areas that supply water for the city. The concentration of industries in the Izmir Bay environmental area is having three consequences in particular:

- Growing conflicts between industry and other users in the area—fisheries, agriculture, tourism, recreation, and water conservation
- Adverse impacts on the value of the land, given the absence of a mechanism for charging the industrial sector its full share of the social costs of operation, including its contribution to pollution and congestion
- Adverse impacts on the environmental integrity of the inner bay, as discharges of industrial wastewater have led to eutrophication.

Heavy Port Activity Increases Contamination Risks

The large-scale industrial development that has been the driving force behind vigorous economic growth in Izmir in the past 40 years has been enhanced by the attractiveness of the Izmir Bay port. Izmir is the second largest port in Turkey, servicing a substantial portion of the country’s external trade. The Izmir port accounts for 25 percent of annual exports and 55 percent of imports in Turkey. Serving as a trans-shipment point for marketing agricultural produce, the Izmir port has a large servicing area, including the fertile agricultural lands of Afyon, Denizli, Manisa, Mugla, and Usak. Each year, approximately 2,000 commercial ships stop in the harbor. The harbor is also home to a commercial fishing fleet, private boats, and the navy. Each of these groups threatens the bay’s ecosystem, due to spillage, discharge, and accidents.

Agriculture, Fisheries, and Tourism Compete for Water Use

Given its rich natural resources, Izmir contains extensive agricultural activities. The region contributes almost 15 percent of the country’s total agricultural production. Commercial fishing is also a prominent economic livelihood, with an annual fish stock and catch level of, respectively, 217.6 tons and 65.87 tons. Tourism is also another revenue source for the city of Izmir, the starting point for tours to a variety of nearby historic sites and archaeological remains (for example, Ephesus and Pergamon), tourist resorts (Bodrum, Çesme, and Kusadasi), and nature preserves (such as the Izmir bird sanctuary). Numerous

holiday resorts that can easily be accessed from the city contribute significantly to the income from tourism.

How Polluted Is the Bay?

Measurements of physical, chemical, and bacteriological indicators show that the capacity of the ecosystem of Izmir Bay is insufficient to sustain the current quantity of waste discharged from numerous sources.

Pollution Is Spreading to the Middle and Outer Bays

Degradation of organic substances discharged into the Inner Bay has depleted dissolved oxygen in the seawater, creating toxicity and foul odor, a typical indicator of the anaerobic process. A very low oxygen concentration in that part of the bay has caused most of the marine life to disappear. Suspended solids continually deposited at discharge points are gradually filling up the Inner Bay. The presence of suspended particulate matter (including planktonic organisms) has increased turbidity, impeding the process of photosynthesis. Furthermore, pathogenic microorganisms and viruses in surface waters reaching the Inner Bay may be causing a variety of diseases.

The environmental degradation is also spreading to the Middle Bay, and although the Outer Bay region is not an intensively urbanized area, it receives severe discharges from the Gediz River, also constituting a constant risk of serious pollution. The watershed of this river supports intensive agricultural and urban development, and the Gediz River receives all the waters from the watershed.

Domestic and Industrial Wastes Contribute to Half the Organic Pollution

More than 70 percent of the Izmir area is covered by a sewerage network. But problems occur in almost all coastal, mostly densely populated, areas of the agglomeration, where the network is old and frequently jerry-built. In these zones high population density, flat slopes, and storm water frequently cause surcharges and blockages of the old sewers, sometimes collapsing conduits.

But the most severe problem with the existing sewerage system is the current wastewater disposal regimen: 105,000 cubic meters of industrial discharges and 308,000 cubic meters of sewage are dumped daily into the Inner Bay through 128 canals and 10 streams, without any pretreatment.

Sewerage networks are absent in the southwestern parts of Izmir and in parts of squatter settlements built without any plan at the edges of the agglomeration (*gecekodu*). Sewage is disposed of in septic tanks, and wastewater from these tanks is disposed of by infiltration, at a great risk of polluting potable water lines. Another problem is that wastewater from septic tanks and cesspits seeps into the groundwater. And in some *gecekodu*, domestic wastewater is discharged directly into the street, creating odor and spreading disease. Per capita and domestic wastewater discharge projections until the year 2015 indicate that wastewater flows, loads of organic pollution, suspended solids, and levels of nitrogen and phosphorus will triple in the next 25 years.

Industrial wastewater discharges are estimated to be 105,000 cubic meters daily, without adequate treatment. They comprise 116,000 kilograms of biological oxygen demand (BOD), 55,000 kilograms of suspended solids, 2,600 kilograms of nitrogen, and 160 kilograms of phosphorus each day. Projections indicate that industrial discharges to the bay will increase by approximately 62 percent by the year 2015.

Improving Environmental Resource Management in Izmir Bay

It is clear that in a metropolitan area such as Izmir, in which a broad range of actors have a stake in its economic, environmental, and social development, water resource planning and management are daunting challenges. Looking at efforts to save Izmir Bay solely in terms of preventing pollution is a much too narrow perspective. The solution is to expand activities in the area under a more contemporary, integrated environmental management system.

Recognizing these demanding challenges, the authorities in Turkey adopted measures to prevent environmental pollution in Izmir, by proposing or supporting projects for collecting, treating, and disposing both industrial and domestic wastewater, and for improving the

drinking water distribution system. These projects are largely in the planning and initial implementation stage. But these initiatives are also being subsumed under the Izmir Coastal Area Management Programme, a strategic resource management intervention that for the past five years has been studying the success of projects and other elements of the current environmental management system in Izmir Bay. Under the aegis of the UNEP-Mediterranean Action Plan, the program seeks to integrate all economic, social, regional, and environmental dimensions associated with the environmental integrity of the bay, and to view the regional development structure as a rational and long-term perspective. The conclusions and recommendations of the Management Programme's studies and evaluations lay the groundwork for a sounder environmental management policy.

Six studies have been undertaken in particular, and their results are being used to formulate a masterplan for the Izmir Bay area.

- *Environmental impact assessment of a sewage treatment system that is under construction and the problems that may ensue if the project proceeds as planned.* The study indicated that, although the sewerage system will help improve the bay environment, it will not prevent its further pollution.
- *Profile and impact assessment of the entire range of economic, social, and environmental issues associated with Izmir, focusing particularly on the consequences of the rapid population growth in the area.* The study found that uncontrolled economic development has been the primary determinant of environmental degradation of the area in general and the bay in particular, largely because it has lured illegal immigrants to the area.
- *Study of the current institutional arrangements for environmental management, in recognition that different degrees of decisionmaking authority seem to stagnate action.* The study highlighted the fact that no single authority is entrusted with responsibility for environmental management in the bay area. It depicted a resource management system that consists of four competing administrative and decisionmaking levels: central government, the governorate (regional level), the Metropolitan Municipality of Izmir, and four district municipalities.

Furthermore, overall environmental activity in the bay area is a product of competing institutional forces between the municipality (for shore settlement and environmental activity) and the ministries—Transport (for shipping and the harbor), Defense (for naval shipping, the harbor, and dockyards), and Agriculture (for fisheries).

- *Study of the spatial aspects associated with the planning work of the municipality—including training on the use of such modern planning techniques as geological information surveys.* The findings of the study prompted work on preparing an environment-sensitive action plan that will be initiated in conjunction with a coastal zone management methodology. The two will culminate in a coastal management masterplan.
- *Economic analysis of environmental control activities being conducted in Izmir in the context of technical preparations for UNCED to augment the Izmir Coastal Area Management Programme under the UNEP-Mediterranean Action Plan.* The study underscored the importance of a properly planned pollution control program as a vehicle for generating economic resources.
- *Case study of Izmir to assess how environmental considerations can be integrated into the Coastal Management Masterplan, a study that was initially undertaken as an analysis of Izmir wastewater management.* The study indicated that an integrated approach to Izmir Bay resource management is a necessity, and activities in that direction are already under way.

All these studies have been supported interactively by a broad range of international organizations, national-level entities, and regional- and community-level concerns. The joint studies themselves—as a “consortium-oriented” model—indicate the importance and benefits of a well-coordinated approach to problem resolution. The specific structural, strategic, and functional problems identified by these study groups provide the targets for environmental management intervention:

- *Policy fragmentation.* The four levels of government decisionmaking have competing interests in economic and environmental policy, thus inhibiting a balanced approach to community development and resource management.

- *Absence of institutional resources.* Despite their efforts and activities, the Ministry of Environment and the Metropolitan Municipality of Izmir do not seem to have enough institutional strength or resources to respond to the escalating population and industrial growth.
- *Locus of decisionmaking.* All major decisions about the environmental-development interaction in Izmir Bay and the coastal area come from the central government. This does not fully capture concerns at the local level. Rather than coordinating efforts, the central government directs them, thus inhibiting participation by such community groups as environmentalists, municipal workers, business people, commercial enterprises, and industries.
- *Unwieldy legislative and regulatory regimen.* The legal framework is extensive and sometimes contradictory, and the jurisdictional responsibilities of the various administrative bodies overlap.
- *Absence of financing instruments.* The current shortage of financial resources reflects the absence of cost recovery mechanisms and operations and maintenance (O&M) budgetary management; it also reflects the government's priorities in public funding allocation.
- *"Curative," short-term approach to environmental problems.* Policy interventions have not been targeted at longer-term, preventive measures that could have greater social and economic benefits in the long term.

Perpetuating these structural and institutional shortcomings continues to endanger every single component of the environment; already, the pollution of some of the ecosystems has exceeded the critical point. The benefits of industrial, urban, and economic development in Izmir Bay have reached the level at which they are being overwhelmed by the costs incurred in the form of environmental degradation and resource depletion.

Recommendations

The following recommendations have been made for a two-prong environmental management strategy for Izmir Bay. The strategy takes a multi-

dimensional approach to resolving the environmental problems of the city that includes institutional improvements to help bring about change.

- The boundaries of activities to be carried out must be expanded. Planning decisions for the future must capture all facets of environmental protection and control.
- An efficient system of standards and monitoring must be developed, defining responsibilities for enforcement, and preparing quantitative indicators of pollution levels, concentrations, and composition.
- A long-term, cooperative research program must be initiated, with systematic data collection to monitor the recovery of the Izmir Bay and to evaluate the effects of global weather patterns on the coastal and marine environment.
- A more efficient and coordinated institutional arrangement should be developed among national and regional institutions, and universities and research institutes.
- Working groups of technical experts and policy analysts should be formed to provide technical assistance when necessary; foreign resources and foreign expertise should be sought if necessary.
- Legislation can be enacted to define the specific responsibilities of the municipalities and ministries under a coordinated resource management plan.
- An Integrated Coastal Masterplan should be prepared as a foundation for a resource management system—providing a cross-sectoral management strategy for the area, physical and financial requirements, detailed site-specific land- and sea-use proposals, and operational instruments for implementation.
- Management strategy and masterplan preparation should rely even more heavily on the Geographical Information System initiated by the Metropolitan Municipality of Izmir.
- Greater power and autonomy should be vested in local authorities.
- A study should be undertaken on how economic instruments can best be applied to environmental management.

Water Resource Management in Mexico City

Ismael Herrera

The metropolitan area of Mexico City is approximately 3,773 square kilometers. According to the 1990 census, the metropolitan area contained 17 percent of the total population of the country—or approximately 15 million people—and 45 percent of its industrial activity, generating 38 percent of the country's GDP. Combined with its concentration of government offices, international business, cultural activities, and leading universities and research institutes in the country, the capital dominates the national economy as few other national capitals do. If Mexico City were a state, it would represent the fourth largest economy of the Western Hemisphere—behind the United States, Canada, and Brazil.

The metropolitan area has expanded rapidly in two ways—industrially and residentially. Residential growth has had two patterns—planned movement by upper- and middle-class families, and disordered movement by poor, sometimes illegal settlers from inside the metropolitan area and out. The pockets of low-income residents have gradually become established in the area, and authorities have come to recognize their permanence, regularizing land possession and eventually providing urban services, including water, although the services are sometimes inadequate.

Supplying water for such a large city is a daunting challenge, made the more difficult by Mexico City's location in the Valley of Mexico, at an altitude of about 7,300 feet, with the lowest valley pass at 8,000 feet. The main source of water supply (72 percent) is the Mexico City aquifer—

but dangers of land subsidence above the aquifer mean that this source cannot be exploited without restriction. Given the scarcity of water, the consumption and costs of water are extremely high in the metropolitan area.

To address these problems quantitatively as a basis for developing technical solutions, the National Academy of Sciences and the National Academy of Engineering in Mexico, in cooperation with the National Academy of Sciences of the United States, have undertaken a study of water resource management in Mexico city. The study has been coordinated by a bilateral committee consisting of 14 members, 7 from each country. This discussion addresses four issues raised in the first meeting of the bilateral committee—the supply and disposal of water, the quality of the water supply, including public health concerns, the feasibility of implementing a demand management system for controlling consumption, and the legal and institutional arrangements necessary for managing water supply.

The Issues

Two issues are paramount in the metropolitan area of Mexico City: how reliable the aquifer will continue to be as a source of water, and how successful the recently constructed deep drainage system has been at controlling the long recurring problem of flooding. Other issues include:

- *Water quality.* Whether the procedures used for treating water and ensuring its quality are safe for the environment and people.

- *Demand management.* Whether reducing the demand for water, rather than increasing its supply, is a satisfactory option for water management, without restricting development and progress.
- *Legal and institutional framework.* How the complex network of legislative agencies and regulatory bodies can be made more efficient.

Findings of the Study

The study reached several conclusions:

Water Supply Needs Are Being Met

The Valley of Mexico is a closed basin—although it has been opened artificially—and it is important to distinguish between internal and external sources of raw water. The most important source of water supply for Mexico City is an internal one—the aquifer that flows beneath it. Other internal sources come from surface water—from Rio Magdalena, Presa Madin, springs, and ice from Popocatepetl and Iztlacihuatl—but they represent only a small fraction (2.3 percent) of total supply.

Mexico City has two external sources of water supply. One is the Cutzamala system, which takes water from the Cutzamala-Lerma-Santiago basin, approximately 100 kilometers west of the Valley of Mexico, and about 1,000 meters below it. The other is the Lerma Valley, which yields groundwater.

Study estimates indicate that 97 percent of the population in the federal district has access to water through an urban distribution network, and that the remaining 3 percent are served by tank trucks or self-supplies. In the state of Mexico overall these proportions are 90.5 percent and 9.5 percent, respectively. Consumption in the federal district is 364 liters per person daily; in Mexico overall it is 230 liters per person per day. Consumption in the district varies by income and type of household. For comparison, the rates in the United States range from 250 to 1,120 liter per person per day, with an average of 660. To address the rapid growth of the urban population, the government of the federal district has established 150 liters per person per day as its basic quota for supplying the new urban population.

The Aquifer Is Being Overexploited

The aquifer is very thick and has been explored recently to great depths—3,000 to 4,000 meters. The study contains a detailed description of it as it is known at present. An important feature of the aquifer is a thick cover of compressible clay, which creates ground subsidence when worked on, damaging construction and civil works in the country.

Water is being extracted at a rate of 43 cubic meters a second. The figure of 16 cubic meters a second is generally accepted as an adequate recharge rate for the aquifer, although more optimistic computations put the rate at 26 cubic meters a second. Although the aquifer is being overexploited, it could continue to supply water at the present rate for many years—a century or more—if not for the associated land subsidence, which is extremely expensive and inconvenient.

Another important factor is that only 20 percent of the area of the aquifer is covered by clay layers. Thus, there are some management opportunities for exploiting other areas of the aquifer, which some of the utilities have already pursued.

The Quality of Water Is Good

All of the water from the Cutzamala system is purified at the treatment plant in Los Berros. Its installed capacity is 10 cubic meters a second, although it currently treats 10.6 cubic meters a second; in the original project its capacity was 24 cubic meters a second. The treatment consists of percolation, coagulation and flocculation, gravity sedimentation, and rapid filtration through sand.

Several treatment plants were originally slated to treat groundwater from wells located in the Valley of Mexico. At present, however, these plants are performing only chlorine disinfection.

The quality of the water from the Mexico City aquifer is generally quite good. The thick layers of clay that cover the aquifer have very low permeability and constitute very effective protection against pollutants. However, as has been mentioned, only 20 percent of the area is overlaid by these strata, and the rest is exposed. The aquifer is particularly vulnerable in the recharge areas, where many of the irregular, illegal settlements have moved, and in which inadequate sanitation

and disposal services increase the risks to the aquifer.

Demand Management and Water Conservation

Both water costs and water consumption are out of control. It is not clear whether increasing the supply of water is the correct measure to cope with demand from the growing population and burgeoning economic activity. Given the scarcity of water, as well as stricter water quality and environmental standards, water costs have escalated, leaving the water utilities with an annual deficit estimated to be US\$1 million. This shortfall drastically restricts the ability of the system to expand and provide essential services to areas that lack them.

Until recently, water authorities have focused their attention on increasing supply, constructing new and impressive waterworks, and networks to bring water from far away. However, little attention has been given to demand management—a realistic and equitable pricing and metering system that, rather than pursuing water conservation, seeks to increase the efficiency of water consumption and to recover water costs more effectively. Recently, these issues have begun to have a more pronounced position in the water strategy. The system requires that users play an active role, and public awareness campaigns have been introduced.

Water Management and Moves toward Privatization

Water supply in Mexico City is governed by a wide range of laws and regulations and managed by a complex network of institutions responsible for developing and administering water and sanitation services in the metropolitan area. These institutions start at the federal government level with the Water Commission, which in turn governs the Water Agency of the Valley of Mexico, the governments of the federal district, the state of Mexico, and local municipal governments. In addition, two secretariats are responsible for health and environmental management.

The institutional framework for water management in Mexico City is currently undergoing extensive change—particularly in the federal district. On July 14, 1992, a privatization decree was issued, which established a new semiautonomous Water Commission for the Federal District, whose primary goal is to increase the efficiency of the supply of water and of wastewater disposal. The Dirección General de Construcción y Operación Hidráulica—the entity that is largely responsible for these functions in the federal district—will continue to serve as an operational agency, but plans call for privatizing such functions as potabilization and water supply, and the drainage and treatment of residual waters.

Floor Discussion

Question 1: Has the World Bank developed a policy on sharing and conserving the resources of international rivers?

Mr. Le Moigne: Yes, the Bank has a policy for financing projects on international rivers. We have no formal policy yet for financing projects on internationally shared groundwater aquifers, which are currently treated on a case-by-case basis. For international rivers our policy rests on the two principles of equity and appreciable harm, with more emphasis on the latter concept.

If a country requests Bank financing for a project that is located in an international river basin, and the country has an agreement with the other riparian(s), then the only objective is to make sure that the project proposed is in accordance with this agreement. The Bank tries to encourage countries to reach agreements. This is our first objective. But if this cannot be done for various reasons, political or otherwise, we make our own assessment as to the harm that can be caused to the other riparians. And if in our opinion the project will not harm the other riparians, the management of the Bank may decide to overrule the objection of other states, if any, and still finance the project.

Before doing this, when there are objections, we often appoint a group of international experts to review the World Bank assessment. This has only happened once, in the case of a project in Somalia some five or six years ago. The Somalis wanted to build a dam on the Daua River, which is shared by Ethiopia and Kenya. We concluded that the project would not harm the other two countries. The Bank staff assessment was con-

firmed by an international panel of experts. However, there were other macroeconomic conditions that were not met and so this project was never financed.

Question 2: How does the caretaker approach in water supply management work in a very large city? What is the advantage of having a local caretaker when you can have infrastructure for the whole city?

Mr. McIntosh: The caretaker approach is my idea; it will be put into practice in Colombo, Sri Lanka, in a pilot project of 5,000 connections, starting within the next 6 months for a duration of about 18 months. There is no reason it should not work in a large city. It comes down to a question of responsibility for what is happening in the area, and the ability of the caretaker to interact with the community—to be a part of the community, not an outsider.

Question 3: Some of the speakers have mentioned the need to reduce water loss. What technologies are being used to reduce losses?

Mr. McIntosh: With regard to the technology for the reduction of losses, all too often consultants are called in who have a different, and unnecessary, technology. For instance, foreign consultants may emphasize leakage control and leak detection equipment. But when unaccounted-for water losses are on the order of 50 percent and more, when leaks are visible, when there are illegal water connections, and when water meters do

not work, there is a great deal that can be done before using leak detection equipment.

We do not have to get too sophisticated with the technology. First solve the simple problems; and then we can look at those other losses that could be reduced by using more modern technology.

Audience observation: The Bangkok case may respond to the question. From around 1970 to 1990, the Metropolitan Water Works of Bangkok had a huge campaign to reduce losses. There were three main efforts. One was leak detection, the second was replacement of old pipes, and the third was metering. These three things combined constituted an effort to reduce losses considerably over the 20-year period, and I think it was very successful.

A lot of the spirit behind this effort came from the donors. Japanese investment was used to set up an excellent training center at the Metropolitan Water Works for leak detection, repair, pipe replacement, and so on. And they have been training people from all over the region: Filipinos, Indians, Sri Lankans, Vietnamese, and others. Other funding has come from the Asian Development Bank and the World Bank.

However, the program could still be improved. For example, the Thais have not yet considered conservation. The water rates are very low, and they are considering interbasin transfers and importing water from Burma, without first attempting conservation or demand management.

Another problem is that water quality is still very low in Bangkok—not safe for drinking. The tariff structure does not cover the cost of water, even though the water authority is more autonomous than it used to be, and could set more realistic prices. And they say they cannot reduce the unaccounted-for water below the current level of 30 percent.

This example indicates that, although donor assistance was successful in reducing unaccounted-for losses from 70 percent down to 30 percent, the donors might be able to initiate a similar campaign for demand management. They could start by giving well-defined criteria for reducing water consumption through demand management before resorting to interbasin transfers.

Mr. McIntosh: Bangkok is a very interesting case. The Asian Development Bank put a lot of money

into Bangkok. We could take some of the credit for that, for the reduction of unaccounted-for water, but when a water utility is making close to US\$100 million profit a year, it will not listen to the Asian Development Bank and ask for demand management.

But demand management is needed in Bangkok. Bangkok is the highest per capita consumer of water among Asian countries, and last year's drought was a real crisis.

Demand management problems should be tackled through the tariff structure and not through raising prices, because the tariff structure for Bangkok is almost flat.

Question 4: To follow up on that question, while I agree that it is more cost-effective to increase efficiency rather than increase supply, is there some mechanism that the Bank or regional banks could employ that would require least-cost demand-side measures, such as toilet replacement programs, in conjunction with funding for any kind of supply project? We have this same problem in the United States, particularly in California. And the answers seem to be the same: it is cheaper to save water than it is to develop new supplies of water.

Mr. Briscoe: I am from the Water and Sanitation Division in the Bank. We very much share the sentiment that you and others have expressed. Tariffs are the major issue for country dialogue in most Bank-funded water supply and sanitation projects. By putting tremendous pressure on this issue, we managed get the very elevated level of about 30 percent of water supply costs covered by tariffs in Bank projects.

In comparison with other sectors, such as telecommunications or energy, we are much closer to the break-even point. This raises a very important question as to why is it so difficult to get cost recovery in water—what is different about water? The answer is both very complex and very simple. Water is perceived as a resource that is different from a telephone, that is different from energy, because it is a basic need. It has always been available at some level.

Working with governments to get realistic tariffs is a fundamental issue—it is a political problem as much as it is an economic problem. There has to be a consensus in the country, in the city,

that charging for water at something close to its marginal cost is, in fact, in the interest of all people. Some of what Mr. McIntosh spoke about today is a very important first piece of the puzzle.

In these discussions the first point always raised is that poor people cannot pay for water. This is a genuine concern. There is always rationing of some sort with inadequately financed systems—either water does not get to certain areas, or the supply is intermittent. And the poor are the ones who suffer the most.

The poor often resort to getting their water from vendors, which is expensive, or by using polluted supplies, which is dangerous. We find a virtual consistency in this throughout the world: water supply systems are heavily subsidized, but poor people do not benefit from these subsidies. The people who benefit are the people who get access, the people who get water, and that is never the poor. This is an issue that has to be dealt with in partnerships, and solutions must come about as a result of dialogue in the societies.

We must also address the issue of the high cost of supplying water, which touches on inefficient systems of supply. We did a review of water utilities in Latin America and found, on average, 10 times as many employees as were needed: about 30 employees per 1,000 connections; to compare, an efficient utility in Latin America, like that in Santiago, functions with 3 employees per 1,000. This raises the cost of provision, and this is where social control and accountability have a role.

We have learned from some very significant failures we have had over the years, in particular, the Manila water supply project. There have been six water supply projects in Manila. The first was designed to reduce the unaccounted-for water losses from their rate of 50 percent. After six projects the losses are now at around 60 percent.

We have learned that without a much more comprehensive approach that takes account of incentives, and unless utilities are made autonomous and accountable for being efficient and for providing services, no amount of codes and regulations on low-cost latrines and so forth will ever make a difference.

On the other hand, we have some very good cases in which water is priced near its marginal cost, and utility managers respond by doing things that are cost-efficient. Again, it is not a matter of sophisticated leak detection equip-

ment, but a matter of getting incentives right so that managers of utilities will be rewarded for efficient management. These incentives should take account not just of the financial costs but the opportunity costs of water. Once this is in place, the technology will effect the desired resource sustainability.

Question 5: In Trinidad the water utility is a classic case of excessive government intervention, the use of water provision as a form of subsidizing the people. Though the state has invested excessively in the production side, water supply is still not reliable.

The private sector is interested in taking on the risk in the water sector. Should the state maintain some presence in terms of production and encourage the sector to be involved on the distribution side?

Mr. McIntosh: We have found that private sector participation normally comes in production first, and in distribution last. I cannot think of any examples of successful private sector water distribution in Asia, nor in other parts of the world.

My earlier point about government setting the policy and the agencies implementing that policy is that the agencies do not have to be private agencies. They can be government departments or government enterprises. But there must be a clear delineation between the policy and its implementation. This means that government does not set tariffs, but rather the policy and goals that tariffs are supposed to meet. The utility then has a responsibility to administer that policy.

Mr. Briscoe: To add to this point, there are quite a few examples of distribution being “privatized,” though I use this word with caution. France has the most “privatized” water industry in the world; and in fact it is publicly owned, but franchised. In Paris the bulk of the water supply system is, in fact, run by an autonomous entity that is mostly owned by the city of Paris itself. But for distribution, Paris has given out 30-year concession contracts.

Mexico City has a very gradual and graduated approach to involving the private sector. The water rates in Mexico City at the moment are around one cent a cubic meter, while the production cost is about one dollar. This is not attractive

to the private sector, though the system would benefit from more efficient management. The approach they have taken in Mexico City is to divide the city into four zones, and they have contracted two British companies and two French companies to manage those zones. This is without the incentives that normal private sector involvement would entail, but it is considered that in 5 to 10 years there will be enough experience working with the private sector that the tariffs will be more realistic, and it will become an investment that is attractive.

One last but striking example is Buenos Aires, where the government has given a 30-year concession contract to a consortium for both water and sewerage provision.

Mr. Le Moigne: I would only add that, in Asia, Macau has a private water supply.

Chairperson Postel: On a point related to demand management, the United States passed water efficiency legislation in late 1992 that requires manufacturers of plumbing fixtures to meet certain standards of efficiency for toilets, showerheads, faucets, and so forth. The collective savings from those measures over the long term would reduce domestic water by about 30 percent. In a fast-growing metropolitan area that is rapidly expanding its water infrastructure, making sure that the most efficient appliances are going in makes a big difference to long-term water capacity needs, wastewater treatment needs, and so forth. Is the water appliance infrastructure that is going into new construction in some of the larger Asian cities of this efficient variety?

Mr. McIntosh: The only example I can cite is in Seoul where the government itself, in its own housing schemes, insisted on these water-saving devices. But I do not know of any such initiative in the other megacities, which is why demand management is so important. The water utility should look at how people actually use water and help them use it more efficiently.

Mr. Herrera: In Mexico City there has been recent regulation requiring a change to more efficient water appliances, and currently the appliances are being changed.

Question 6: Even Sweden, a country with abundant water resources, has problems with water resources. In particular, we have problems of pollution from waterborne sanitation systems. To what extent is the Bank promoting dry solutions to urban sanitation today in view of water conservation?

Mr. Briscoe: The World Bank has tried very much to avoid a situation in which we take a position on a particular technology. I do not think that you in Sweden would be advocating that all of Stockholm have dry toilets. Similarly, when we deal with developing countries, what we try to do is to encourage consideration of a range of technologies—wet and dry, on-site and off-site—that are appropriate to particular areas.

For example, in the downtown areas of São Paulo, with buildings 40 stories high, it does not make sense to consider on-site dry solutions. On the other hand, in the *favelas* in the periphery of São Paulo, this becomes very interesting where land size is appropriate. The issue is not so much for the Bank or any other agency to be prescriptive, but to try to get the incentives for demand management in place and to develop a menu of options. We have run into problems when we have pushed experimental technologies that have not been proven in developing countries and that have then failed. That is even worse than not having tried at all.

Question 7: In most cases tariffs for sewerage services are related to the amount of water consumed. However, this relationship does not encourage people to connect to the sewerage network. How do you look at this problem?

Mr. McIntosh: There is no easy answer to this. Manila has a water charge and a sewerage charge and an environmental charge. People have not been hesitated to connect to sewerage because the overall charges have not been too high. In general, the policies have aimed at covering just the operation and maintenance costs of sewerage schemes; whereas the water supply sector in a large city must cover a lot more than that.

Mr. Briscoe: This is an excellent question. While the Manila case may be different, there are quite a few cases in which systems are put in but

connection charges or monthly charges for sewerage discourage people from connecting.

This issue must be addressed before the system goes in. This relates to the earlier question on the sorts of services that are appropriate in particular areas. Increasingly, we are trying to look at the willingness to pay for different levels of service before going in with the project.

The Bank has actually done this in a series of cities in the Philippines—not in Manila, but in areas in which people have invested very heavily in on-site systems. Of course, the residents in these areas were not willing to pay for a connection to the sewer system because they had no problem with sewage disposal. So before putting in the sewer system, one has to look at the need and the demand.

The results of extensive work in Kumasi and Ouagadougou in West Africa were quite different. The relatively lower costs of sewerage versus on-site systems resulted in very little difference in willingness to pay because there was little trust that the authority could actually manage the sewers. The sewer was seen as a source of problems rather than solutions.

Mr. Maglio: In the case of São Paulo sewerage and water rates are connected. But we never considered the impact of subsidies on different levels of consumption. So the poor, who do not consume as much, receive a low level of subsidies; while the wealthier, who consume more water per capita, actually get bigger subsidies.

URBAN WASTEWATER AND SANITATION: RESPONDING TO HOUSEHOLD AND COMMUNITY DEMAND

Overview

Carl R. Bartone

As we have learned throughout this conference, the world is becoming increasingly urbanized, particularly in the developing world. And although cities are the engine that drives the development process in a country in the early stages of modernization, they also concentrate pockets of poverty. Cities confront several challenges as they seek to meet the growing demand for urban sanitation and sewerage services and improved wastewater management. The challenges are dual in nature (Serageldin 1994).

First, cities must complete the “old agenda” of extending sanitation services to the entire urban population. From a financing standpoint, it is clear that the bulk of funding can and should come from users. This requires providing the services that people want and are willing to pay for. To help poor urban households meet sanitation needs, innovative credit mechanisms will also be required. Institutional arrangements should be grounded on the principle of shared responsibility, with devolution of decisionmaking to the lowest appropriate level, and service delivery institutions should be responsive and accountable to users. In many cases this configuration will require local partnerships to ensure effective community participation in service delivery, and a greater role for the private sector. On the technical side, cities should consider more modern sanitation technology and equipment, but should also match service options with a user’s ability to pay.

Second, cities in the developing world are being called on to embark on the “new agenda” of wastewater treatment and water quality management while the “old agenda” is still on the table. Doing so represents an enormous financial challenge, as evidenced by recent experience in industrial countries, where financing responsibilities for the environment are being debated in the face of scarcer resources. Difficult tradeoffs in developing countries reinforce the need for strategic financing mechanisms that simultaneously promote an optimal use of available resources and provide incentives to reduce their pollution loads—for instance, such economic instruments as water pricing and pollution taxes. New institutional arrangements are also required to provide resource management systems that capture the concerns and interests of local communities while also making the difficult choices between economic development and environmental quality. Innovative technical approaches and more modern equipment and facilities are also required, as is long-term planning in water conservation and reuse.

To confront this dual agenda, cities should adopt a new policy framework that is more strategic in nature—oriented more effectively toward the wants of citizens and opportunities for their participation in solutions, and targeted at market incentives rather than regulatory compliance—and should be more visionary about the role of the private sector.

A Meeting of the Old and New Agendas

To understand the nexus of sanitation service and environmental issues, consider the sequence in which people demand water supply and sanitation services. For a family that migrates into a shantytown, the first environmental priority is to secure an adequate water supply at reasonable cost. This is followed shortly by the need for a private, convenient, and sanitary place for defecation. Families are quite willing to pay for these household or private services, in part because the alternatives are so onerous and expensive. Accordingly, they pressure local and national governments to provide such services, and in the early stages of development much external assistance goes to meeting the strong demand for these services. Success at meeting these primary needs, however, gives rise to a second generation of demands—the removal of wastewater from the household, then the neighborhood, and then the city. As cities succeed in this endeavor, the process gives rise to yet another problem—protecting the environment from the degrading effects of such large and concentrated pollution loads.

The Old Agenda of Basic Sanitation Services Still Faces Supply and Demand Challenges

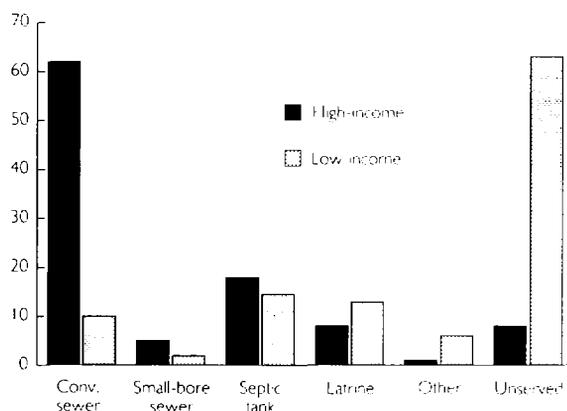
Significant progress on basic sanitation needs was made in the 1980s; the number of urban dwellers with adequate sanitation facilities increased by about 50 percent. But the provision of sanitation services, including sewerage, has not kept pace with the population growth. During the same period the number without ade-

quate sanitation actually increased by 70 million, and as many dwellers were unserved as were provided with service. And the results of a recent WHO/UNICEF (1993) survey of 63 countries show large disparities in the types of sanitation services that are reaching the upper- and lower-income urban populations (figure 1). The challenges of the next two decades dwarf any progress made in the previous decade—some 1.3 billion new urban residents will require sanitation services in addition to those currently without service. This is roughly six times the increase in service provided during the 1980s.

Although a growing share of urban sanitation services are being provided by sewerage (currently, 40 percent on average worldwide), user contributions have been negligible. And the public subsidies that are provided go largely to the middle- and upper-income classes of urban areas, leaving few public resources to be spent on sewage treatment and safe disposal.

The health consequences of the service shortfalls are enormous, and fall most heavily on the urban poor. In most low-income communities the pollutant of primary concern is human excreta. The World Health Organization (1992) reports that 3.2 million children age five and younger in the developing world die each year from diarrheal diseases, due largely to poor sanitation, contaminated drinking water, and unhygienic food. Infectious and parasitic diseases linked to contaminated water are the third leading cause of productive years lost to morbidity and mortality in the developing world (World Bank 1993b). Diarrheal death rates are typically about 60 percent lower among children living in households with adequate water and sanitation facilities than those in households without such facilities (World Bank 1992).

Figure 1. Urban sanitation by technology type and income (percent)



The New Agenda of Wastewater Management and Pollution Control Faces Financial and Technical Challenges

The wastewater management situation in cities of the developing world leads to acute water pollution problems. Even in middle-income countries, sewage is rarely treated. Buenos Aires, for instance, treats only 2 percent of its sewage, a figure that is typical for many middle-income countries of Latin America. There is also the problem of uncontrolled industrial discharges

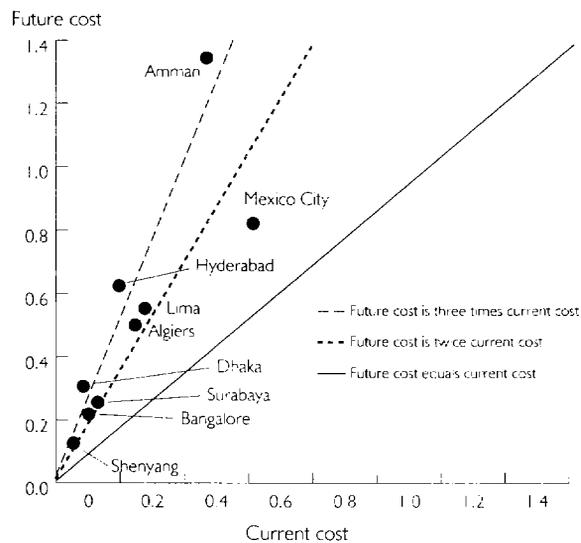
into municipal sewers, increasing organic loads and introducing a range of chemical contaminants that can damage sewers, interrupt treatment processes, and create toxic and other hazards. Water quality is far worse in developing countries than in industrial countries. Furthermore, while environmental quality in industrial countries improved in the 1980s, it did not improve in middle-income countries, and declined sharply in lower-income countries.

The costs of this degradation can be seen in many ways. The vast majority of rivers in and around cities in developing countries are little more than open, stinking sewers. Not only do these degrade the aesthetic life of the city, but they constitute a reservoir for cholera and other water-related diseases. The recent outbreak of cholera in Peru can be traced to inadequate urban sanitation and water contamination (WASH 1993) and, as we shall hear from Catterina Ferreccio, the otherwise inexplicable persistence of typhoid in Santiago over four decades has been attributed to the pollution of irrigation waters by untreated metropolitan discharges (World Bank 1994b). The costs of urban water pollution also fall back on the cities in the form of higher water supply costs (figure 2). In metropolitan Lima, for example, the cost of upstream pollution has increased treatment costs by about 30 percent. In Shanghai, water intakes had to be moved upstream more than 40 kilometers at a cost of about \$300 million (World Bank 1992).

Meeting Financial Challenges: Sharing Financing Responsibility

In recent years, there has been remarkable consensus about market-friendly and environment-friendly policies for managing water resources and for delivering water and sanitation services efficiently and equitably. The new consensus gives prime importance to a central principle of public finance—that both efficiency and equity require that private resources be used to finance private goods, and that public resources be used to finance public goods. Implicit in this principle is the belief that social units themselves—whether households, firms, urban communities, or river basin associations—are in the best position to weigh the costs and benefits of different levels of investment. The vital issue in applying this principle to the

Figure 2. How the cost of water supply is increasing
(1988 dollars per cubic meter)



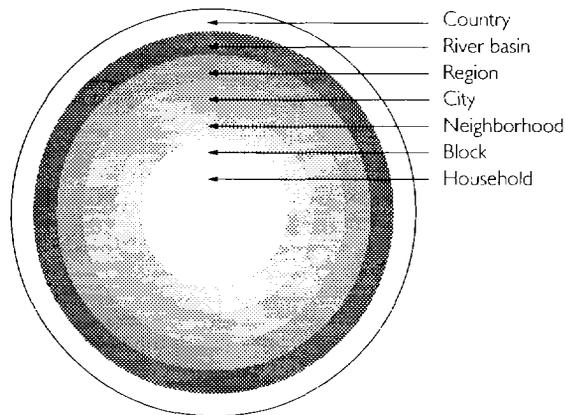
Source: World Bank 1992.

urban sanitation subsector is defining the decisionmaking unit and what responsibilities are internal (private) and external (public) to that unit.

The benefits from improved sanitation, and therefore the appropriate financing arrangements, are complex. At the lowest level (refer to figure 3), households place high value on sanitation services that provide them with a private, convenient, and odor-free facility which removes excreta and wastewater from the property or confines it appropriately on-site. However, there are clearly benefits that accrue at a more aggregate level and are therefore “externalities” from the point of view of the household. Willingness-to-pay studies (see, for example, Ducci 1991) have consistently shown that households are willing to pay the first category of service benefits, but have little or no interest in paying for external (environmental) benefits that they do not perceive.

It is useful to think of the different levels at which such units may be defined as concentric circles (figure 3). The fundamental principle of public finance tells us that costs should be assigned to different levels in this hierarchy according to the benefits accruing at different levels. This suggests that the financing of sanitation, sewerage, and wastewater treatment be allocated approximately as follows:

- Households pay the costs of on-site facilities (bathrooms, toilets, and sewerage connections).

Figure 3. Levels of decisionmaking on water and sanitation

Source: Serageldin 1994.

- Block residents collectively pay the additional costs of collecting waste from individual homes and transporting it to the boundary of the block.
- Neighborhood residents collectively pay the additional costs of collecting the waste from the blocks and transporting it to the boundary of the neighborhood (or treating the neighborhood waste).
- City residents collectively pay the additional costs of collecting the waste from the neighborhoods and transporting it to the boundary of the city (or treating the city waste).
- The stakeholders in a river basin—cities, farmers, industries, and environmentalists—collectively assess the value of different levels of water quality within a basin, decide what level of quality they wish to pay for, and determine who will be responsible for paying for the necessary treatment and water quality management activities.
- The nation may choose to pay collectively for meeting more stringent treatment standards, as a concession to broader benefits that accrue to public health or the environment.

Enabling Households to Assume Financing Responsibility

Such innovative sewerage financing schemes are now being observed in cities of the developing world. Mr. Hasan's discussion of financing sewerage services in Orangi, an informal urban settlement in Karachi, describes how households

pay the costs of their on-lot services, lanes pay the cost of the primary sewers, contiguous lanes pool their resources to pay for neighborhood sewers, and the city via the Municipal Development Authority pays for trunk sewers. The arrangements for financing *condominal* sewers of the urban poor in Brazil (de Melo 1985; Briscoe 1993) follow remarkably similar lines: households pay for the on-lot costs, blocks pay for the block sewers (and decide what level of service they want from them), and the water company or municipality pays for the trunk sewers (box 1).

Lack of access to credit may impede investment in sanitation, drainage, and other essential urban environmental services, especially in small cities and towns. This problem has been overcome in some cases with the creation of special municipal development funds or rotating funds to finance environmental investments. For example, the World Bank has supported the creation of municipal development funds in the State of Minas Gerais, Brazil, for environmental improvements in small cities and towns, and in Mexico for municipal water supply, sewerage, and solid waste investments in intermediate cities.

Similarly, poor urban households need financing mechanisms for acquiring sewer connections and in-home sanitary facilities. Some cities provide (unsubsidized) credit to poor households for these investments that can be paid off in installment payments in three- to five-year periods. Where water and sewerage utilities are operated effectively, the installment payments can be collected as part of the monthly water bill. In some cases households can provide sweat equity or even make partial payment in the form of construction materials. A special sanitation credit fund has been established in Honduras for poor urban households, fashioned along the lines of the well-known Grameen rural credit bank in Bangladesh (Hermanson 1994). The Ouagadougou example to be presented by Eustache Ouayoro shows how household access to credit is an essential incentive to stimulate demand for on-site sanitation. Such experiences show that the urban poor will invest in a healthier environment if they can spread the initial costs over time.

Participatory Financing and Environmental Taxes

Industrial countries use two very different models to finance wastewater treatment facilities.

Box 1. The condominal sewerage system in Brazil

The "condominal" system is the brainchild of Jose Carlos de Melo, a socially committed engineer from Recife. The name condominal was given for two reasons. First, a block of houses was treated like a horizontal apartment building—or condominal in Portuguese. Second, "Condominal" was a popular Brazilian soap opera and associated with the best of urban life. The result is a radically different layout (with a shorter grid of smaller and shallower "feeder" sewers running through the backyards and with the effects of shallower connections to the mains rippling through the system). These innovations cut construction costs to between 20 and 30 percent of those of a conventional system.

The more fundamental and radical innovation, however, is the active involvement of the population in choosing their level of service, and in operating and maintaining the "feeder" infrastructure. The key elements are that families can choose to continue with their current sanitation system; connect to a conventional water-borne system; or connect to a condominal system. If a family chooses to connect to a condominal system, it has to pay a connection charge and a monthly tariff. If the family wants a conventional connection, it has to pay an initial cost and a monthly tariff that are each about three times higher, reflecting the different capital and operating costs. Families are free to continue with their current system (which usually means a holding tank discharging into an open street drain). In most cases nearly all families eventually

choose to connect. Either they succumb to heavy pressure from their neighbors or they find the buildup of wastewater in and around their houses intolerable once the (connected) neighbors fill in the rest of the open drain.

Individual households are responsible for maintaining the feeder sewers, with the formal agency tending only to the trunk mains. This increases the communities' sense of responsibility for the system. Also, the misuse of any portion of the feeder system (by, say, putting solid waste down the toilet) soon shows up in a blockage in the neighbor's portion of the sewer. The rapid, direct, and informed feedback to the misuser virtually eliminates the need to educate the users of the system in the "do's and don'ts" and creates fewer blockages than with conventional systems. Finally, because of the greatly reduced responsibility of the utility, its operating costs are sharply reduced.

The condominal system is now providing service to hundreds of thousands of urban people in northeast Brazil and is being replicated on a large scale throughout the country. The danger, however, is that the clever engineering is seen as "the system." Where the community and organizational aspects have been missing, the technology has worked poorly (as in Joinville, Santa Catarina) or not at all (as in the Baixada Fluminense in Rio de Janeiro).

Source: Briscoe 1993.

Many industrial countries set universal environmental standards and then raise the funds necessary to finance the required investments. As is becoming increasingly evident, this approach is expensive and financially infeasible, even in the richest countries of the world. In the United Kingdom the target date for compliance with the water quality standards of the European Community is being reviewed as customers' bills rise astronomically to pay the huge costs involved (more than \$60 billion this decade). In the United States \$56 billion in federal construction grants were provided to local governments from 1972 to 1989 to build mandated secondary treatment facilities, but the grants are now being replaced by more limited state revolving funds, even as more stringent environmental standards are being proposed. Many local governments are revolting against the unfunded mandates of the federal government (Austin 1994). The city of San Diego,

for example, has refused to spend \$5 billion on federally mandated secondary treatment, arguing that it is more cost-effective to use long coastal outfalls for sewage disposal. San Diego brought suit against the federal government and recently won its case in the federal courts (Mearns 1994). The U.S. National Research Council (1993) has advocated a change in which both costs and benefits are accounted for in sewerage management, with a shift to a water-quality-based approach at the coastal zone, watershed, or river basin level.

A few countries have adopted a different model, establishing river basin institutions to ensure broad participation in setting standards and making tradeoffs between cost and water quality, and to promote economic incentives for encouraging users and polluters to reduce the adverse environmental impacts of their activities. In basins in France, Germany, and, more recently, Brazil, river basin financing and management

models are used to raise resources for wastewater treatment and water quality management from users and polluters, and the stakeholders are involved in deciding the level of resources to be raised and the consequent level of environmental quality they wish to “purchase.” This system has proved to be efficient, robust, and flexible for meeting the financing needs of the densely industrialized Ruhr Valley for 80 years, and for all of France since the early 1960s (Briscoe and Garn 1995).

Emerging evidence indicates that if such participatory agencies were developed, people would be willing to pay substantial amounts for environmental improvement, even in developing countries (Serageldin 1994). In the state of Espirito Santo in Brazil, a household survey showed that families were willing to pay 1.4 times the cost of sewage collections systems, but 2.3 times the higher cost of a sewage collection and *treatment* system. In the Rio Doce Valley an industrial basin of nearly 3 million people in southeast Brazil, a French-type river basin authority is in the process of being developed. Stakeholders have indicated that they are willing to pay about \$1 billion over a five-year period for environmental improvement. And in the Philippines recent surveys show that households are often prepared to make substantial payments for investments that will improve the quality of nearby lakes and rivers.

For developing countries the implications of the experience of industrial countries are clear. Even rich countries manage to treat only a part of their sewage—only 52 percent of sewage in France and only 66 percent in Canada. As in Japan, the United States and even France, most countries have provided some form of environmental grants to municipalities to reach treatment level standards. Given the very low starting points in developing countries—only a very small percent of wastewater is treated in Latin America, for example—and the vital importance of improving the quality of the aquatic environment, what is needed is an approach that both uses the optimal package of available resources and provides incentives to polluters to reduce the loads they impose on surface and groundwater.

Many countries, ranging from France and Germany to China and Mexico, have used an effluent tax as an economic incentive. The tax can be applied to any dischargers, cities or industries, with two benefits—it induces waste reduction and

treatment, and it provides a revenue source for financing wastewater treatment investment. The experience of China in imposing an industrial effluent tax will be presented at this session by Yang Suzhen. In France and Mexico the tax is applied equally to municipal and industrial effluent, thus encouraging local investment in municipal wastewater treatment plants. An effluent tax, however, should be combined with municipal sewer use charges to ensure both that industries do not escape paying for their discharges by passing the cost on to the municipality and that the municipal sewerage authority has sufficient revenue to build and operate sewerage and treatment works.

Clearly Defined Arrangements and Regulations, and Community Participation

A recent comprehensive review of the World Bank’s experience in water and sanitation projects pinpoints “institutional failure” as the most frequent and persistent cause of poor project performance (World Bank 1992). Three areas are key for institutional reform.

Configuring Institutions for Service Delivery

In line with the subsidiarity principle of participatory water management, it is obvious that responsibility for providing sanitation and wastewater services should be shared across all levels of government. The subsidiarity principle calls for devolving authority and responsibility to the lowest appropriate level. This concept is embodied in the condominial sewer system in Brazil, in the Orangi Pilot Project in Pakistan, and, at a more aggregated level, in the river basin management model offered by France.

For cities the dominant model is that of a public water and sewerage utility (although a few countries have set up exclusive sewerage agencies—Tunisia, for example). Although many public utilities work effectively in industrial countries, only few do so in developing countries. Nonetheless, as Briscoe (1993) argues, improving the performance of public utilities is important, since in the near term they will continue to provide services to the great majority of urban residents. In addition, improving the performance of public utilities is often a precondition for involving the private sector in operations.

Improving performance requires managing the utility like a business, not a bureaucracy, with financial autonomy and discipline and greater responsiveness to customer demands.

It is also necessary to separate service provision from regulatory functions both financial and environmental. And for both service providers and regulatory bodies, freedom from undue political interference is critical to their performance. While nominally autonomous, utilities and regulators in developing countries are often subject to policy decisions—on investments, staffing, and tariffs—that are made by government officials and influenced heavily by short-term political considerations. Efficient utility performance based on commercial principles and appropriate regulation will not be sustainable without strong political commitment to improve public sector service delivery. Political commitment, in turn, often depends on an informed citizenry that demands better services. It also requires introducing competition and depending on consumers to be the best monitors of service quality. Environmental regulation in urban areas also requires an independent authority; the Beijing Municipal Environmental Protection Bureau that will be described by Yang Suzhen is an example of a local agency that is responsible for monitoring and controlling municipal and industrial discharges and levying effluent taxes and pollution fines.

Supporting Community Participation in Service Delivery

The aspiration of most urban households, including the urban poor, is to have access to cost-effective and affordable sanitation services via public or private utilities. They are willing to participate as responsible users by paying the appropriate service charges. In many cities of the developing world, however, such services are not yet universally accessible, and poor communities must themselves become involved in planning and delivering sanitation and sewerage options.

The examples of the *condominial* sewer system in Brazil and the Orangi Pilot Project are illustrative institutional approaches to community participation, in which a productive partnership is formed between community groups and the municipal government or the utility. These partnerships are often defined by the separation of

responsibilities: the public provides the external or trunk infrastructure, either the public or private sector operates it, and the community provides and manages the internal or feeder infrastructure. Community participation in sanitation and sewerage services takes many other forms:

- Community information gathering to support needs and impact assessments
- Advocacy for local preferences and priorities
- Consultation on the design and selection of programs, projects, and policies
- Contribution of “sweat equity” or project component management
- Information dissemination, monitoring, and evaluation.

When political will exists, governments can indeed create the conditions under which communities and households, as well as nongovernmental organizations (NGOs) and the private sector, can play their appropriate roles. For example, the World Bank–financed PROSANEAR project in Brazil (box 2) provides the framework and resources necessary for enabling municipalities and utilities to experiment with innovative technical and institutional arrangements for providing sanitation services to the urban poor. Absent such government support, alternative approaches have commonly been used to stimulate community involvement and build the necessary political will. First, NGOs or community-based organizations often play a catalytic role in mobilizing communities and forming partnerships. In one of the largest-scale examples involving an NGO, Sulabh Shauchalaya International began promoting the construction of pour-flush latrines in Delhi and other Indian cities in 1970, and in the past 25 years has constructed more than 660,000 private latrines and 2,500 public toilet complexes with community participation and government support (NIUA 1990). Consultations and town meetings are also increasingly being used as a forum to discuss and agree on environmental priorities, and to propose participatory solutions (Bartone and others 1994). Moreover, communities may engage in public protests or legal actions to apply pressure on local governments and utilities for dialogue and action. Recall that the Orangi Pilot Project had its origins in the discontent of local residents with the overflow of excreta and wastewater in the streets when the Karachi Development Authority failed to provide adequate sewerage.

Box 2. The PROSANEAR project in Brazil

The World Bank, in collaboration with the Brazilian government, has financed the PROSANEAR project to address the dearth of water and sanitation service in low-income neighborhoods. The project tests technical and institutional solutions in these *favelas*, without any preestablished "blueprint" for service levels, delivery systems, or targets. About \$100 million of investments are providing water and sanitation infrastructure to about 800,000 *favela* residents in 11 cities, using a radically different approach. State Water and Sewerage Companies are encouraged to try out flexible, adaptive, and participatory project designs, so that projects are based on what the poor residents want and are willing to pay for.

The PROSANEAR project has been operating for about two years, and provides convincing evidence about the advantages of a participatory and flexible approach. The bottom line: per capita investment costs have averaged about one-half the investment cost "ceilings" of \$140 for sewerage that the State Water and Sewerage Companies were allowed by the project loan agreements. These dramatic reductions in costs can be attributed to several factors:

- Subprojects were encouraged to build upon localized but significant Brazilian experiences of the past two decades with intermediate technical solutions.
- State companies were required by project rules to consult with community-based organizations (such as church groups, resident associations, women's groups, and others) at every stage, from design to construction.
- Participation was further reinforced with the requirement that the state companies award project design consultancies to consortia of engineering firms and firms/NGOs specializing in

community participation, rather than just to the former.

- Project design consultants and state water company engineers were actively supervised by the national project management team (in Caixa Economica Federal), so that proposals on service levels, technology, construction schedules, cost recovery arrangements, billing, and other details were finalized only after active negotiations with communities.
- Close supervision of bidding documents ensured that construction contracts were competitive, and that construction firms were fully accountable to local communities.

An interesting feature of the PROSANEAR project has been the diverse institutional routes taken to finalize subproject designs. Three basic models can be identified. One class of "community organization" models worked out project designs in consultation with leaders of existing community organizations, and then the details with actual beneficiaries. A second class of "direct consultation" models reached agreement directly between design engineers and beneficiaries, with community leaders and organizations retaining a consultative role. In both models, conflicts of interests between the state company and community-based organizations were resolved through negotiations. The project design consultants functioned as facilitators, with community meetings serving as a type of market surrogate institution. In the third class of "pedagogic" models, training in participatory methods and hygiene education were advocated as a way to increase awareness and build up countervailing power in poor communities.

Source: World Bank 1994a.

The Private Sector Must Play a Role

Poor service provision by the public sector often suggests partnerships with the private sector. Private sector participation, however, is a possible opportunity—not a panacea. When existing sanitation service delivery is either too expensive or inadequate, private sector participation could be a way to enhance efficiency and lower costs, and to expand the resources available for service delivery. Whether to involve the private sector is predicated on several key factors that have been summarized by the *World Development Report 1994* on infrastructure for development (World Bank 1994c). Introducing competition is the most

important step in creating conditions for greater efficiency by both private and public operators—some services can be unbundled to help create contestable markets. The principle of accountability to the public should be maintained through transparent contractual agreements open to public scrutiny—to minimize risking public welfare, create real competition, ensure efficiency, and promote self-financing. Paradoxically, public sector capacity may have to be strengthened in order to achieve effective private sector participation—in such areas as preparing bidding documents and performance indicators, assessing proposed outputs and costs, administering contracts, and regulating performance.

Many opportunities are available for unbundling urban sanitation and sewerage services and creating competition—from on-site services to piped sewer systems, to wastewater treatment plants. This is best illustrated by a few concrete examples taken from projects supported by the World Bank:

- In Maseru, the capital of Lesotho, bricklayers are trained and certified by government and directly contracted by urban households to build improved pit latrines (Blackett 1994). Government banks also provide credit for the unsubsidized financing of improved latrines. The program has been a singular success, thanks mainly to active government promotion and the aggressive role played by bricklayers in expanding their markets and providing services. Eustache Ouayoro will present a similar experience for Ouagadougou, Burkina Faso.
- In Mexico municipalities are granting concessions to the private sector to build and operate wastewater treatment plants—both to finance investments in plants through the private sector and to overcome problems with weak local operating capacity. An innovative example is a concession to 26 industries in the Vallejo area of Mexico City to form a new firm, Aguas Industriales del Vallejo, which will rehabilitate an old municipal wastewater treatment plant, treat up to 200 liters per second of sewage, and sell the treated water to shareholders at 75 percent of the public utility water tariff (IFC 1992). In another case, the state of Jalisco has a management contract with SICOPRECA to operate 16 newly constructed wastewater treatment plants in the Lerma-Chapala basin.

Strategic Planning and Rational Policy

While most large cities in developing countries share some common problems (and causes), the specific environmental concerns of each urban area are different and depend on their economic status, the prevalence of urban poverty and unequal access to urban services, and other factors. Cities also exhibit different degrees of awareness, political commitment, and capacity to mobilize resources. Solving city-specific problems requires a strategic focus on essential interventions that can be implemented quickly, have a

high chance of success, lay the groundwork for solving future environmental problems, and give priority to strengthening incipient urban institutions. Successful strategic planning must blend careful analysis with consensus-building and the participation of local stakeholders. A proven approach, described in *Toward Environmental Strategies for Cities* (Bartone and others 1994), builds on a process of informed consultation to agree on local environmental priorities, joint formulation of issue-specific environmental management strategies, and agreement on actor-specific action plans that identify priority projects, policy reforms, and institutional arrangements—and how they will be financed.

Applying this strategic planning approach to urban sanitation problems should help create the right policy instruments, priorities, standards for service provision, and strategic investment programs. The question of appropriate service standards is a particularly vexing one, which should in the end be answered by considering user preferences and willingness-to-pay. In a large city with many pockets of poverty, service standards will likely be spatially differentiated, since many households cannot afford conventional sewerage without massive government subsidies. The Kumasi Strategic Sanitation Plan (KMA 1993) in Ghana provides an example of a differentiated plan that matches housing types, income levels, and user preference; the plan recommends that sewers be used in tenement areas, latrines in the indigenous areas, and flush toilet/septic tank systems in high income and new government areas. Willingness-to-pay surveys were carried out (Whittington and others 1992), and the results used to help define differentiated financing options—with explicit subsidies targeted to the city's low-income population.

Pursuing Cost-Effective Technologies

Cities in developing countries are beginning to recognize that poor urban residents cannot afford, nor do they necessarily want or need, expensive conventional sewerage. Beyond the dense urban cores, the average household cost of conventional sewerage may range from \$300 to \$1,000—clearly too expensive for many households with annual incomes well below \$300. Fortunately, a broad range of cost-effective

technological options are available to respond to the demands of urban consumers beyond the urban core, with the potential for reducing costs to \$100 per household. The UNDP–World Bank Water and Sanitation Program has worked with many countries in the past decade to develop, demonstrate, document, and replicate many of these low-cost sanitation options. The examples drawn upon throughout this overview illustrate many of the options available to households as well as the supporting institutional and financial systems that make possible the wide-scale application of these options—ventilated improved pit latrines in Lesotho, Sulabh pour-flush latrines in India, condominal sewers in Brazil, and simplified sewerage in Pakistan.

Wastewater treatment technologies—a particularly expensive and long-term undertaking—also have a wide range of costs. Conventional treatment processes may cost from \$0.25 to \$0.50 per m³ (NRC 1993). If nonconventional options can be used, it may be possible to cut these costs by half or more. Promising low-cost treatment approaches, especially for small and intermediate cities, range from natural treatment systems (such as waste stabilization ponds, engineered wetlands systems, and even ocean outfalls) to decentralized treatment systems (such as those used in Curitiba, Brazil), to new treatment processes (for example, anaerobic treatment processes such as the upflow anaerobic sludge blanket (UASB) reactors presently operating in cities in Brazil, Colombia, and India). In large cities land or other constraints may make conventional treatment the most cost-effective approach for improving water quality, but this should always be a decision based on rigorous economic analysis. Lifetime costing should always be used to compare and choose among treatment options, given the major share of costs necessitated by operation and maintenance.

Improving Consumption Behavior and Pricing Policy

Cornerstone ecological principles for sustainable cities include the conservation of resources and the minimization and recycling of wastes. Translating these principles into urban policies for wastewater management should emphasize the strategic importance of water conservation

and wastewater reclamation and reuse in cities. Successful conservation and reuse policies must also strike an appropriate balance among ecological, public health, and economic concerns.

Pricing and demand management are important instruments for encouraging efficient domestic and industrial water-use practices and for reducing wastewater volumes and loads. Water and sewerage fees can induce urban firms to adopt water-saving technologies, including water recycling and reuse systems, and to minimize or eliminate waste products that would otherwise end up in the effluent stream. Besides price-based incentives, demand management programs should include educational and technical components—for example, water conservation campaigns, advice to consumers, and the promotion, distribution, or sale of water-saving devices such as six-liter toilets (World Bank 1993a).

Wastewater reclamation and reuse is increasingly recognized as a water resource management and environmental protection strategy, especially in arid and semiarid regions. The use of reclaimed urban wastewater for nonpotable purposes such as in-city landscape irrigation and industry, or for periurban agriculture and aquaculture, offers a new and reliable resource that can be substituted for existing freshwater sources. Water pollution control efforts can yield treated effluent that can be an economical source of water supply when compared with the increasing expense of developing new sources of water (see, for example, Asano 1994). Conversely, in developing countries only recently embarking on major wastewater treatment investments, reuse can reduce the cost of wastewater disposal to municipalities.

Most reuse that is observed around sewered cities and towns in developing countries is for the irrigation of agricultural crops, whether controlled or uncontrolled. Irrigation consumes the greatest amount of water and plays a unique role in any scheme of sequential use of water. An important constraint to wastewater reuse is concern for public health because of pathogens or potentially toxic industrial wastes that pose a threat to residents, farmers, and consumers. Special precautions should be taken to ensure that these groups are not adversely impacted by irrigation reuse. Indeed, when adequate protection like wastewater treatment and crop restrictions have not been put in place, as in the example

of Santiago to be presented by Catterina Ferreccio, severe health problems may ensue. In response to these public health concerns, WHO (1989) has recommended international guidelines for the safe reuse of wastewater in agriculture. Furthermore, irrigation reuse is, by definition, a multidisciplinary endeavor. It is necessary to consider it within an overall water resource management framework. The UNDP–World Bank Water and Sanitation Program has produced a planning guide (Khouri, Kalbermatten, and Bartone 1994) that integrates environmental and health concerns with agronomic concerns for the sound management of plants, soil, and water.

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Replicating the Low-Cost Sanitation Programme Administered by the Orangi Pilot Project in Karachi, Pakistan

Arif Hasan

Orangi Township is the largest squatter settlement in Karachi. It is spread over 8,000 acres and has a population of about 900,000, living in 94,122 houses. Land-grabbing and its sale and development, along with credit and advice for house building to individual families, have all been carried out by the informal sector, which also provides substandard health and education facilities. The main problem of the settlement, as in all informal settlements in Pakistan, has been the unhealthy conditions created by the absence of sanitation and wastewater disposal.

The Orangi Pilot Project (OPP) is a non-governmental organization (NGO) that has been operating in Orangi Township, Karachi, since 1980. It considers itself a research institution whose objective is to analyze outstanding problems in Orangi, and then discover viable solutions through prolonged action research and extension education. It does not carry out development work but promotes community organization and cooperative action, and provides technical support to such initiatives. In the process, the OPP overcomes most of the constraints facing governments in upgrading low-income informal settlements.

Guiding Principles

The OPP operates under three guiding principles: (a) social and economic organizations should be created at the grassroots level, (b) replicable models should be the foundation for future policy, and (c) professionals should interact with the community. The philosophy of the

OPP is summed up by its director, Akhtar Hameed Khan, in a note on welfare work written in February 1980:

We are all living through a period of social dislocation. Where people have been up-rooted from their old familiar environments, this dislocation is especially acute. They have to re-establish a sense of belonging, community feeling and the conventions of mutual help and cooperative action. This can be done chiefly through the creation of local level social and economic organizations. Without these organizations, chaos and confusion will prevail. On the other hand, if social and economic organizations grow and become strong, services and material conditions, sanitation, schools, clinics, training and employment will also begin to improve.

The OPP feels that the function of NGOs and pilot projects in informal settlement rehabilitation programs should be to develop strategies that can be integrated into the planning mechanisms of government. This is essential given the huge scale of the current problem being tackled without effective government participation. However, effecting this integration depends on three prerequisites:

- Models should overcome the constraints facing government agencies in rehabilitating informal settlements, without requiring major changes in their structure or the devel-

opment and imposition of any radical legislation.

- Overheads, staff salaries, and related costs should be in keeping with government expenditure patterns and regulations, and the strategy should respect the established state procedures.
- Documenting the processes of developing the model, creating a demonstration area, and providing effective training material are necessary—without these, replication is difficult, if not impossible.

Most programs developed for the poor in Pakistan, in the opinion of the OPP, fail because they are designed by professionals who belong to the upper classes. These professionals are not fully conversant with the sociology, economics, and culture of low-income communities or the causes of the conditions in informal settlements. Conversely, the informal sector, which caters increasingly to the needs of the urban poor in Pakistan, as well as the urban poor themselves, do not have access to technical research and advice that qualified professionals can give. Subsequently, the development these programs bring about is substandard, and fails to use the full potential of informal sector operators and low-income communities. Therefore, an arrangement must be made and institutionalized to support effective interaction between qualified professionals and research institutions and the informal sector and low-income communities. The OPP has been successful in creating such arrangements.

The Low-Cost Sanitation Programme

The OPP's Low-Cost Sanitation Programme has been described in detail in various monographs and reports and is its most developed and popular program. Briefly, the OPP motivates the residents of the lanes in Orangi to organize, collect money, and then manage the construction of underground sewers in their lanes and neighborhoods. The sewers drain into natural drains, or *nullahs*, which carry the effluent to the sea. The OPP provides the lane organizations with plans, labor and materials estimates, and construction tools. Because the people finance and build the sewers themselves, they also maintain them. The average cost of a sanitary latrine in the home, a sewer in the lane, and a collector

drain is about Rs 900 (US\$36), which is affordable to the people.

Improved Sanitation Infrastructure

It is now difficult to find a lane in Orangi that does not have an underground sanitation system. Of 94,122 houses, 72,070 now have sanitary latrines; of 6,230 lanes, 4,701 have an underground sewerage line; and 367 secondary drains collect and carry the affluent to the open *nullahs*. The people of Orangi have invested Rs 53.2 million (US\$2.13 million) in this effort. The OPP's administrative, research, and extension cost for this effort is Rs 3.4 million (US\$127,000). The ratio of OPP costs to the investment by the people is thus 1:15.5 (OPP quarterly reports). In addition, the people themselves maintain the system they have financed and constructed. If the local government had carried out this work, it would have cost about Rs 375 million, and the people would not have been able to pay it back.

The OPP is currently addressing problems with the *nullahs*, which carry the sewerage to the sea. They are silting up, and with heavy rains they are also prone to flooding. Untreated sewage is being taken to the sea, not only from Orangi, but from all of Karachi. The OPP has already developed designs for trunk sewers and is lobbying the Karachi Municipal Corporation to get them implemented. Trunk sewers and treatment plants are items the residents of Orangi cannot possibly develop.

Improved Overall Health Status

Surveys by the Aga Khan Medical University establish that health conditions in Orangi have improved immensely due to the sanitation program. Infant mortality per thousand has fallen from 130 in 1982 to 37 in 1991. The morbidity rate fell from 18.94 to 8.29 during the survey period, and real estate prices have shot up. In addition, the OPP now has technical staff and social organizers who not only understand the sanitation-related problems of low-income settlements, but also the processes required to involve and train communities to solve them. The OPP possesses tools, shuttering, and equipment that it has designed and developed to train people and to deliver its sanitation model.

Internal-External Development Concept

Through its work in Orangi the OPP has discovered that the people can finance and manage the construction of the sanitary latrine in their homes, the underground sewer in their lanes, and the intermediate or collector drain at the neighborhood level. This work that the people can carry out themselves is termed *internal development* by the OPP and can be operated and maintained by community and area organizations.

Sewerage trunks and treatment plants cannot be built by the people, nor can long lengths of intermediate infrastructure. This has to be developed by the state. OPP calls this infrastructure *external development*; it has to be operated and maintained by the state.

A Model for the Rest of Pakistan

The formal sector in Pakistan serves only 180,600 housing units annually in the urban sector, against a demand of 428,000 required to take care of population growth alone. The annual deficit of 257,400 housing units is subsumed by the creation of squatter settlements, informal subdivisions of agricultural land, postponement of replacement, or increased densities (ADB 1989). In Karachi alone, informal settlements grow at a rate of more than 9 percent, compared with a total urban growth rate of 4.8 percent. Realistic planners agree that for the foreseeable future this trend will not just continue, but will increase (the Karachi Masterplan figures support this contention).

Most squatter settlements manage to acquire water supply, electricity, and gas over a period of time. Even road paving of some sort is developed by the "councillors programme" of the municipal bodies and town committees. However, sewerage systems are almost never developed.

Meanwhile, the *katchi abadi* (squatter settlement) Improvement and Regularization Programme (KAIRP), which was to overcome the problems of the *katchi abadis*, has run into serious problems. The program has failed miserably in meeting its targets. Since its inception only 1.2 million of 5.6 million *katchi abadi* residents have benefited from the program, according to an internal World Bank report. This amounts to about 16,800 households annually. To keep pace with the increasing backlog, the program will

have to serve 100,000 households annually over the next decade (ADB 1989). In addition, the recovery of land and development charges is very poor. For example, the Lahore Development Authority has spent Rs 200 million on the program, and in the past seven years recovered only Rs 10 million (ADB 1989). The project design makes the project inoperable if there is more than a 20 percent default in payment.

Since 1983 community organizations, activists, and NGOs from other *katchi abadis* and informal settlements in Karachi and other cities of Pakistan have applied to the OPP for help in replicating its Low-Cost Sanitation Programme in their areas. Since 1986 international agencies, including the World Bank and UNICEF, have also cultivated the OPP, and in recent years tried to replicate the OPP experience by integrating it into the planning processes of government projects they are sponsoring and by using the OPP as their consultant. Meanwhile, in its search for solutions to Orangi's problems, the OPP has had to lobby relevant municipal and government organizations. In addition, to protect the work of Orangi residents from destruction by insensitive government planning, it has had to monitor nationally and internationally sponsored projects and deal with the organizations responsible for them.

Obstacles to Successful Development

Some of the work has yielded successful results, while other work has encountered several major barriers. The replication process has meant training government officials, orienting consultants of the various agencies to our work, and training activists and leaders of the communities and the areas where we have had to work. The process has been slow, because it has faced barriers in engendering the participation of people in developing the program in communities:

- *Psychological*. All actors have to be convinced that the program is not the exclusive responsibility of the state, but their responsibility as well, else the work might be postponed or abandoned.
- *Social*. There has to be some sort of organization so that people can work together, and the motivation for that has to be created.
- *Economic*. Development has to be affordable. For that, research is needed in sanitation

technology, new approaches, and new tools that can lower costs.

- *Technical.* People have to be made aware of sanitation technology; they have to be assisted and helped to understand it, and they need to be supervised, at least in the beginning.
- *Governmental.* A whole organization and culture of engineering institutions and bureaucracy does not understand and is not willing to relate to the concept.

Lessons of the Replication Process

The replication process has yielded three key lessons.

Hands-on Participation: A Key Training Mechanism

The training that we have been imparting was extremely inadequate because it was theoretical training. We found that the only way to get officials and engineers to accept our approach was to involve them actively in the project itself; it was not sufficient for them to come to Orangi to the training institute, see what was being done, and then go do it. Constant dialogue with the staff of the Orangi Pilot Project was a necessity on the new sites. They had to participate in this process; they could not do it themselves. But once they did participate, it became possible for them to replicate it later.

Ultimately, the successful scaling up of the program depends on the availability of appropriately and adequately trained professionals, technicians, and administrators. This calls for a major shift in the curriculum of relevant academic institutions. The OPP has worked in close collaboration with the Department of Architecture and Planning at Dawood College, Karachi. This relationship has brought about changes in the Dawood College curriculum. Most of the OPP staff consists of architects and planners who have been trained at this institution; some of them are now teaching there.

Training and demonstration areas must be developed for government agency officials, NGO staff, community activists, social organizers, technicians, and health and education activists and paramedic staff.

A Critical Mass for Broader Implementation

There was also pressure on us to turn the program into a national one. The Orangi Pilot Project and its large-scale replication was part of the five-year plan documents of the government. We have resisted broadening the program because, unless and until we have a sufficient number of projects that could serve as demonstration areas and training grounds, it would not be possible to replicate the project nationally. A polite term that is used today is “critical mass.” When a critical mass is created, perhaps then the program could become national. Until then, it is just not feasible for the OPP to assume such a large responsibility.

The Dynamics of Project Relationships

An optimal relationship must be defined among needs, resources, and standards, and we have to accept that these three are all dynamic. And in planning, we will have to cater to this dynamism, to this change. Otherwise, we will not be able to improve conditions incrementally, and that is what the poor can afford.

In dealing with the international agencies, we have faced problems similar to those we encountered with the government of Pakistan: we have run up against the organizational culture; we have found out that high-profile projects can quickly alienate people, and that complex monitoring and evaluation systems can become more important than the project itself.

What is also important to understand is that, like the government planners, the international agencies place a great deal of importance on existing conditions. Surveys are carried out to determine these conditions. But conditions are not static—they change quickly. And unless and until processes are identified and helped and supported, the project cannot possibly involve the people in a manner that responds effectively to the original objectives of the project.

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Ouagadougou Low-Cost Sanitation and Public Information Program

Eustache Ouayoro

Burkina Faso is a landlocked country of 274,000 square kilometers in West Africa. Of the current population of 9.5 million, 17 percent live in urban areas. And the number of urban dwellers continues to increase at 8.7 percent annually, the second highest rate of all low-income countries throughout the world. The infant mortality rate of 132 deaths per 1,000 live births is one the highest in the world, life expectancy is only 48 years, and the adult illiteracy rate is 82 percent. Per capita income was only US\$330 in 1992. According to the World Bank's 1994 World Development Report, 70 percent of the population had access to safe water in 1990, and only 7 percent had access to sanitation in 1990.

Ouagadougou: A Microcosm of Water Supply and Sanitation Problems

Ouagadougou, the capital city, contains about 750,000 inhabitants, representing almost 50 percent of the country's total urban population. The population is expected to reach 1,100,000 inhabitants by the year 2005. The city occupies 19,000 hectares of land, and has a relatively low urban density of 35 inhabitants per hectare, despite the tremendous development that has taken place in the city since 1983. For example, in just the past five years, the number of plots has increased from 20,000 to 84,000.

The result of this unprecedented development is a complete absence of the necessary infrastructure for water supply and sanitation. A survey conducted in 1991 showed that 70 percent of the population used traditional pit latrines, 18 per-

cent used vault latrines, and 5 percent used septic tanks. About 7 percent of the population—44,000 inhabitants—were without any facility and used open defecation. About 600,000 cubic meters of industrial wastewater are discharged each year without treatment.

Given a low water connection rate (only 38 percent of plots), a low solid-waste collection rate (about 30 percent of the refuse generated daily), unsafe disposal of the garbage, and inefficient excreta and wastewater collection and disposal, the population has been severely affected by environmental health hazards. Approximately 43 percent of the population are younger than 15 years old; one of every four doctor visits is linked to a waterborne disease.

Strategic Planning for a Sanitation System

With the financial assistance of UNDP and the technical assistance of the Regional Water and Sanitation Group in West Africa of the UNDP-World Bank Water and Sanitation Program, the Government of Burkina Faso and its national water and sanitation utility (ONEA) launched a strategic sanitation plan (SSP) for excreta and wastewater in 1990. The plan encompassed four proposals:

- Low-cost on-site sanitation should be the preferred technology for most of the city, given its flat-grade topography, low water connection rate, low consumption per capita, low urban density, appropriate soil infiltrative capacity, deep water table, and willingness and ability to pay for improved sanitation services.

About 19,000 facilities were targeted for construction or improvement between 1994 and 2000, ultimately reaching a 52 percent coverage rate for the entire city.

- Sewers should be built in the downtown area—a densely populated area with a high water consumption rate, low soil infiltration capacity, and high water table. Sewers are also needed for the industrial area. The sewage should be treated in ponds, to be located on the outskirts of the city.
- ONEA should be responsible for sanitation in the city (excreta and wastewater collection and disposal), but all construction works should be executed by the private sector.
- The existing sanitation surcharge should be replaced with two different rates—one for connections to the future sewerage system, and one for nonconnections. The surcharge should be used to finance the maintenance costs of the off-site systems, to implement public awareness and information campaigns, and to subsidize on-site sanitation services.

The total cost of the proposed program was estimated to be US\$9.4 million. Of this amount, US\$5.7 million would go to on-site sanitation—78 percent of that amount for the construction of new facilities or the renovation of existing ones; 14 percent for the installation of septic tanks; and 8 percent for public awareness campaigns, hygiene education, and the training of local technicians. Of the total funding, US\$0.5 million was slated for school sanitation and hygiene education at schools.

Financing of the SSP represents a dramatic shift toward self-sufficiency. About 77 percent of the cost of the on-site program was to be borne by households. The remaining funds would be provided by ONEA through the sanitation surcharge on the water bills. The total external financing needs for the SSP represent 30 percent of the total cost.

The Low-Cost Sanitation and Public Information Program

To test the feasibility of the SSP proposals, ONEA launched a demonstration project in 1992 in two neighborhoods of 50,000 inhabitants. One of the neighborhoods is a newly occupied area; the

other is an old settlement with well-established, traditional leadership. The project was financed by UNDP and ONEA with the technical assistance of the Regional Water and Sanitation Group in West Africa. Three broad objectives are at the heart of the project:

- The sustainability of sanitation services depends on increasing the demand for improved sanitation, rather than relying on supply-driven techniques to maintain services.
- Benefits that accrue to households should be financed at that level, and a stable financial mechanism should be found to help cross-subsidize services and increase the coverage.
- Local technicians should be trained to install new sanitation technologies, developing individual and communitywide human capital for the future.

At the culmination of the project, planners hope that a comprehensive sanitation and wastewater system will be in place, consisting of three elements:

- New or improved latrines and sullage disposal facilities, financed primarily by the households
- A financial mechanism—the sanitation surcharge—to subsidize the construction of the facilities and fund the promotional activities of ONEA
- Trained extension workers and local technicians who will work in the neighborhoods.

Start-up and Technical Considerations

Between six and eight months were necessary to prepare the contracts with the different partners, to train the extension team and the local technicians, and to prepare the didactic and participatory materials for enhancing dialogue within the communities.

Adventist Development and Relief Agency (ADRA), an international nongovernmental organization with a locally based bureau, was awarded a 24-month contract by ONEA to conduct the extension work in the project area. This agency was chosen over civil servants from the Ministry of Health and Social Affairs because agency staff offered a more flexible and thus responsive schedule—willing to work evening, weekend, and holiday hours.

ADRA recruited eight extension workers—five of them women—conversant in local languages and culture. The project area was divided into seven quarters, representing about 700 plots each. The work load was the same for each extension worker. The extension team was trained in community participation techniques, on-site sanitation technologies, SSP objectives and procedures, focus group meetings and consultations with the public, and local geographic conditions and terrain.

Local technicians and slab casters were trained and used during the project. The trained technicians, already working in the neighborhood, were put in charge of building the substructure and the superstructure of the sanitation facilities, and contracted on a market demand basis. Slab casters also work in the areas, casting the slabs to be used for latrines and other facilities.

Every household can take advantage of an in-kind subsidy from ONEA when building or upgrading its sanitation system along program guidelines. The subsidy consists of a set of slabs or precast concrete blocks used as vent pipes, bowls, and siphons for pour-flush latrines. This equipment is supplied by ONEA to trained slab casters and trained technicians to complete work in a household plot.

The intent is to eliminate the casting of traditional slabs and the construction of traditional pit latrines by increasing the business opportunities available for both slab casters and technicians. The trained technicians can promote the newer technology because they are being paid directly by the households. Households that want to build alternative facilities, such as septic tanks, can receive only technical assistance from ONEA.

The facilities are to be well constructed and well maintained, and the equipment kept clean. A target for each extension worker—the number of facilities built in his or her region—has introduced competition, further increasing efficiency. A participatory monitoring process helps extension workers track construction deficiencies and the cleanliness of the equipment, by requiring that they visit and speak with the households about how the facilities can best be maintained.

Involving Stakeholders in the Process

ONEA began the SSP by meeting with government and city officials to present the project and

its objectives. The extension team made follow-up visits. Subsequent meetings were held with submetropolitan and city officials, and with leaders at the local level—traditional chiefs, religious leaders, and community associations. The meetings are critical to gain the support of local leaders; in turn, the leaders' commitment to the project filters down to their communities.

Meetings with Groups of Households

Other meetings are organized by each extension team at the quarter level, in conjunction with the submetropolitan officials and local leaders of each zone. Extension workers introduce themselves and the project to groups of households in the quarter, and receive input from the households on concerns, problems, or other issues. A total of 273 meetings were held by the extension team with these household groups.

The extension team visited 4,290 plots and 3,560 households during a six-month period. They prepared a sanitation profile and assessed the willingness of the household to improve sanitation facilities on the plots. (Box 1 describes the type of technologies offered to households.) The team met largely with women during the day,

Box 1. The technological menu

Different on-site technologies are proposed for households:

- The well-known improved double-pit latrine, for people using solid materials as cleansing devices
- Pour-flush latrines for people using water for self-cleansing
- Rehabilitated traditional pit latrines, with the addition of a masonry vent pipe
- Bathplace washing platforms for sullage collection, followed by soakaways (a soakaway is a 1 to 1.5 meter in diameter hole, 3 meters deep, with a covered concrete slab that collects and filtrates sullage produced by households).

Bathplaces were not originally to be offered, but they were added at the request of the population. Excreta in the soakaway are treated anaerobically. The contents of pits are innocuous after two to three years and can be removed without serious health risk. The contents can be used to fertilize garden plots. Because of the deep water table (11 meters) and the low depth of the soakaways (3 meters), sullage is completely treated in the soakaway before ever reaching the aquifer.

and with men during the evening, describing the project, the new technologies, and the material needed to build them, and explaining the ONEA subsidy for using trained technicians to build or improve their facilities.

What has been helpful in these household meetings is the presence of women on the extension team. Many of the meetings were with the women of the household, who needed to choose the technology and the date on which it was to be built; they found it easier to talk to the women on the extension team.

Of households visited, 90 percent were willing to improve their facilities, 40 percent of whom said that they were "quite ready." Households willing to have the technology installed were plotted on a map, and then revisited. The extension worker provided the household with a detailed list of the required building materials, with alternatives for local materials for the superstructure. The labor cost of a trained technician is also noted on the list (between US\$20 and \$25), so that households know not to pay more excessive charges.

The extension worker then contacts a local technician, and sends him to the plot to bargain with the households about labor cost. If a deal is set up, the household hires a digger for the pit, to be supervised by the technician. The extension worker is not involved in the deal.

Local Technician Training: A Foundation for Future Business

Traditionally, the sanitation facilities are constructed by technicians, and slabs are cast by the casters. The extension workers chose two groups of technicians from each quarter, according to their technical ability and reputation among community leaders and neighbors.

Training manuals for building the proposed on-site sanitation technologies were prepared by the project team, CREPA (a member of the International Training Network [ITN] that was awarded a contract by ONEA), and the Department of Sanitation of the Ministry of Health. The technicians and slab casters were trained in two sessions by the project team and CREPA. By December 1992, 37 technicians and 6 slab casters had been trained. Half of the technicians and five slab casters are still working in the business.

Media Marketing and Social Events to Reach the Public

Television and radio advertisements were produced by a consulting firm and were shown 261 times on national television in French, and aired 72 times on national radio in the three most widely used dialects in the city and country. Each weekend, a private FM radio station broadcast interviews with households who had sanitation facilities built or existing ones improved. The interviews were conducted in local dialects. A series of five broadcasts also aired with "Radio Rurale," a station popular in rural areas.

The advertising attracted about 300 people from other neighborhoods who were interested in building the new facilities at the full, nonproject cost. A survey conducted in Bobo Dioulasso revealed that 48 percent of the population were made aware of the sanitation improvement program by the advertising campaign.

Community events and activities also centered around the theme of improved sanitation and neighborhood revitalization. A soccer match was held between two of the neighborhoods, and dancing festivals were led by women. About 8,000 people attended or participated in these activities.

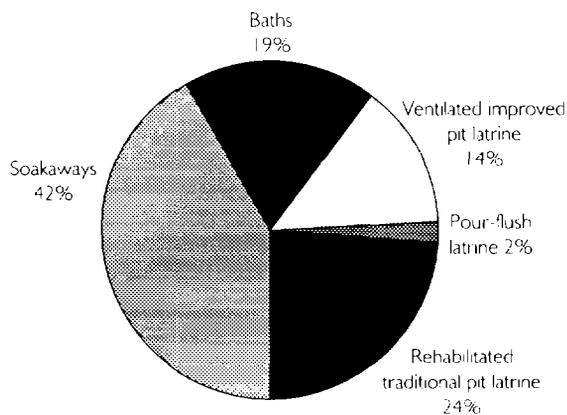
Statistics on the Success of Implementation

Each type of technology proposed for the project was constructed. In 16 months, 1,090 facilities were built; the construction rate increased rapidly after the first month of the television and radio advertising.

The private soakaways were a huge success, particularly with women who insisted on them. Women have financed some of the soakaways, or have gotten their husband to do so. One of the proverbs used by women to explain why they wanted soakaways is, "When a stone is falling from the sky, everybody has to protect his head." Because the traditional public soakaways are not properly covered, many children have fallen in the pits, particularly during the rainy season.

The application of the other technologies was fairly equally distributed (figure 1).

Facilities have been built on 637 geographically dispersed plots; of that number, 116 plots have been fully equipped with sullage and excreta disposal

Figure 1. Facilities built during the project

Source: Burkina Faso national water and sanitation utility (ONEA).

facilities, and baths, representing about 18 percent of the plots with new or improved facilities.

The marketing campaign led to the construction in nonproject neighborhoods of another 143 facilities by the trained technicians. The total contribution from households who had improved their sanitation facilities amounted to US\$30,000, with a mean contribution of US\$45 per plot. The remainder is paid by ONEA through the sanitation surcharge on the water bills.

Lessons and Prospects for Sustaining the Project

ONEA has started scaling up the entire city of Ouagadougou, representing some 30 neighborhoods, without external financing. Local capacity developed during the project and the internal financial mechanism of the sanitation surcharge are being used. A sanitation account separate from the water account has been established. A sanitation department has been set up with staff from the project team.

Project technologies are accessible and reliable, and 50 new technicians were trained in 1994. Local technicians have "internalized" the process, "selling" their skills and increasing the construction prospects in the neighborhoods.

Improving sanitation services in cities of the developing world will be feasible with the adoption of on-site sanitation technologies. Soakaways and sullage disposal facilities are preferred choices and should be part of the menu in flat-grade cities. Design work on these facilities is required, and the blueprints should be disseminated.

Simplifying the Problem: The Consensus Dilemma

Is it appropriate to form a consensus about what should be done at the institutional level before work is begun with the population? Since 1980 targets for sanitation services had been set, but all the institutions responsible for action (the Ministries of Water Resources, Public Health, and the Environment) could not embark on a coordinated plan of attack. It took the efforts of the national water utility, backed by financial commitments, a strategic plan, and concrete operational objectives, to take the lead in improving sanitation services, and it did so with the active involvement of the population. Consensus was reached when other institutions saw visible results from the project, and when the demand from the population increased.

Role of the Water and Sanitation Utilities

Water and sanitation utilities tend to concentrate on the water-supply side of their activities to sustain their financial and operational viability. In the past most of the money from sanitation surcharges has gone toward meeting the huge deficits incurred in supplying water inefficiently. The government or municipalities should form "contract plan" agreements with the water utilities, setting revenue and operational targets, and keeping performance and transactions transparent.

Role of the Informal Private Sector

Increasing sanitation coverage, satisfying consumer demands for reliable facilities, and reducing the transaction costs of formal water and sanitation utilities is a conflicting process. Improving the technical, marketing, and human capital skills of local technicians will respond to the needs of consumers for prompt, qualified service, and it will enable the technicians themselves to build their business and expand their services to broader markets. Whether the presence of locally trained technicians will hold down transactions costs is questionable.

Sustainability

Participatory monitoring and evaluation should be part of all programs, to capture shifts in the

demands and conditions of the population. Only by understanding and appreciating these dynamics can programs increase a household's sense of ownership and thus its efforts to maintain the facility properly.

A sanitation surcharge on water consumption is an easy and effective way to collect revenue, and enhances the financing capacity of the popu-

lation. Sanitation surcharges collected from wealthier residents are used to cross-subsidize the less affluent people who use water from public standposts. This arrangement creates more internal funding, and reduces dependence on external financing. The 70 percent internal fund generation in Ouagadougou reflects the sustainability of the SSP.

Santiago, Chile: Avoiding an Epidemic

Catterina Ferreccio

Chile has a per capita income of US\$3,000 and a population of 13 million. Forty percent of the population live in the capital city, Santiago. Like many other developing countries, Chile has a problem with basic sanitation, but the communities and households—particularly the women—have fought hard to combat the foul odors and poor-quality water. Chile now has a high coverage rate for basic sanitation—almost a contradiction given its relatively low income level. Yet after the sewage is carried beyond the household, people become less vocal, less concerned. As has been said earlier at this conference, the problem is “not in my backyard.”

Santiago is located in the Andes foothills, 150 kilometers from the Pacific Ocean. The Mapocho River flows cleanly from the hills and into Santiago. But as it crosses the city, it receives all the sewerage. This poses a problem as the river water is used to irrigate a large land area of about 130,000 hectares (ha) that is located in the immediate vicinity—within one block—of Santiago. About 7,000 ha of that land are used to grow vegetable crops, such as lettuce, tomatoes, celery, and parsley, which the population of Santiago consumes raw.

The consumption of these vegetables has been linked to alarmingly high rates of enteric infection in the Santiago metropolitan area—particularly typhoid fever and infectious hepatitis. Classic control measures (food handling control and routine vaccinations of schoolchildren) proved to have little impact on this disease, whose rates remained persistently at more than 50 cases per 100,000 population.

Government intervention to address these health risks has consisted of two programs. The first was in 1984, when in response to the largest outbreak of typhoid in Chile’s history (the “hyperendemic period,” 1976–86) health authorities prohibited the cultivation of some vegetables (those that are consumed raw) and initiated a public education campaign about the health risks of sewage-irrigated crops. By 1985 typhoid had dropped by 59 percent and hepatitis by 11 percent in the Santiago Metropolitan Area, falling by 1986 to what were historic endemic levels. The second, more intensive intervention was implemented in 1991 as a response to the cholera epidemic in neighboring Peru. The intervention was successful not just at preventing the spread of cholera into Chile, but also at controlling and reducing the rates of typhoid and hepatitis in the Santiago Metropolitan Area to unprecedented levels.

The Cycle of Contagion: Poor Sanitation with Enteric Disease

Despite improvements in income, education, nutrition, and health care, and ample coverage of quality water and sanitation, Chile presents high rates of some enteric infections that are linked to poverty and the absence of hygiene.

Enteric diseases are transmitted by poor personal hygiene, or the “short cycle” (excreta → hand → mouth), and by environmental pollution, or the “long cycle” (infected individual → sewage → water pollution → food → people). The incidence of short-cycle contagion has

declined significantly in the Santiago Metropolitan Area, but the long cycle has persisted, and has even increased as environmental pollution has increased. Three pieces of epidemiological evidence link typhoid with environmental pollution in metropolitan area:

- Historically, the incidence of typhoid has been greater in the metropolitan area than in the rest of the country, where irrigation with raw sewage water is less prevalent.
- The causal agent of typhoid fever (*salmonella typhi*) has been isolated directly from irrigation water in the city.
- The occurrence of typhoid fever in the metropolitan area is particularly high in the summer, when sewage irrigation needs increase and as the consumption of raw vegetables becomes greater. This seasonal variation is much greater in the Santiago Metropolitan Area than in the rest of Chile.

Cholera Epidemic Spurs Action by the Government

Cholera had disappeared from the Americas by the end of the last century, but returned with the recent epidemic in Peru in January 1991. The Peruvian epidemic created alarm throughout the continent, but particularly in neighboring Chile, given the similarity in typhoid rates and the prevalence of long-cycle transmission. Thus, the expectation in Chile was that the Peruvian cholera epidemic would travel quickly to the Santiago Metropolitan Area and elsewhere in the country.

Cholera did in fact reach other countries rapidly; by the end of 1991, 15 countries had been affected, from Mexico to Chile, and from the Atlantic to the Pacific coasts. The epidemic peaked in 1991, slowed in 1992, and declined in 1993. But by the end of 1993, only Uruguay on the Latin American continent and the Caribbean islands remained free of the disease. (Interestingly, typhoid rates in Uruguay are reportedly much lower than in Chile or Peru.) In April 1991 Chile had an outbreak of 41 cholera cases, 70 percent of which were linked to the consumption of vegetables from Santiago; by the end of 1993 a total of 142 cholera cases and 3 cholera deaths had been reported, a rate that was, however, much lower than the rate in the rest of Central and South America.

The key concern of the public was of course about the health risks, but concerns also extended to the economic health of the country. In particular, the cholera epidemic in Peru was hurting its exportation of produce. The fear in Chile was the same—that the epidemic would harm an important part of its economy, the exportation of vegetables and fruits, and seafood and fish. So both business and the general population rallied to respond to the sewage-irrigation problem in Santiago, forcing intervention by the government.

Intervention to Improve Irrigation Water and Change Behavior

As early as February 1991 the authorities began a series of actions aimed specifically at breaking the long cycle of contagion. The government created a National Commission to Avoid Cholera, which involved several ministries—Agriculture, Health, and Public Affairs. A control program was also immediately instituted, with interventions on three broad fronts—improving irrigation and drinking water, changing the irrigation practices of farmers, and changing the consumption behavior of the population.

Measures to improve irrigation water included the immediate construction of interceptors on some of the irrigation channels and the chlorination of others. One measure sought to induce farmers to get loans to drill wells that would provide clean water for irrigating their fields. The government also intensified its efforts to provide cleaner drinking water—improving monitoring practices and upping the level of chlorine in the water. It also began an intensive epidemiological surveillance system to monitor diarrhea.

To induce farmers to change their irrigation practices, the government prohibited the sale of sewage-irrigated produce, removed this produce from the markets, and banned transportation of the produce outside Santiago. New regulations were also promulgated to extend these restrictions to other vegetables normally consumed raw, and field inspections were intensified.

But the most significant intervention was a Ministry of Health campaign to educate the public about the health risks of eating raw vegetables, augmented by growing press coverage about cholera and typhoid. Many television programs were aired about the health risks of consuming

sewage-irrigated produce, as were several documentaries that showed farmers' efforts to change their irrigation practices. The other important measure was a prohibition on the sale and consumption of raw vegetables in restaurants throughout the metropolitan area, a policy that is still in force. For the first time, the government, the public, and the farmers worked together on a broad front to become more aware of the problems, risks, and conditions associated with using the Mapocho River as a source of irrigation water.

Intervention Interrupts the Long Cycle of Contagion

The spread of cholera was rapidly controlled (table 1), and typhoid and hepatitis were reduced significantly throughout the country, especially in Santiago (table 2). Estimates also indicated that between 500 and 3,500 cases of typhoid could have been avoided annually had these measures been applied in 1986.

The model chosen to analyze the impacts of the interventions indicated that the critical factors behind the reduction in the long-cycle transmission of typhoid and cholera, and to a lesser extent hepatitis, were the public information campaign (including active commitment and participation by the press), leadership in the health sector, and direct controls on the production and sale of vegetables.

An analysis of efforts to change the irrigation practices of farmers indicated that the total area planted with prohibited crops fell from 6,970 ha in 1991 to 4,964 ha in 1993. The remaining 2,000 ha were either irrigated with well water or were cultivated with permitted vegetables or fruits.

The critical factor behind the success of the intervention was the close collaboration among all parties who had a stake in the health crisis, a

Table 1. Cholera in the Americas, 1991-93

Country	Cases	Deaths
Argentina	2,623	33
Bolivia	31,655	625
Chile	142	3
Peru	606,652	4,211
Rest of South America	197,906	2,340
Mexico, Central America	102,827	1,395
Total	941,805	8,622

Source: PAHO 1994.

Table 2. Typhoid and hepatitis before and after 1991 interventions

(average cases per year)

Period	Typhoid fever		Hepatitis	
	Santiago	Rest of Chile	Santiago	Rest of Chile
Pre-intervention, 1985-90	3,558	2,971	4,040	7,474
Post-intervention, 1992	454	1,429	1,430	3,845
Reduction (percent)	87	52	65	49

Source: Ferreccio 1993.

cooperation facilitated by the movement toward democratization that had begun in Chile in 1991. In short, the synergistic power of the government and population of Chile was demonstrated. However, because the intervention was not targeted at structural measures to control pollution from the sewers—but rather at its behavioral origins—the longer-term effect of these changes on guaranteeing safe crops for the population is difficult to predict.

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Strategies for Controlling Industrial Wastewater Pollution in Beijing

Yang Suzhen

Rapid industrialization in Beijing since the founding of New China has transformed the city into a comprehensive industrial base. In 1992, Beijing had 6,205 industrial enterprises, employing 1.87 million workers, with a total value of industrial output at 91.53 billion yuan (US\$16.95 billion). In addition, Beijing has 29,982 village-run or neighborhood-run industrial enterprises, employing 523,398 workers, with a total value of industrial output at 17 billion yuan (US\$3.14 billion).

This industrial development has brought prosperity to the city, but has created severe health and environmental pressures. The main culprit is the irrational industrial structure and layout: many polluting factories are located in urban residential neighborhoods, and the industrial area covers about one-fourth of built-up urban areas. Much of the technology and equipment is obsolete, and energy consumption and waste are quite high. Sewage discharge in Beijing has reached more than 2 million tons daily; 47 percent of it is industrial wastewater, accounting for more than 60 percent of daily pollution.

Intervention by the Beijing Municipal Government

Intervention by the Beijing Municipal Government is targeted at helping industries control the pollution problem through legislative initiatives and technological change. On the whole, government reform in China since 1981 has encouraged the industrial sectors to introduce foreign investment and advanced technology to improve

productivity, resource use, and wastewater emission. Development of production has also improved the ability of enterprises to raise funds for controlling pollution themselves.

As part of an overall strategy to ensure the economic sustainability of China—seeking to integrate economic, social, and environmental concerns—the Beijing government has intervened in five broad areas to control industrial pollution:

- *Laws and regulations for industrial wastewater control.* Beijing has formulated 10 regulations and standards for water pollution control according to the National Environmental Protection Law. These regulations and standards fall into four categories: water pollution control; the protection of drinking water resources; the prevention of new sources of pollution; and the control of wastewater from the electroplating industry.
- *Industrial pollution monitoring.* The government has set up an industrial pollution monitoring system—the Beijing Environmental Monitoring Network, which comprises the Beijing Municipal Environmental Monitoring Center (BMEMC), district and county environmental protection monitoring stations, and industrial bureaus and corporations. It has also supported efforts by individual industries to establish their own monitoring systems.
- *Discharge permits.* To change industrial practice that traditionally sought to control pollution by focusing only on “end-of-pipe” wastewater treatment, the Beijing government

began issuing permits for the amount of wastewater that could be discharged from industries. The idea was to induce industries to implement more efficient production techniques and processes that would control the generation of wastewater.

- *Levies on excess pollution discharges.* Beijing started levying pollution discharge fees in 1981 through its own network. But it has also allowed district and county environmental protection departments to operate their own supervisory stations to levy pollution discharge fees on enterprises within their jurisdiction.
- *Environmental management institutions.* The Beijing Municipal Government established an Environmental Protection Bureau responsible for planning, policy, strategy, and coordination among different departments for environmental protection. It also promoted the establishment of locally based environmental protection staff who are responsible for managing and supervising the extent of pollution discharges in the townships and neighborhoods.

The measures have been successful: enterprises are assuming greater responsibility for controlling pollution and treating wastewater. Both the enhancement of environmental protection legislation and the implementation of environmental management systems in recent years have made people realize that preventing and controlling industrial pollution is critical to the sustainability of the national economy. Enterprises are speeding up the treatment of wastewater, and investment in treatment is rising annually (table 1).

The amount of funds raised by enterprises for addressing the pollution problem (comprising

renovation funds, the use of profit remaining, loans, and other funds) amounted to 1.58 billion yuan from 1981 to 1992. This is 82.5 percent of total investment in treating pollution sources, including 0.50 billion yuan directed to wastewater treatment, and investment for the construction of 783 industrial wastewater treatment facilities. The percentage of industries meeting industrial wastewater treatment standards has risen from 38 percent to 64 percent between 1981 and 1992 (table 2). The amount of mercury, cadmium, Cr+6 (six valence chromium), arsenic, phenol, and cyanide in industrial wastewater has declined significantly during the period, and drinking water sources have largely been protected.

Regulations for Controlling Industrial Wastewater Discharges

The ten laws, regulations, and standards that Beijing has formulated for water pollution prevention and control according to the National Environmental Protection Law fall into four broad categories; the discussion here highlights the thrust of these legislative initiatives.

Controlling Water Pollution

One law has established even stricter water pollutant standards for Beijing than counterpart national standards—in recognition that Beijing, as the nation's capital, should serve as a model for the rest of the country. These stricter regulations also reflect the severe pollution problem in Beijing, given its lack of water, the dilution of its rivers, and the concentration of industries in populated areas. The standards apply to all wastewater-discharging industrial sectors in the Beijing municipality. Fees are collected from enterprises whose wastewater discharges

Table 1. Industrial pollution control investment
(million yuan)

Investment	1981-92	1981-85	1986-90	1991	1992
Total investment	1915.88	420.08	961.77	184.52	329.51
Grants	335.37	92.97	178.53	29.82	34.05
National Fund	21.87	19.32	2.35	0.10	0.10
Beijing Municipal Government	114.57	36.19	63.35	6.00	9.03
Environmental Protection Fund	198.93	37.46	112.83	23.72	24.92
Enterprise investment	1580.51	327.11	803.24	154.70	295.46
Renovation funds	721.02	266.62	195.32	88.88	170.20
Profit reinvested	13.83	5.82	6.89	0.46	0.66
Loans	413.86	50.67	332.40	21.61	9.18
Other funds	431.80	4.00	268.63	43.75	115.42

Table 2. Wastewater treatment in Beijing
(million tons)

Indicator	1981	1984	1987	1990	1992
Wastewater treated	86.0	115.4	124.0	128.2	459.9
Wastewater treatment rate (percent)	30.0	44.0	36.5	45.3	80.4
Wastewater meeting standards	153.1	252.5	189.6	218.1	259.6
Share of wastewater meeting standards (percent)	38.0	59.0	42.9	53.7	64.1

exceed these standards. Another law prohibits township and neighborhood enterprises from generating mercury, arsenic, lead, and radioactive products, and from engaging in the production of asbestos, sulphur, coke, phosphate fertilizer, dyestuff, paper, metallurgy, and other heavily polluting substances.

Protecting Resources for Drinking Water

Three regulations have been established to create three classes of protected zones for sources of drinking water from reservoirs, canals, and underground. The provisions apply to new construction: no new industrial enterprises are to be built in first-class areas, no projects with wastewater discharge are to be built in second-class areas, and no projects with heavy pollution are to be built in third-class areas. Existing enterprises are also required to take measures to prevent and control water pollution.

Preventing New Pollution

On February 22, 1988, the Beijing Municipal Government ratified and promulgated the Beijing Environmental Protection Bureau's "Detailed Rules for Implementation in Beijing of Administrative Measures on Environmental Protection of Construction Projects." The rules stipulated that new projects with wastewater discharge and other pollution emissions undertake an environmental impact assessment of their operations. The rules also require that new industries simultaneously design, construct, and operate pollution control facilities.

Controlling Electroplating Wastewater

Two regulations have been promulgated to limit the construction and expansion of electroplating plants, and to require that permits be acquired by the factories. Electroplating factories and workshops that produce heavy pollution and use obsolete technologies and equipment are to be shut down or moved. The regulations have been successful: the number of electroplating plants has been reduced from 700 to about 200 (with a significant reduction particularly in urban areas), and wastewater treatment facilities have been built in all remaining electroplating plants.

The Environmental Monitoring System

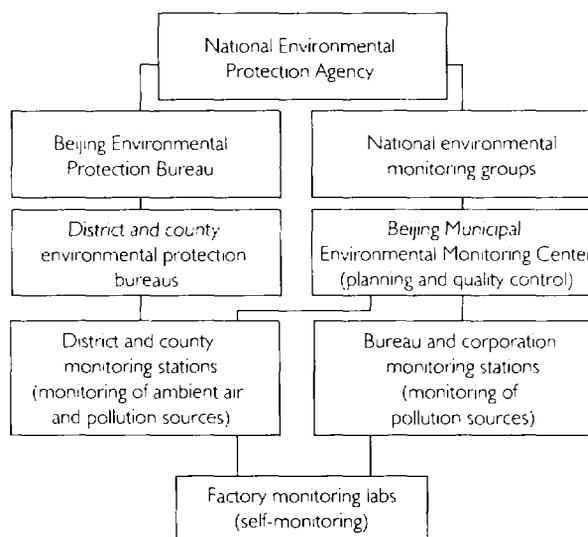
The environmental monitoring system in Beijing consists of the Beijing Municipal Environmental Monitoring Center (BMEMC), district and county environmental protection monitoring stations, and monitoring stations in each bureau and general state corporation (figure 1).

The BMEMC monitoring center organizes the monitoring network in the municipal area, giving instructions to businesses, and performing quality assurance checks on the monitoring stations in each district, county, bureau, and general corporation. It also performs supervisory monitoring of pollution sources. The monitoring center also assigns targets to district and county environmental monitoring stations, which report the environmental and pollution monitoring situation to local district and county governments and to the monitoring center. District and county monitoring stations can perform supervisory monitoring on the enterprises within their jurisdictions.

The important industrial bureaus and general corporations have set up their own environmental protection monitoring stations. The BMEMC gives instructions to and performs quality assurance checks on these stations.

Some of the heavily polluting industries, such as metallurgy, chemicals, petrochemicals, paper mills, and tanneries, have their own monitoring labs. Those without monitoring equipment can have the monitoring done by the environmental

Figure 1. Environmental monitoring system in Beijing



departments or other departments qualified to undertake monitoring.

Monitoring Plans

The Beijing Municipal Environmental Protection Bureau (BMEPB) prepares an annual plan that assigns various functional responsibilities to enterprises. Some 1,100 industrial enterprises are required to fill in annual environmental statistics forms. According to the regulations, enterprises should monitor the amount and concentration of wastewater pollutants from each pollution source and report them to the BMEPB; in turn, the bureau prepares a general report for the National Environmental Protection Agency.

Beijing Municipality compiles data for a checklist of 21 items from the national "Urban Environmental Comprehensive Treatment Quantitative Check," which provides subnational levels of government with standards for industrial wastewater; the checklist includes information on the percentage of industries meeting industrial wastewater discharge standards, the percentage meeting wastewater treatment standards, and the industrial wastewater discharge amount per 10,000 yuan of output. Beijing Municipality provides this checklist to the districts, counties, bureaus, and general corporations. Each bureau and general corporation then provides the checklist to its affiliated enterprises.

Pollution Discharge Permits

Given the lack of awareness about pollution control in the overall production process, many enterprises had previously focused on "end of pipe" pollution treatment. Increasing evidence shows that environmental problems occur not only at the end of the pipe, but also in the process of production. End-of-pipe control will not solve environmental problems. Only by working on the scale of production, raw material consumption, technological processes, and equipment and management can we set up a system that preserves natural resources by promoting energy conservation, consumption awareness, and the protection of water resources.

Beijing Municipality began promoting effective management and quantitative control over the entire production process by issuing waste-

water discharge permits to 15 demonstration enterprises in 3 general corporations—light industry, textiles, and chemicals. These three general corporations account for 64 percent of the pollution in the municipal area. The permits allow these industries to operate only if they meet specific standards for amounts for wastewater discharge. The effectiveness of the demonstration prompted the government to extend permits to 64 enterprises, 36 of which are subenterprises in the three general corporations. These enterprises generate approximately 85 percent of all discharges in their respective industrial branches. Thirteen permits have also been extended to industries in the Yongdong River area, and 15 to industries in the Shijingshan district.

The permit issuance process follows three stages:

1. *Permit registration.* On the basis of an internal wastewater discharge audit, each enterprise specifies the amount of discharge that is being generated and forwards this measurement to its general corporation, which verifies the amount. The enterprise then applies to district or county environmental protection departments for registration.
2. *Setting the permitted pollution amount.* On the basis of the wastewater discharge audit, the enterprise also undertakes an analysis of the measures that should be used to control the discharge, formulates an overall wastewater reduction plan, and assesses what measures should be taken to phase in the wastewater reduction with the least impact on the environment. Using this information, the BMEPB decides the amount of wastewater pollutants to be permitted to the enterprise.
3. *Issuing permits and auditing.* After setting the pollution discharge amount for enterprises, and discussion with the districts, counties, and enterprises, the BMEPB issues legally binding pollution discharge permits to enterprises. Those unable to meet the goal stated in the permits are fined according to the specific level of wastewater discharged.

Implementation results are encouraging. Pollution discharges have been reduced and controlled in the demonstration enterprises. During the demonstration period the average value of industrial output of the three general corporations increased by 1.9 percent, while chemical

oxygen demand (COD) discharge amounts declined by 8.16 percent, with 5,150 fewer tons of COD than before.

The Chemical Industry Group Corporation, in particular, made 53 technical renovations. In doing so it gained 0.7 billion yuan of newly increased output value and 80 million yuan of profit and taxation, and lowered by 56 percent its pollutant discharge amounts per 10,000 yuan of output.

Levying Excess Pollution Discharge Fees

To enhance environmental management and treatment in the enterprises, to promote reductions in the consumption of natural resources and energy, and to raise funds for enterprises to treat pollution, Beijing Municipality levies pollution discharge fees against enterprises with excess air emission, wastewater discharges, solid waste discharges, and noise levels.

Polluting enterprises are responsible for monitoring their own pollution discharges, and for reporting these concentrations to the district and county. After supervisory and statistical monitoring, the environmental protection bureaus then send out levying notices to polluting enterprises. The enterprises pay the fees to the district and county environmental protection bureaus, which then forward them to the municipal and district financial bureaus separately, according to the levels at which the enterprises operate. The municipal, district, and county environmental protection bureaus can channel income from these fees into the budget as environmental protection funds. The "Provisional Measures for Levying Pollution Discharge Fees" stipulate that 80 percent of the excess pollution discharge fees be returned to polluting enterprises as environmental protection funds to subsidize pollution treatment efforts. The remaining 20 percent, plus any penalty income, serve as a comprehensive urban environmental treatment fund and are used for own-funded construction of an environmental protection system.

Levies have reduced pollution and increased treatment activity. In the past five years, 3,000 to 4,000 enterprises have been levied annually, and a total of 199.6 million yuan (about US\$40 million) has been collected, most (about 57 percent) from wastewater treatment discharge. Fee pay-

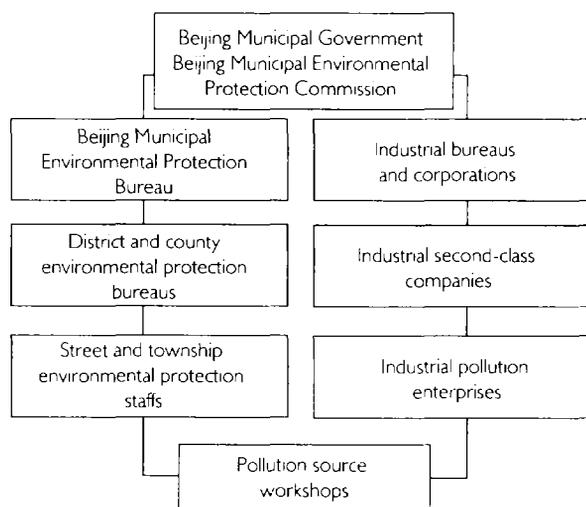
ments for excess discharge come mainly from the chemical, metallurgical, power, light, textile, and coal industries.

Since fee levying began in 1981, subsidies have been given to more than 3,000 projects to treat pollution sources. While the annual output value increased at a rate of 6 to 10 percent, the amount of mercury, cadmium, and Cr+6 discharged in wastewater was reduced by 90 percent, and the amount of arsenic, phenol, and cyanide has declined by 85 percent. The use of environmental protection funds has contributed greatly to reducing and controlling existing pollution. Not only have discharge pollutants been controlled, but more than 2,000 sources of noise and air pollution have also been controlled.

Environmental Management Institutions in Beijing

The Beijing Municipal Government attaches great importance to environmental protection. In the 1970s the government set up several environmental institutions. The Beijing Municipal Environmental Protection Bureau, the Institute of Environmental Protection Research, and the Municipal Environmental Monitoring Center were the first such institutions set up in the provinces, municipalities, and autonomous regions in China. Environmental bureaus have also been established at the municipal, district, and county levels of government, supervising and managing the pollution discharge departments in their respective jurisdictions. Environmental protection staff are also located in townships and neighborhoods, where they are in charge of managing and supervising pollution discharge departments locally. A comprehensive environmental supervisory management system has also been established (figure 2).

BMEPB is a functional bureau of the municipal government. It works as the agent of the municipal government to formulate environmental protection laws, regulations, and standards in Beijing; organize the work of environmental protection programs; examine and approve the environmental impact assessment and environmental protection facilities of newly constructed, expanded, and upgraded projects; organize the levying of discharge fees and penalties; organize environmental monitoring, scientific research,

Figure 2. Environmental management system in Beijing

education, and publicity in the municipality; give instructions to businesses; and coordinate the environmental protection work of each district, county, bureau, and general corporation.

The BMEPB is in charge of directing the work of environmental protection bureaus in districts and counties, which are the functional bureaus of district and county governments.

Special environmental management institutions have been set up in each industrial bureau and general corporation of Beijing, or personnel have been hired to take charge of environmental protection work within the sector. These institutions and personnel organize and fulfill the environmental protection plans set by the municipal government, formulate the sector's environmental protection funds utilization plan and the industry's environmental protection programming and projections, and organize the sector's pollution source treatment program and its environmental education and publicity campaigns.

Environmental protection divisions have been set up in vital industrial enterprises, with special or part-time personnel. Their primary responsibility is to organize pollutant discharge workshops and work groups of employees.

Progress Has Been Impressive, but More Must Be Done

Great strides have been made toward controlling industrial pollution and protecting environmental resources in Beijing. However, existing industrial pollution control strategies still have a few shortcomings:

- There are two problems with the pollution discharge fee policy: one is that the levying scope (pollutants) is too narrow; the other is that the levying standards are too low. Often, the treatment fees are several times or dozens of times higher than the discharge fees, leading industries simply to pay the fees rather than invest in mitigation.
- The demonstrations of the permit system are just beginning. Special laws have yet to be enacted. It will take time to integrate wastewater auditing, clean production, and the permit system into effective industrial pollution prevention and treatment strategies.
- Enterprises should be encouraged more heavily to develop clean production processes, with an emphasis on yielding the lowest level of pollution possible and on reducing the percentage of energy and natural resource use per unit produced. Water reuse and recycling, and comprehensive utilization should take place before wastewater treatment. This is critical for sustainable development strategies, and positive steps should be undertaken to promote these processes.

Floor Discussion

Question 1: With regard to demand for sanitation services, Mr. Hasan noted that people in Orangi realized the importance of sanitation; the director of OPP reckoned that people spent 50 percent of their incomes to address health problems arising from a lack of sanitation. Yet the presentation on Ouagadougou described the need to create a demand for sanitation. Was Orangi a special case—a particularly dynamic and enterprising immigrant community—or is it more generally the case that people recognize the advantages of sanitation but don't have the means to do anything about it?

Mr. Hasan: My response is based on the communities I have worked with; I cannot address the question at a universal level.

We were told again and again by official planners that Orangi was a rare example, and its experience could not be replicated. But we discovered when we started working in the smaller towns, with communities that were not migrant communities, that they also were quite willing to invest in sanitation.

But there is an important distinction. In communities that have an old, established system and social organization, it takes much longer for this process to be initiated because it actually undermines the power of established organizations. The process calls for a certain amount of democratization that the old system is not willing to accept.

Mr. Bartone: Across the case studies here there is a grassroots demand for some kind of service, and people are expressing that demand. They

have expressed it to the Orangi Pilot Project, when the women expressed their preference for soakaways, because of flooding problems. And in the case of Santiago, the population has become very involved because of a very obvious environmental public health concern.

People in Santiago now pay double for their vegetables because the restriction on growing vegetables in the nearby area has changed the whole marketing structure for vegetables. Certified vegetables began to appear on the market after these emergency programs were put in place, although nobody knows who certified them. The water and sewerage authority was reluctant to embark on wastewater treatment previously because they were concerned that people would not be willing to pay the sewage treatment surcharge on the water bill. Water was fairly cheap because Santiago gets high-quality water from the mountain, with a gravity flow system. But the costs would probably double when they put in wastewater treatment.

Today, this is not the political concern. The politicians are well aware that the public is now cognizant of the public health implications of raw sewage irrigation and is also aware of the need for wastewater treatment. So selling the public on wastewater treatment is not in question. The question is whether the utility can respond by building up the wastewater treatment capacity in a cost-effective manner.

If we look at the Beijing case there is also a certain responsiveness between what the industries have to do and the incentives to get industries to behave in more environmentally

responsible ways. Perhaps it is not so much demand management as an incentivization by tariff and tax systems.

Audience observation: To follow up on that point, in Bangkok, which has a host of environmental health problems, the real impetus to address the problems came from commerce and industry. It was discovered that multinational companies were avoiding setting up their regional bases in Bangkok, and in fact, the motivation was political.

It seems that, in the Santiago case, the real impetus behind community demand for sanitation was not worries about health or the environment; rather, it was a concern about trade and the potential loss of export earnings from fruit and vegetables that actually led to something being done.

Dr. Ferreccio: That is my interpretation, because the data on health impact were available previously, but nobody cared. People changed when the economy was threatened. But now they have also become more aware of the health damage, and the process is irreversible: people now feel that sanitation is a good that they want to have.

Chairperson Izaguirre: And it is a good for which they are willing to pay.

Dr. Ferreccio: Yes. The problem in Santiago now is finding an appropriate standard for our water. We should not apply American standards. The deciding factors will be local costs and how much risk we are willing to accept locally. The standard of irrigation water should be debated locally, as should the issue of which treatment technique should be used.

One problem is that we have a large volume of water to treat and we must have a comprehensive plan. Most other countries have begun with a small plan, and they have been able to develop sewage treatment and a treatment system simultaneously.

Question 2: On the issue of standards, how do enterprises and the pollution control authority in Beijing negotiate and establish standards?

Mme. Yang: The national government is responsible for setting standards. Of course, a municipal

government has the authority to further modify the national standards, but only to make them more stringent.

In 90 percent of the cases the municipal government simply adopts whatever was established at the national level, because it is already difficult to meet that standard in most cities in China. There are cases of industries establishing their own standards that are even more stringent than the municipal standards. For example, in the case of new industries—those built in the 1980s and 1990s—the concerned sector ministry expects them to maintain high standards because they started up with more advanced processes than older enterprises.

Question 3: Does the Orangi Pilot Project include any arrangements to operate and maintain what has been constructed? What are the considerations for the cost recovery of operations and maintenance?

Mr. Hasan: The residents of Orangi have made considerable investments of effort, time, and money in the system, so naturally they will maintain it. There is no formal, organized method of maintaining and operating the system. It is more or less a question of crisis management. If something goes wrong, people get together and tackle it at the level of the lane, which is 30 to 40 houses. Usually, the residents ask the lane manager to coordinate the effort. This is so in the majority of cases.

In cases in which there have been problems with collector drains, people have formed organizations and contributed a small sum of money, such as 5 rupees (about 17 cents) a month, to a repair fund. Eventually, collector drains will break down everywhere, and a more organized arrangement will be necessary.

Question 4: There is a tendency in many cities in which the World Bank works for the water and sewerage utilities not to take the time to incorporate community participation, in the interest of alleviating the problems sooner. How long did the implementation of the whole Orangi Pilot Project take?

Mr. Hasan: I would have to say that the project occurred at different paces in each area. Karachi

has a population of about 10 million, of which about one million live in Orangi Township; it is an enormous area. For the entire 75,000 households, it took about 12 years to implement the project. However, there were neighborhoods of 1,000 to 2,000 households that implemented the project in six months, while there were also neighborhoods of 500 households that probably took three or four years. Over time, the rates for completion of work and involvement of households increased.

While it is true that the government contracting system would do the work much faster, it would also be much more expensive, and it would serve perhaps one-tenth of the area that we have served, given the government's financial problems and inability to recover costs from the people.

Question 5: An important part of the sanitation provision in Ouagadougou was the training of technicians and workers to provide and maintain the facilities. How much does this appear to be a force for growth of that industry? Are the

technicians developing new markets, improving facilities, and continuing provision of these facilities outside the demonstration project?

Mr. Ouayoro: First, the technicians came from the neighborhood and we were careful not to train too many artisans at once so as not to overcrowd the field. The artisans are training their assistants. In time the number of artisans will increase, and some will leave the neighborhood to work elsewhere. Those people will set up their own businesses and promote the technologies outside the pilot area.

The technicians have started building latrines on their own plots, which is also a kind of marketing.

Chairperson Izaguirre: In closing I would like to emphasize that all the presentations indicated the importance of communication and the mass media. This was illustrated especially in the cases from Burkina Faso and Chile.

HEALTH, POVERTY, AND ENVIRONMENT: THE NEXUS

Overview

Carolyn Stephens

Today, urbanization is perhaps one of the most pressing global changes affecting humans, both in the way they live and the way they die. The omens are not altogether good. We have long known that, for much of the world, an increased concentration of population in urban areas is synonymous with rising urban poverty and growing environmental degradation.

This session explores the nexus of urban health, poverty, and environment in the context of environmentally sustainable development. This issue is a difficult one and is a fertile area for platitudes. Indeed, we must recognize that, while it is important to understand the impacts of individual factors on health, we cannot resolve the multiple health problems stemming from urban poverty and its symptoms without a commitment to understanding the *synergy* of threats facing the urban poor. In turn, we must recognize that urban poverty and its effects exist within a context: the extensive and damaging *polarization* of socioeconomic and environmental conditions among communities within cities. Evidence indicates that this inequality, by itself, has ramifications for the health of the poor and for the development of sustainable urban society as a whole (Wilkinson 1994).

Linking Urban Poverty with Environmental Conditions

By the 1980s, 40 percent of the total global human population had become urban citizens. Most of these urban people now live in developing coun-

tries, and projections for 2025 indicate that four out of five urban people will live in towns and cities in the developing world (Kasarda and Parnell 1993). In theory, living in urban centers offers great potential gains, including health benefits, for their inhabitants (Satterthwaite, Cairncross, and Hardoy 1990). However, the theory is disproved by the reality of urban poverty and its ramifications in the developing world. The current evidence does indeed suggest that population growth in urban areas is synonymous with the proliferation of urban poverty; an estimated 30 to 70 percent of the urban populations in developing countries are living in extreme poverty (Hardoy, Mitlin, and Satterthwaite 1992).

Urban poverty has been defined in a variety of ways, often linking "environmental" aspects of urban life with such "economic" aspects as income. For example, the World Bank World Development Report (1991) defined poverty as the "inability to attain a minimal standard of living" as measured by household income and expenditures. Ownership of such assets as consumer durables or the consumption of food (calories) also provides measures of "poverty" (UNDP 1994). Ownership of or access to physical facilities in the environment (or rather the absence thereof) has also been used as a proxy for urban poverty, particularly when data on income are weak (see Housing and Development Associates 1990; Benneh and others 1993). Already, the distinction between the physical conditions in which people live and their socioeconomic circumstances is blurred.

Hundreds of studies have detailed the inadequacy of urban facilities (water, electricity, and housing) and the absence of assets among the poor (see Benneh and others 1993; Bisharat and Zagha 1986; Cheema 1992). Another layer of complexity is added with data on relative expenditures on environmental facilities. Ample evidence exists that the urban poor pay more than the rich for the minimal, inadequate services they do receive (Leitmann 1992; Hardoy, Mitlin, and Satterthwaite 1992).

Recently, Moser (1994) explored a broader set of assets and vulnerabilities among urban poor, consisting of personal, household, and community assets; Moser's analysis indicates that the relationship between poverty and its indicators is complex, and varies across urban settings. For example, in Chawama, Lusaka, where more than half of the population is below the official (income-based) poverty line, urban poverty is linked to lower levels of education, limited access to and ownership of facilities (particularly water), the use of potentially health-threatening fuels that are both expensive and highly energy-inefficient, and the limited ownership of consumer assets. Some aspects of the conditions of the poor appear to be deteriorating—most critically, there has been an increase in low-paid female employment in the past decade, combined with increases in the number of adults who are not working.

In Metropolitan Manila, where a smaller proportion of the community is below the official poverty line (around 25 percent), Moser found that while poverty is linked with asset ownership, it is not linked closely with educational level; moreover, although environmental facilities (water and sanitation) are limited, they are not expensive. Findings also suggest that women are paid less and are more likely to work in the informal sector. In Guayaquil, Ecuador, where two-thirds are below the official poverty line, access to sanitation and water facilities is poor; however, education has improved over time, and housing conditions, though dense, are better. Within each setting, the very poor experience worse conditions than their poor neighbors, and in each area women seem to be particularly disadvantaged (Moser 1994).

This analysis shows clearly that relationships between levels of poverty and indicators of poverty cannot be extrapolated loosely from one

city to another, or from one poverty group to another. Indeed, overall, although the breadth of analysis of urban poverty and the environment in developing countries has progressed over time, most studies still rely largely on measuring asset-based conditions of isolated groups of people—the urban poor—as a proxy for exploring a complex condition that, in reality, exists within a context. Arguably, in the context of cities, where the rich and poor often live and interact closely, isolated analyses of the physical or even asset-based conditions of one group may give a limited picture of what poverty means relative to the urban social environment as a whole.

Linking Poverty and the Environment to Health Conditions

Growing concern about the disparate living conditions facing different areas in cities has prompted more than a hundred studies of the impacts of urbanization on environmental health. These focus on three age groups—infants, children, and adults (Bradley and others 1992). The majority of these studies in developing countries examine infant and child mortality and morbidity, focusing on differentials among groups. Mortality rates for infants are between 2 and 10 times higher for those in squatter areas of cities than for those in nonsquatter areas. The two sets of studies discussed in this session—those sponsored by the Stockholm Environment Institute on Jakarta, and those sponsored by the U.K. Overseas Development Administration (ODA) on Accra and on São Paulo—found considerable differentials in child morbidity and mortality from diarrheal disease and respiratory symptoms among communities within cities.

Some studies try to tease apart the health, poverty, and environment nexus in relation to children. Some have concluded that differences in neighborhood environmental conditions may be more important for child health than are individual household facilities (Koopman, Fajardo, and Bertrand 1981; Bapat and Crook 1984; Bateman and Smith 1991). In other words, a poor household may struggle to get its own facilities, but getting them may not necessarily protect the health of its children if the surrounding environment is poor (Stephens and others 1994). Other studies have concluded that water and sanitation have no

impact on mortality after their relationship with the socioeconomic status of the household is accounted for (Pickering 1985). Other studies suggest that the impact of the urban environment on health is conditioned by a wide range of personal characteristics and behavior. For example, the effect of improved facilities on child health may vary between individuals and populations according to the education of the parents, child feeding practices, or income (Stephens 1984; Esrey and Habicht 1988; Butz, Habicht, and Davanzo 1984).

Studies on children, particularly those younger than age five, have equipped policymakers with an important understanding of the urban health, poverty, and environment nexus, and particularly the importance of water and sanitation. But despite this wealth of knowledge, the picture of this nexus in developing countries is still overly simple, largely because the literature has been slanted toward children (primarily infants) and communicable disease; this tends to give the impression that the physical (particularly the sanitary) conditions of the urban environment create the most significant health risks for urban people as a whole. This does not mean that child health is unimportant but that, to date, adolescents and adults and their health patterns have been missing from the picture.

Few systematic studies have been undertaken on urban chronic disease among adults. Where data are available, diseases of the heart and neoplasms emerge as significant health problems in cities of the developing world. These problems are combined with chronic respiratory conditions in adults and increased levels of urban traumatic deaths—most notably, accidents and violence (PAHO 1990; Pagliaro 1992). Contrary to popular misconception, heart disease is now acknowledged as a disease of poverty in both industrial and developing countries, acting via diet, health behavior, and psychosocial factors (Feachem and others 1992). Some authors argue, controversially, that environmental deprivation in utero and in childhood is linked to adult heart disease (Barker and others 1989; Baker 1994); others are skeptical (Elford, Whincup, and Shaper 1991). The studies presented on Accra and São Paulo in this session suggest that age-specific rates of heart disease are more than twice as high in poor areas as in rich areas of cities (Stephens and others 1994).

Traumatic injury and death, particularly from violence, is another, emerging problem of the social environment of cities and is a concern that has been expressed by the urban poor (and rich) in cities as diverse as Lusaka (Moser 1994), São Paulo (Jacobi and Camara 1993), Metro Manila (Moser 1994), and Washington (van Vliet 1992). Deaths from violence now overshadow infectious diseases as childhood killers in some poor urban environments (SEMPLA 1992; Laurenti 1972; PAHO 1990). For example, violence (primarily homicide) accounts for 86 percent of all deaths among 15- to 19-year-old males in São Paulo, and more than half of all deaths among 5- to 14-year-olds (SEMPLA 1992; Stephens and others 1994). Differences in rates of mortality are elevenfold between rich and poor for 15- to 19-year-old boys. Mental health problems are also increasingly becoming a significant urban health problem (Harpham 1994), and some evidence suggests that the poor may suffer a greater burden than their more affluent urban neighbors (Blue 1994).

This is not to say that the old sanitary environment–poverty problems of cities have gone away: alongside the deaths from what can be called diseases of the social environment are still cholera epidemics and considerable illness from infectious diseases (Benneh and others 1993; Surjadi 1993). But when one opens the Pandora's box of adult and child health in cities, the complex linkage among urban environment, poverty, and health becomes overwhelming: the physical conditions of urban poverty seem to interact with economic circumstances to compound the threats to health—both of children and, resoundingly, of adults. Definitely, the urban poor die more.

Policy Implications of the Research for Urban Management

The idea of sustainable development is problematic at the best of times and is often linked fundamentally to concepts of equity (UNDP 1994; Stren and others 1992; Redcliff 1987). When applied to discussions of how poverty and health fit into the sustainability of the urban environment, data on the extent and complexity of the health-poverty-environment nexus indicate that equity considerations cannot be ignored. Increasingly, cities are not only places where poor

sanitary conditions predominate, but also where stark symbols of resource misallocation, both physical and social, reveal themselves.

As Virginia Bottomley, Minister of Health for the U.K. Government, says, "Information is such a lever for change." Information on the extent of health-poverty-environment problems in cities is often within the grasp of policymakers. Existing aggregate urban data conceal large-scale differences in health between urban socioenvironmental groups. Dissaggregated data on health, poverty, and the environment can be important input for local urban planners, particularly as a tool for identifying the needs of high-risk socioenvironmental and health groups (Stephens and others 1994). The increasing documentation on health, poverty, and environmental differentials within cities have value for advocacy groups and for managers looking for transparent needs-based tools for urban management.

But perhaps as important as the information itself as a lever for change in urban environments is where the information comes from and how it is analyzed. If we argue that a synergy of causal factors underlies urban poverty, environment, and health and that we need integrated interventions to tackle the environment-poverty nexus, then there is a natural logic in analyzing health-poverty-environment problems as an integrated domain of research. It is also important that we encourage the managers and administrators of cities to use their own information to respond to this logic. This is not to say that we should rely less heavily on epidemiological tools and the statistics generated by independent academic inquiry. But we must develop an extensive understanding of how independent inquiry can be promoted to address the problems and, as important, how we can get diverse policymakers together to use this information effectively.

When achieved, the process of putting together a complex analysis of urban deprivation with diverse agencies involved in city management and policy may foster the recognition that integrated action is not only desirable but feasible. The studies of intraurban differentials using existing planning data in Accra and São Paulo found that the process of collaboration and data linkage among agencies has itself enhanced communication and trust and has encouraged transparency in decisionmaking by the groups.

Environmental monitoring systems are particularly valuable tools for evaluating changes in our global environment. Urban air pollution monitoring is an example applied to cities—a risk to sustainable development that preoccupies many governments. If monitoring problems is a tool for policy change (WHO 1994), then it is logical that we regulate not just the macro-environmental risks to health, but also the poverty-environment nexus within our cities.

There is a strong argument for developing disaggregated information systems in cities to monitor diverse but interconnected indicators of progress toward environmentally sustainable development through the health-poverty-environment nexus. In São Paulo air pollution has been monitored since 1966 as a major environmental risk factor. And, based on long-term evidence and data on the synergy of poverty risks and health impacts, legislation has recently been promoted to develop a system to monitor the complexity of problems subsumed under the health-poverty-environment nexus. This move may, at the least, make the veiled complexity of urban poverty visible at the broader social level throughout São Paulo.

In its urban agenda setting for the 1990s, the World Bank has delineated two priorities for urban policy and development—alleviating urban poverty and improving the environment. Many people believe that the two are inextricably linked at the micro and macro levels. If we recognize that the problems of poverty and the environment in our urban centers require integrated management, then analyzing the problems as an integrated construct takes us one step forward. If those who plan the cities and control their resources are those who actively monitor the health-poverty-environment nexus as an integrated system, we are another step forward. These are the information stepping-stones; the policy steps are more difficult.

Integrating Strategies and Depolarizing Professionals

More than 60 percent of the world's population will be urban by 2025. Current estimates indicate that more than 50 percent of this population will be poor. This picture of poverty extends from control over assets to control over destiny—it is a

deprivation that implies inaccessibility not only to physical goods, but also to the resources that allow people to develop the self-esteem necessary to become a productive part of their society. In its complexity, this deprivation has grave consequences for health and the quality of life, as we know. But merely describing this scenario falls far short of the mark.

Tim Lankester, Permanent Secretary for U.K.-ODA, in commenting on United Nations strategies for urban development, has described the dilemma succinctly: "If there is so much agreement on what needs to be done, why is so little happening?" (Harris 1992). Perhaps much of the blame can be attached to the disparity between the rhetoric that calls for an integrated policy-making strategy to tackle urban poverty and the reality of searches for single solutions to human problems that are more complex. At the moment, despite the rhetoric, most of us in the analysis and policy fields actually resemble more the inhabitants of Jonathan Swift's island of Laputa in *Gulliver's Travels* (1726) than the mutually supportive developers of an environmentally sustainable future:

He had been eight years upon a project for extracting sunshine from cucumbers, which were to be put into vials hermetically sealed, and let out to warm the air in raw inclement summers. . . . The world would soon be sensible of its usefulness, and he flattered himself that a more noble exalted thought never sprang into any other man's head.

Current urban policy, planning, service, and training—and the analysis of problems—at the national and international levels are more often reductive and specialized, as if we could extract people from poverty by providing them separately with toilets, or houses, or water, or education, or income.

Integrated urban policies imply fresh but difficult rethinking at the global, national, city, and community levels. Integrated strategies imply multisectoral collaboration that is currently beyond the "laws of bureaucracy" in many agencies and beyond the training of many professionals. As such, we face both managerial and educational challenges in seeking to create

imaginative and coordinated policy for environmentally sustainable urban development. This view has been echoed at a local level in Accra, Jakarta, and São Paulo—all of which have different service and planning agencies organized into very discrete units that communicate with hesitation and often mistrust.

Data on the complexity and repercussions of the health-poverty-environment nexus in cities suggest that current laws of bureaucracy and sectoral specialization should not be allowed to determine the future development of urban policy internationally or within cities. Information indicates clearly that the health-poverty-environment nexus is indeed a nexus—a complex interplay of issues and hard realities. Information can be assembled—perhaps as the first steps toward creating more fluid channels of communication, both among those who control and manage cities and those who live in them. Information that starts from this premise of complexity is perhaps only a small step forward, but it is a constructive one.

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Health, Poverty, and the Environment: Lessons from a Three-City Study

Gordon McGranahan

Consider a nightmarish vision of the future for an environmentally heedless world: resources are so scarce that people can barely eke out a living; physical crowding is so intense it is difficult to find an undisturbed place to sleep; water, even for basic household needs, is undrinkable or inaccessible; and waste collection has virtually ceased, with only the bouts of severe air pollution managing to mask the otherwise ever-present smell of decaying waste. As a prediction of a future catastrophe this may seem unrealistically dire, but it could easily be a contemporary account of environmental conditions in a particularly disadvantaged urban neighborhood. In short, what many futurists would view as an environmental disaster is already a reality for many poor urban households.

In the futurist's nightmare, environmental degradation is the underlying reason for poverty and ill health. Some combination of environmental insults has undermined human health and material welfare. In the urbanist's contemporary reality, poverty is the more fundamental deficiency. This is not to say that urban squalor arises simply because residents cannot afford better conditions. Typically, more subtle economic, political, and social factors are at work. But while it may be too simple to blame poverty for environmental degradation and ill health in so many slums and shantytowns, it would simply be wrong to say that environmental degradation is the cause of their poverty.

In this session we are addressing the health-poverty-environment nexus in contemporary urban centers. This places poverty at the fore, as

Carolyn Stephens made clear in her overview discussion. It also focuses attention on a range of environmental problems quite different from those most commonly debated in international arenas, such as global warming, acid rain, the ozone layer, and biodiversity. There is some doubt whether a conventional environmental perspective is even appropriate. Indeed, Dr. Stephens applies a broad concept of environment, encompassing, for example, the social environment. This allows her to incorporate such problems as violence into the health-poverty-environment nexus, and to explore more fully the complex health problems often facing the urban poor.

My discussion captures some of the general lessons from a recent study of household and community-level environmental problems in Accra, Jakarta, and São Paulo (Benneh and others 1993; Jacobi 1994; McGranahan and Songsore 1994; Songsore and McGranahan 1993; Surjadi 1993; Surjadi and others 1994). For this purpose, I retain a more narrow physical definition of environmental distress, so as to allow the environmental health problems of the urban poor to be contrasted with other, more conventional urban environmental problems.

The Health-Poverty-Environment Nexus

The more serious environmental problems at the household and community levels, such as inadequate water and sanitation facilities and indoor air pollution, are more prevalent in poor cities and neighborhoods. Many city-level problems, such as ambient air pollution, are most severe in industrial

megacities with weak pollution control programs, most often located in middle-income countries. And global environmental problems, such as global warming or the depletion of the ozone layer, are typically the product of the wealthy.

To some extent this disparity reflects a tendency for the environmental problems to become more dispersed and less immediate as cities and neighborhoods grow wealthier. A wealthy urban lifestyle creates more waste, but the wealthy choose to devote part of their wealth to avoiding exposure to unhealthful or unpleasant pollutants. The problems close to home are the first to improve as wealth increases, not only because they are the most immediate and health threatening, but also because addressing them is easier institutionally. As one shifts from household problems to neighborhood problems, to city problems, to, eventually, global problems, the political and institutional obstacles to improvement become increasingly complex. The end result is that the problems of the poor affect predominantly other poor households, while the environmental burden of the wealthy falls on an ever-expanding public.

Accompanying the shift in the scale and immediacy of environmental problems is a shift from issues of health to those of sustainability. While intense environmental insults in and around people's homes threatens primarily the health of the inhabitants, the threat of the broader environmental burdens is more likely to involve very indirect routes to undermining human welfare, and to take time to manifest itself. Whether these broader environmental burdens are sustainable is often a very pertinent question. The same cannot be said about inadequate household water and sanitation, or indoor air pollution. Such problems are all too sustainable. Judging from the estimates provided in the World Bank World Development Report (1993), they also account for most of the world's environmental health problems.

In 1991 the Stockholm Environment Institute (SEI) initiated a study of household environmental problems in Accra, Jakarta, and São Paulo. The goal was threefold: to support environmental management efforts in each city, to develop methods applicable to other cities, and to guide international discussions on urban environmental issues. A survey was administered to

about 1,000 households in each city, covering access to water, water use and storage practices, sanitation and hygiene, the presence of pests and the use of pesticides, housing density and indoor air pollution, solid waste collection and disposal, and food contamination. Each major problem area was assessed for its impact on health risks involved, particularly on the health of women and children, as well as for its physical manifestations and severity. The survey results from each city were used to develop household environment profiles, displaying environmental conditions both across different wealth levels and geographically, and capturing the perspectives of the household about which problem areas should be a priority for action.

Poverty, Not City Size, Determines Exposure

Conventional wisdom would have it that the megacities of the developing world, such as Jakarta and, especially, São Paulo, are the epitome of urban environmental distress. Yet the household-level environmental indicators tell a very different story (table 1). For almost every indicator, average conditions improve between Accra and Jakarta and improve further between Jakarta and São Paulo. The more detailed data clearly support this finding. It is poverty rather than city size that determines exposure to these household environmental problems. Had the study focused on city-level problems, the picture would be quite different, of course. Even per capita, São Paulo

Table 1. Selected household environment indicators in Accra, Jakarta, and São Paulo
(percentage of sample)

<i>Environmental indicator</i>	<i>Accra</i> (<i>N</i> = 1,000)	<i>Jakarta</i> (<i>N</i> = 1,055)	<i>São Paulo</i> (<i>N</i> = 1,000)
<i>Water</i>			
No water source in residence	46	13	5
<i>Sanitation</i>			
Share toilets with more than 10 households	48	14	20
<i>Solid waste</i>			
No home garbage collection	89	37	5
<i>Indoor air</i>			
Main cooking with fuel wood or charcoal	76	2	0
<i>Pests</i>			
Flies observed in food preparation area	82	38	17

Source: McGranahan and Songsoe 1994.

generates the greatest amount of municipal waste, releases the largest quantity of sewage into open water, and has the highest concentration of air-polluting industries and automobiles. Overall, Accra's citywide environmental problems pale beside those of both Jakarta and São Paulo. Nevertheless, the environmental health problems faced by Accra's residents are almost certainly more severe.

Neighborhood Environment and Health Risks

The health implications of environmental inadequacies are difficult to quantify in a meaningful way. The complex economic, social, and environmental interconnections make it impossible to demonstrate unambiguous causal links based on data from a cross-section of households. Nevertheless, statistical associations from an analysis attempting to identify the best predictors of diarrhea and respiratory illness among children, and of respiratory problems reported by the principal woman of the household, are revealing (table 2). While the risk estimates associated with individual factors should be judged with caution, the overall picture is compelling.

Table 2. Approximate relative risk of environmental factors in Accra

<i>Environmental risk factor</i>	<i>Approximate relative risk</i>
<i>For diarrhea among children age six and younger</i>	
Use pot for storing water	4.3
Experience regular water supply interruptions	3.1
Share toilet with more than five households	2.7
Purchase vendor-prepared food	2.6
Use open water storage container	2.2
Outdoor defecation by neighborhood children	2.1
Many flies in kitchen at time of interview	2.1
Do not always wash hands before preparing food	2.0
<i>For acute respiratory symptoms among children age six and younger</i>	
Child often present during cooking	2.6
Many flies in kitchen at time of interview	2.4
Less than 4 sq m per person in most crowded sleeping room	2.3
Experience regular water supply interruptions	2.2
Use mosquito coils	1.8
Never cook outdoors	1.8
Roof leaks during rains	1.7
<i>For respiratory symptoms among principal women of household</i>	
Use pump-spray insecticide	3.5
Experience regular water supply interruptions	1.6
Roof leaks during rains	1.5
Never cook outdoors	1.4
Smoke cigarettes	1.1

Note: The approximate relative risk, or odds ratio, is the odds of having the symptoms if the factor is present divided by the odds of having the symptoms if the factor is absent.
Source: Benneh and others 1993.

Improving household and neighborhood environments would almost certainly make an enormous difference to the health and well-being of many Accra residents. Furthermore, the more disadvantaged households would benefit disproportionately.

The environmental and health conditions of Accra, Jakarta, and São Paulo implicitly suggest different policy priorities. The survey results suggest that the priorities of residents vary accordingly. By and large, households—or, more accurately, the principal women of the households—seemed to attach priority for action to the environmental problems whose health risks were more severe. Of the environmental problems examined, the primary concern in Accra was insects (which include malarial mosquitoes); the primary concern in Jakarta was water; and the primary concern in São Paulo was outdoor air quality. Households did not necessarily view health as the reason for their concern. Indeed, in São Paulo the results suggest greater concern with the more visible aspects of environmental degradation than with the health risks per se. However, people's priorities, along with their expressed willingness to pay for improvements, clearly imply that action must be taken on the environmental health front.

Flexibility and Local Participation

Environmental services, such as piped-water connections, waterborne sewerage systems, electricity, and house-to-house garbage collection, are the orthodox solution to household- and community-level environmental problems. To some extent these measures displace rather than solve the problems. Ironically, environmentalists tend not to favor standard environmental services. But, more serious to the growing population of urban poor, acceptable household services are often either too expensive or unavailable. The governments of low-income countries cannot afford to underwrite complete coverage. Attempts to subsidize environmental services often end up providing financial benefits to the relatively well off households who already have access to the services, and placing such an onerous financial burden on the utilities that they cannot possibly expand coverage. Policies that improve how standard environmental services are provided to

households are important. But in a discussion of the health-poverty-environment nexus, the more obvious areas of concern are neighborhoods in which complete service provision is not really an option, at least as long as existing economic inequalities persist.

Especially in neighborhoods with an absence of services, surprising parallels exist between the household- and neighborhood-level problems of the poor and the larger-scale problems that are of greater concern to the wealthy. As with most environmental problems, household- and community-level environmental problems are typically the unintended outcome of human activity. They are often closely interconnected: waste clogs the drains, bad sanitary conditions lead to contaminated drinking water, flies breed in the waste, and mosquitoes breed in the stagnating water. Environmental externalities are often pervasive: one household's poor sanitation is another household's health risk, and there is little that individual households can do to protect themselves. And often some of the most severe problems are hidden.

Just as the physical features of local environmental problems are often structurally similar to those of large-scale problems, many of the organizational problems they pose are analogous. As with most environmental problems, neither market mechanisms nor government planning can provide the solution alone. Truly effective action requires effort by a diverse set of actors for whom environmental improvement is not a central responsibility: households struggling to cope in difficult economic circumstances, utilities accustomed to a role that ends at the tap or collection site, local organizations whose principal interest lies elsewhere, and various other actors accus-

tomized to viewing waste, and even water, as a relatively low-priority concern.

Priorities vary enormously, both within and between cities. The institutional bases for action are also varied. To find solutions, and even to define the problem, it will often be necessary to go beyond environmental concerns, narrowly defined. But even with a fairly narrow definition of what constitutes an environmental problem, the health-poverty-environment nexus poses one of the greatest challenges on the environmental agenda.

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Accra, Ghana: Intra-Urban Health Differentials

Ben K. Doe

The population of Accra, the capital of Ghana, is estimated to be between 1.2 million and 1.5 million, with an annual growth rate of 2.6 percent. Accra accounts for 30 percent of the country's urban population and for 10 percent of its total population. The city occupies 1.7 percent of the total land area of Ghana; the average population density is 70 persons per hectare.

Accra has 56 residential communities, ranging from low to high socioeconomic classes, and from high to low housing densities; the communities also vary by their age, from indigenous to newly developing. The Accra-based component of the household study sponsored by the Stockholm Environment Institute (discussed by Dr. McGranahan) assessed how these differentials—which are indicators of the adequacy of existing housing, sanitation services, and other neighborhood facilities—affect the health of Accra's population, particularly its women and children. The hypothesis was that this extensive and complex set of socioeconomic variables have a synergistic effect on health status, ranging from the widely cited impacts of inadequate sanitation facilities on infectious diseases among children and adults to the little-understood impacts of long-term deprivation on chronic and psychological health problems among adults.

The results of the study do indeed indicate that the health status of women and children in Accra is influenced by the wider social and physical environment in which their households are located, and is not determined by individual factors, such as the amount of disposable household income.

The 56 communities in Accra were grouped into 7 socioeconomic zones (table 1).

Five socioeconomic and environmental variables were used as a measure of deprivation in Accra:

1. Income of the household
2. Educational level of the head of household
3. Number of persons per room per household
4. Access to sanitation facilities
5. Access to water.

High-Density Zones Are the Most Deprived

The population in the high-density indigenous and high-density low-income socioeconomic areas of Accra (and in certain medium-density indigenous areas) have much lower incomes, lower educational levels, and more people per household. In turn, these areas have inadequate facilities and services, and inhabitants run a high risk of disease contamination and ill health due to their environmental conditions. Conversely, inhabitants in the high-income areas have adequate facilities and are in better health. When

Table 1. Socioeconomic zones in Accra

Zone	Description	Share of Accra's population (percent)
Zone 1	High-density indigenous	26.3
Zone 2	High-density low class	19.4
Zone 3	Medium-density indigenous	21.3
Zone 4	Medium-density middle-class	12.4
Zone 5	Low-density middle-class	14.8
Zone 6	Low-density high-class	4.0
Zone 7	Low-density newly developing	1.9

Source: McGranahan and Songsore 1994

environmental differentials are broken down by water provision, sanitation services, housing density, income, and education, differentials in the health status of the socioeconomic groups clearly emerge.

Population density in the low-income areas ranges from 74 persons per hectare to 370 persons per hectare, compared with an average of 70 persons per hectare for the entire city. In the high-density zones 85 to 86 percent share a bathroom facility; in the low-density upper-income zone 78 percent of residents have exclusive use of bathroom facilities and in medium-density middle-income zones, 54 percent do.

Houses in the high-density zones contain five to six households, with more than three persons per room, and households share bathroom facilities.

Poor Households Have Limited Access to Water

Water provision in Accra is the responsibility of the Ghana Water and Sewerage Corporation (GWSC). The most serious problem facing the corporation is the poor condition of the distribution network. But this problem is particularly acute in the old (indigenous) communities, where deteriorating main transmission lines are leading to an estimated water loss of about 20 to 36 percent of daily production. These leakages are also the main source of pollution.

Although many areas of Accra suffer from poor water supply and regular interruptions due to low pumping capacity and incomplete reticulation, these problems are most severe in the high-density indigenous and high-density low-income areas. Areas with the best access to water supply are in the high-income zones. In the high-density indigenous zone, which contains many compound-type houses, households typically have a connection in the yard and share the facility with others in the household. Low-income communities are forced to rely on standpipes, neighbors, and vendors for their water supply.

The costs to these households are very high. The cost per bucket in some areas is at least 5 cedis (which increases dramatically to 20 to 80 cedis in some areas during water shortages). If a household buys only five buckets daily at 20 cedis, it spends 3,000 cedis (US\$4.80) monthly on water. This amount is higher than the amount charged

formally by GWSC to private homes in the low-density upper-income zones. For comparison, metered premises are charged 300 to 1,380 cedis per thousand gallons, while unmetered premises are charged a flat rate of 645 cedis monthly.

The fact that many high-density indigenous, high-density low-income, and medium-density indigenous households rely on vendors for water supply creates what could be called an informal regressive water tax, where poorer households pay more for poorer service.

Poor Households Must Rely on Public Latrines

Domestic and commercial solid waste generation in Accra amounts to 0.51 kilograms per person daily, or a total of 670 tons. Domestic waste constitutes the bulk (about 85 percent). Only 3,000 households from seven middle- and high-income areas in Accra's 56 residential areas receive house-to-house collection service. Many others (high-density indigenous, high-density low-income, and medium-density indigenous) are provided with containers at sanitary sites into which households dump their waste. The containers are supposed to be removed daily or every other day, but the refuse frequently piles up for days without being removed. Many low-income households have no access to waste collection. Many people in these low-income areas—with and without access to containers—dump their refuse in vacant lots, roadside drains, and water courses passing through the city, or they simply burn it, creating unhealthy and unpleasant sanitary conditions in these areas.

An estimated 70,000 plus residents in Accra do not have adequate means of disposing human waste. Consequently, open drains, water courses, beaches, vacant lots, and street corners serve as toilets, especially in high-density low-income neighborhoods and the periurban areas (low-density newly developing). In the high-density indigenous, high-density low-income, and medium-density indigenous areas, one public toilet seat frequently serves more than 35 people, rather than the basic standard of 7 people per seat.

Although the GWSC runs a sewerage service, the system is plagued by a shortage of connections and by deteriorating facilities. The critical shortage of toilet facilities in Accra is quite obvious. Only 40 percent have access to private toilets

discharging into septic tanks or cesspits; in the low-density upper-income and low-density middle-income zones, 25 percent use the 117 public toilets that are available (for a fee), and 20 percent still have to use pan latrines. Another 5 percent have access to ventilated pit latrines, and 10 percent have no access to any toilet facility. In the low-income areas (particularly in the high-density low-income zones), community toilets are the only recourse.

The Poor Have a Higher Incidence of Death and Disease

Analysis of environmental conditions pointed repeatedly to several areas that have the worst socioenvironmental and socioeconomic conditions. This pattern correlates with the distribution of mortality and illness in Accra as follows:

- *Overall mortality.* The overall death rate in Accra in 1991 was 5.5 per 1,000 population. Rates range from 1.3 per 1,000 in the high-income residential areas to 23.3 per 1,000 in the high-density indigenous zones. Overall, mortality rates in the high-income areas are five times the rates in the high-density indigenous and high-density low-income areas. (Interestingly, although high-density indigenous areas suffer from similar socioenvironmental conditions as do the high-density indigenous and high-density low-income areas, their rates of mortality are lower, particularly from infectious and parasitic disease.)
- *Mortality from infectious and parasitic diseases.* High-density low-income residential areas have the highest rates of mortality from these sources of disease; rates in these areas are five times higher than in the low-density upper-income zones, which have the lowest rates. Certain areas have particularly high rates of mortality from these sources of disease, ranging from 22 to 32 deaths per 10,000 population. The high rates in these areas are consistent with their harsh socioenvironmental conditions.
- *Mortality from respiratory disease.* Differentials in respiratory disease are not as pronounced as for infectious and parasitic disease mortality. The majority of areas have mortality rates of less than 8 per 10,000 population. Some high-density indigenous and high-density

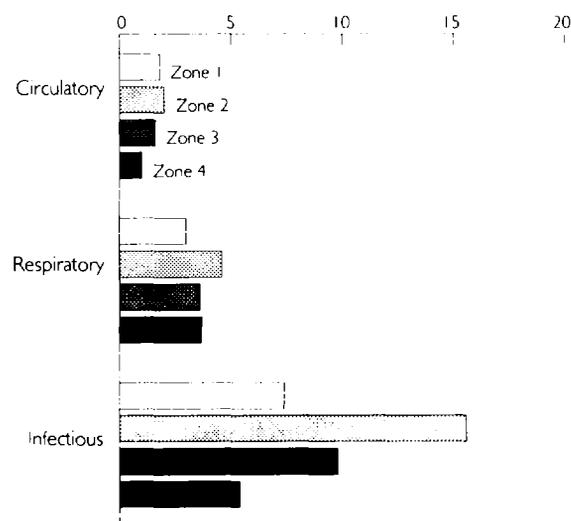
low-income zones have lower rates of respiratory disease than infectious disease, but still have rates that are twice or three times higher than those in the high-income residential areas.

- *Circulatory disease.* The overall rate of mortality from circulatory disease in Accra is 12.2 per 10,000 population. Rates are highest in the high-density indigenous and high-density low-income areas.
- *Cholera.* An outbreak of cholera occurred in June 1993. A special effort was made to map these cases. Many of the recorded cases were clustered in the western half of Accra, especially in the more deprived residential areas of the high-density indigenous and high-density low-income zones—where the quality of the water supply is especially poor. The low-density high-income areas recorded the lowest figures.

Health differentials among age groups also revealed socioeconomic disparities:

- *Age 14 and younger* (figure 1). Infectious and parasitic diseases are the major cause of death among this age group. Children in high-density low-income areas have a three times greater risk of dying from infectious disease than do their wealthier counterparts. Differentials in mortality from respiratory disease among this age group follow a similar, though less pronounced, pattern.

Figure 1. Differentials in cause-specific mortality rates for children 14 years and younger, by zone
(deaths per 10,000)



Source: McGranahan and Songsore 1994.

- *Adults 15 to 44 years of age* (figure 2). Again, infectious and parasitic diseases are the main cause for mortality among this age group. Socioeconomic differentials in mortality from infectious and parasitic diseases follow the same patterns for this age group as they do for children in Accra; the highest rates—8.4 per 10,000 population—are in the high-density low-income zones.
- *Adults 45 years of age and older* (figure 3). Overall rates of mortality for each cause-specific group are high in this age group, but circulatory disease causes the majority of deaths. The highest rates of mortality from both circulatory and respiratory diseases in this age group are found in the high-density low-income zones, but mortality rates from the three diseases in this age group are also high in the medium-density indigenous areas.

Education Is Linked to Standard of Living

Access to formal employment in Accra (and in Ghana generally) is linked closely to educational status. In turn, education, occupation, and type of employment are linked to the standard of living of households in Accra.

According to an analysis by Glewwe and Twum-Baah (1987), 24 percent of heads of households in Accra had no education. Another 6 per-

cent stopped their education at primary school; 49 percent completed middle school; and 19 percent attended high school. Only 5 percent have attended university.

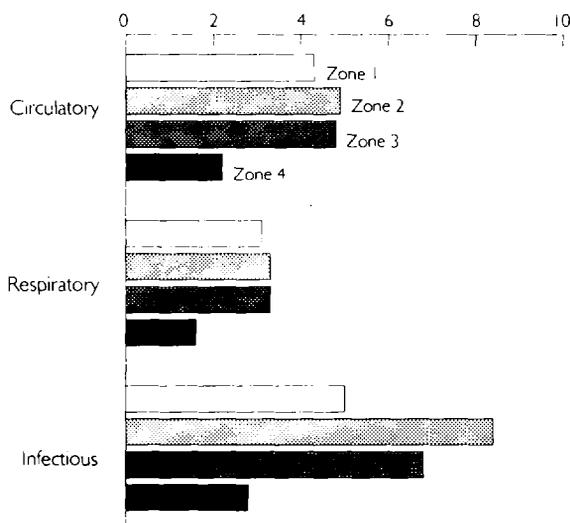
Areas with well-educated populations were also those with better water and sanitation services, and hygiene: the medium-density middle-income, low-density middle-income, and low-density high-income areas of Accra. Those populations with little or no education are found principally in the poorly serviced areas.

Policy Interventions Should Focus on the Poorest Neighborhoods

As the study showed, the high-density indigenous, high-density low-income, and medium-density indigenous areas of Accra are disadvantaged in environmental and socioeconomic terms. These areas are underserved by water and sanitation facilities, and show the highest incidence of disease and ill health in the city. By contrast, the low-density high-income areas are adequately served by water and sanitation infrastructure. The focus of policy interventions, therefore, should be directed to improve conditions in the areas that show the greatest need—the poor areas.

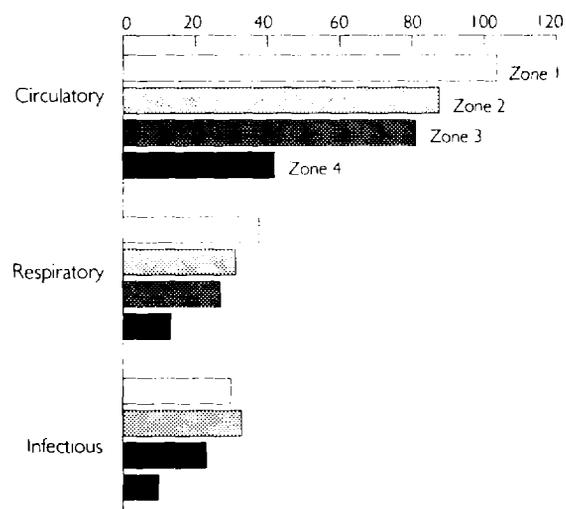
The study also pointed to the complex interactions of poverty, physical environment, and the

Figure 2. Differentials in cause-specific mortality rates for 15- to 44-year-olds, by zone
(deaths per 10,000)



Source: McGranahan and Songsore 1994.

Figure 3. Differentials in cause-specific mortality rates for adults 45 years and older, by zone
(deaths per 10,000)



Source: McGranahan and Songsore 1994.

macroeconomic environment that influence urban health. The results indicate that the health of urban children is not solely determined by disposable household income and household spending patterns, but is influenced by the wider social and physical environment in which the household is located. This synergy among the causal factors affecting the overall health of urban populations challenges the traditionally splintered and sectoral approach of urban manage-

ment, and argues for more comprehensive, inter-sectoral policy interventions.

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São Paulo, Brazil: Urban Differentials in an Industrial City in the Developing World

Marco Akerman and Pedro Jacobi

Despite having the tenth highest GDP in the world, Brazil has not translated its economic growth into an equitable distribution of social benefits, either by region or by income class (World Bank 1990). For example, the top 10 percent of the population controls almost 50 percent of Brazil's wealth; of its population of 157 million inhabitants, 32 million live in what have been called "miserable" conditions, and 20 million work under "precarious" conditions (Cohn 1994).

These countrywide differentials are reflected clearly in the city of São Paulo, where the opulence of many of the residential and business areas in the city contrasts sharply with the squalid conditions found in many of its pockets of urban poverty. Income inequalities abound in the São Paulo metropolitan area, approximately two-thirds of which is urban. The richest 10 percent of this megacity earn 30 percent of its total income, and the poorest 50 percent earn only one-quarter of its total income (Secretaria Municipal de Planejamento [SEMPILA] 1990). The protracted recession of the 1980s—known as the "lost decade"—increased the impoverishment of the population. Average family income dropped from US\$550 in 1977 to US\$290 in 1987. Large disparities exist in health, social, and economic status (Jacobi 1990b). Today, as the "brick and mortar zone" of the São Paulo area reaches distances of 40 kilometers north-south and 80 kilometers east-west, the outskirts of the immediate city have become settlement areas for less privileged, low-income groups that lack basic urban facilities. In contrast, high-income groups live in satisfactory housing and enjoy access to

urban facilities and better standards of health (Jacobi 1990b).

This discussion highlights the urban differentials that exist in the São Paulo metropolitan area, based on two studies. One, sponsored by the Center for Contemporary Cultural Studies (CEDEC) and the Stockholm Environment Institute (as discussed by Dr. McGranahan), sought to document socioenvironmental differentials among households in the city and the way households perceive the problems they face. The other, by the London School of Hygiene and Tropical Medicine and the Fundação Seade, sought to document how these socioenvironmental differentials translate into differentials in mortality patterns between high- and low-income classes.

Breakdowns for the Studies

Respondents for the first study were selected from among all households in the city of São Paulo. These respondents were drawn from 120 census units in 30 districts of the city that were stratified by four indicators of the quality of life—basic sanitation, density of the population, child mortality, and income level. The sample contained 1,000 households, consisting largely of female respondents, in recognition that they and their children are at greatest risk from adverse environmental conditions.

The structured questionnaire focused on a detailed set of conditions in the neighborhood: household-dwelling conditions and purchasing power; inhabitable conditions; sanitation facilities

and personal health care; recognition of household problems associated with water supply and storage, solid waste disposal, and insect and rodent problems; and dwellers' exposure to insecticides and food contamination. In addition, information was sought on the types of actions that householders would consider to be effective moves toward resolving environmental problems in the household and the neighborhood, particularly water supply, sewerage systems, solid waste disposal, air quality, and the presence of insects and rodents. The action was supposed to be evaluated by the dweller on three separate levels: government action, neighborhood action, and individual action.

The main health problems covered were diarrhea and acute respiratory infections among children younger than age six. As part of the survey to evaluate quality of life, physical-chemical and bacteriological tests were performed on the water consumed by the household residents, as were tests to ascertain the level of dampness indoors.

Perceptions about Environmental Conditions

The outcomes of the research indicate not only that socioenvironmental differentials exist between the better- and worse-off in the São Paulo metropolitan area, but also that the socioeconomic indicators of the population that live on the periphery of the city point to particularly precarious conditions. These impacts are linked primarily to their limited or nonexistent access to public services and the added environmental risks from living in poor urban areas.

Perceptions of environmental conditions in São Paulo indicate that the most pressing problems are air pollution, the degradation and pollution of water sources, and the dumping of solid waste in environmentally sensitive areas. Perceptions about the link between pressing environmental issues and the performance of public services indicate also that most dwellers are satisfied with water supply and solid waste collection, but extremely dissatisfied with sewerage systems, which have not reached all regions equally.

Another important conclusion of this component of the research is that households give much more emphasis to aspects that are linked directly to their daily life, stressing the immediate impact of environmental aggravation. Households place

less emphasis on the impact of environmental damage on health, since their perception is that the damage does not have a direct impact on the daily activities of their families.

Probably one of the most striking outcomes is the importance that residents attach to action by the government as the controller, manager, and agent responsible for preventing environmental degradation.

Socioenvironmental and Health Differences

The main objective of this component of the study was to document differentials in urban mortality caused by selected infectious, chronic, and psychosocial diseases, disaggregated by age, gender, and geographic area (Stephens and others 1994). The study adopted the most refined disaggregation possible of the city of São Paulo; environmental, population, and mortality data were compiled on 56 districts and subdistricts, the traditional geographical bases for census data and vital registration. Four socioenvironmental zones were formed in São Paulo, based on a method developed by the United Nations (UNDP 1992), where a human development index is calculated from an average of deprivation values (0 = more; 1 = less) for a range of variables: per capita income, the degree of illiteracy, the percentage of houses linked to a central sewer, average per capita water consumption, and average number of persons per household. The index values for all areas were ranked to form four zones, or quartiles, with an equal number of districts and subdistricts in each zone.

The index revealed that 43.8 percent of São Paulo's population live in the quartile with the worst socioenvironmental conditions (zone 1). They have a low level of education and income, inadequate sewerage, little water per capita, and high housing density. Zone 4 has the best socioenvironmental conditions, but also the smallest proportion of residents—9.2 percent of the city's population.

Both Zones and Age Groups Exhibit Mortality Differentials

The differentials among the zones are striking. Death rates from respiratory disease are 3.8 times

greater in zone 1 than in zone 4 and those from infectious diseases are 4.4 times greater. Diarrhea represents 48 percent of deaths from infectious disease, and pneumonia causes the bulk of respiratory-related deaths at 87 percent. Although they represent only 2.6 percent of all deaths in São Paulo for 1992, these figures are sufficient proof that the "successful city" has not been able to conquer preventable deaths in its vulnerable population groups.

A summary of cause-specific deaths by age group is further evidence of the health status differentials caused by the wide disparity in socioeconomic classes in São Paulo.

Children age 4 and younger. Respiratory disease is the major cause of death in this age group throughout the city. Differentials are fivefold between children of zone 1 and those in zone 4. Mortality rates range from 3.9 (per 10,000) for children living in the best socioenvironmental area (zone 4) to 15.1 per 10,000 for children in the area with the harshest socioenvironmental conditions (zone 1). It is worth noting that mortality rates from infectious and respiratory disease among children living in zone 3 are higher than those among children in zone 2.

Children age 5 to 14 years. Overall, mortality rates among this age group are low. External causes (violent deaths) produce the highest rates of mortality among this age group. Mortality rates from external causes among this age group are almost two times higher in zone 1 than they are in zone 4. Rates of mortality from respiratory disease show a counterintuitive trend: the most socioenvironmentally privileged of this age group (in zone 4) have a mortality rate of 0.79 per 10,000, compared with 0.40 per 10,000 in zone 1.

Working-age adults age 15 to 44 years. External causes (primarily violent deaths) account for the highest rates of mortality among working-age adults. Mortality rates from external causes among this age group are 2.1 times higher in zone 1 than in zone 4. Overall, mortality rates from circulatory disease are lower than those from external causes. Still, deaths from circulatory disease among this age group are 1.7 times higher in zone 1 than in zone 4.

The study found an "epidemic of violence" in São Paulo that disproportionately affects the poor in this age group. In 1992 there were 3,759

deaths due to homicide among working-age adults, a rate of 4 per 10,000. If only males 15 to 24 years of age are considered, the rate shoots up to 19.5 per 10,000, just below the U.S. rate of 22, the highest rate among this age group of males of all industrial countries (Cohen and Swift 1993). These figures illustrate the difficulty of resolving the problem given the traditional tools available in the health sector. Only a concerted effort by the various municipal, state, and national agencies can tackle this disturbing scenario effectively.

Adults age 45 to 64 years. The 45- to 64-year-old group provides some interesting evidence. Premature deaths by traffic accidents, cerebrovascular disease, and hypertension present important excesses between the zones among this age group. It is commonly said that high rates of disease of the circulatory system indicate transition from diseases of poverty to diseases of affluence. The data from São Paulo show a different pattern, where zones 1 and 2—those with the worst socioenvironmental conditions—showed higher rates than in zones 3 and 4. The study was not able to draw any inferences related to individuals, but this finding should be pursued in further research. Interestingly, the 65+ age group does not present a big potential for change between the zones. It appears that the elderly die at similar rates in whichever zone they reside.

Circulatory disease causes the highest mortality rates among this age group. Differentials between zones persist for older adults, and rates vary from 26.5 in zone 4 to 46.1 in zone 1, with a steady gradient between the zones. While mortality from external causes is lower among 45- to 64-year-olds than among working-age adults, it is notable that differentials still persist and show a consistently worse profile for residents of zone 1 than for residents in wealthier areas.

Adults age 65 years and older. Circulatory disease is the major cause of death among this age group, followed by respiratory disease. Only in the 65-and-older age category do patterns of mortality cease to show consistent or substantial differences between zones. Mortality rates from infectious disease are the only cause-specific group in which patterns follow the consistent trend of differentials between the most and the least deprived zones.

Improving Socioenvironmental Measures and Health Interventions

São Paulo is one of the success stories of the developing world. It has been able to produce the most profitable financial market in Latin America, tied to an efficient industrial district. But the study suggests that its economic strength has not been distributed proportionately: 59 percent of São Paulo inhabitants (5,664,000 people) still live in inadequate dwellings (Jacobi 1990a), and approximately 16 percent of its residents (1,536,000 people) do not have access to sewerage facilities (Companhia de Saneamento Básico do Estado de São Paulo [SABESP], internal files, 1993). In a city supposed to need a skillful blue-collar workforce to maintain sound industrial output and an efficient army of white-collar workers, 33 percent of its residents (3,168,000 people) are still illiterate, with incomplete primary schooling (SEMPLA 1992). Although the majority of households have access to water, large variations in per capita consumption exist among socioeconomic zones.

Improving the Data

We suggest that the variables used to calculate the composite index with the existing data may represent a conservative measure of deprivation, since they were chosen according to the indicator "mortality," rather than according to variables that indicate standards of "inequality." We suggest that such variables as "unemployment" or "per capita square meters built" would provide more effective measures. In addition, new indicators should be explored in order to characterize the precarious type of housing in São Paulo known as *cortiços*. The traditional housing indicators, such as water use, sewerage facilities, and the number of people per house, have not been able to define areas that have a greater concentration of *cortiços*. It is also urgent that different administrative databases in São Paulo be consolidated; currently, the databases often pertain to different geographical areas and disparate objectives.

Linking Perceptions with Technical Expertise

Public involvement should be broadened by enhancing the awareness of citizens in interventions, and exploiting the potential of households to contribute to protecting, maintaining, and controlling their local environment. The challenge is to capture the intimate familiarity of households with their environment and transform it into a policy process that includes both the needs of the community and the capacity of technical expertise.

Doing so will necessitate crossing socio-institutional boundaries that have historically perpetuated biased interpretations of people's understanding of problems. As such, motivation and legitimacy must be created by government agencies to enhance the already existing awareness of different social groups, articulating joint activities by the different actors who have a stake in the prevailing environmental issues.

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Jakarta: Environmental Problems at the Household Level

Charles Surjadi and Gordon McGranahan

Jakarta is the capital of Indonesia, the fourth most populous nation in the world. At the time of 1990 census Jakarta had a population of 8.2 million inhabitants in its area of 656 square kilometers—and the population has continued to grow since then. Jakarta is not only by far the largest city in Indonesia, it is also the most diverse. Compared with most Indonesian cities, residents of Jakarta come from a wider range of sociocultural backgrounds and live in a wider range of economic circumstances. Moreover, the city is continually growing and developing, both economically and demographically.

Jakarta's contrasts and rapid changes pose several problems for environmental management. The ambient air and water resources are severely degraded (Biro KLH 1994). The city is undoubtedly straining environmental limits. However, this discussion does not focus on the classic megacity problems, but on the more intimate problems that arise in and around people's homes, many of which are probably equally severe in Indonesia's many other large cities. These problems have a long history and are far from being resolved. Moreover, these problems are intimately linked to poverty and health and are thus particularly relevant to the topic of this session.

This discussion highlights the results of a study on household environmental problems in Jakarta and their impact on health. As Dr. McGranahan has discussed, the study was funded by the Stockholm Environment Institute as part of a broader study that also focused on Accra and São Paulo; the Jakarta component was fielded by the Urban Health Study Group (KSKP),

Medical Faculty of the University of Atma Jaya, in cooperation with the Urban and Environment Study Office (KPPL), DKI Region, Jakarta.

As in the studies in Accra and São Paulo, the study consisted of two components. One is a study of socioenvironmental conditions that affect households in Jakarta—water, sanitation, pests, and indoor air pollution. In Jakarta, however, their impacts on health were assessed largely according to their effect on respiratory disease, given the severe environmental impacts of poor indoor air quality on women and children in Jakarta—from cooking fuels, cooking practices, ventilation work, living space density, smoking habits, and general exposure to ambient air pollution.

The economic status of the population was measured by the amount of consumer durables in the household, broken down by quintiles of income—with "A" representing the very poorest 20 percent of the population, "B" the less poor, and so forth.

The Poor Face the Most Severe Socioenvironmental Conditions

The same pattern emerged in all areas of socio-environmental indicators. Poor households are less likely to have piped-water connections, even when the groundwater is salinated. Poor households are also more likely to share toilets, which are generally in deteriorating condition. Poor households are more likely to use smoky fuels, such as firewood; more likely to cook in poorly ventilated, multipurpose rooms; and more likely

to use mosquito coils to control this insidious pest (discussed later in depth). Poor households are also less likely to have waste collected from their homes, and they are more likely to have flies in their food-handling areas. Overall, environmental conditions improve dramatically as one moves from the poorest to the wealthier districts of Jakarta.

*Water: The Wealthy Have Choices,
the Poor Do Not*

The government piped-drinking-water supply system (PAM) serves a small portion of respondents directly. Only 18 percent of respondents have piped-water connections in their homes. Another 22 percent must buy drinking water from vendors, and 4 percent get water from public hydrants, implying that 44 percent of households obtain water at least indirectly from the PAM system. (Public hydrants are constructed by the government, but operated by private managers, who sell the water to vendors and consumers.) Despite Jakarta's size and density, about 51 percent use water from wells. About 5 percent use other sources of drinking water, including bottled water.

The primary difference in the drinking-water source for poor and wealthy households is that the poor often use vendors or public hydrants and rarely have household connections; the opposite is true among wealthier households. Yet a large percentage in all quintiles use well water.

Some 40 percent of the sample live in areas of Jakarta where the groundwater is salinated. For wealthier households the presence of salinated groundwater generally means that they have a piped-water connection, rather than a well; for poor households it typically means that they must buy drinking water from a vendor, but must continue to use well water for other purposes.

As with many other environmental problems, the tendency of the poor to rely more heavily on natural systems because they have difficulty in accessing manmade systems means that the burden of environmental degradation falls far more heavily on them. Thus, in unsalinated groundwater areas, the poor pay less on average for their drinking water than the wealthy, who sometimes pay for piped water. However, in the salinated groundwater areas, the poor pay far more, because they must buy water from vendors, who

charge about 10 times the utility tariff (Surjadi and others 1994).

Indicators of fecal contamination in the water suggest that, while well water tends to be contaminated, the piped water may, ironically, be even more contaminated. Supply interruptions are also common. Households with piped-water connections are only slightly less likely than well water users to report day-long interruptions of water supply. The group noticeably less likely to face interruptions are the households who purchase water from vendors. In this example, the wealthier households of Jakarta find it difficult to buy environmental improvement.

Sanitation Facilities Show Large Disparities

The differences in sanitation facilities across the socioenvironmental quintiles are more striking than those for water sources, in part because the area of Jakarta in which a household is located is less critical. Of 212 respondents who do not have a private bathroom in their home (20 percent of all respondents), 101 are from the poorest quintile. Thus, almost half of the households in the poorest quintile do not have a toilet in their home. Alternatively, almost all (97 percent) of the households in the wealthiest quintile have septic tanks or aqua privies.

Among the households that do have a toilet, 86 share it with other households. Shared toilets are much more likely to have flies present, are more likely to be surrounded by dirty floors, and are less likely to have soap available. While the presence of soap also depends on wealth, soap was much more likely to be available even among the lowest quintile if the toilet was not shared.

The households that do not have a toilet in their home either share another family's private toilet or use a public toilet. Generally, shared toilets, including public toilets, are far more common among poor households. This prevalence reflects a phenomenon that is found in several other environmental problems areas—that is, many of the "household" environmental problems of the poor are community problems.

Almost two-thirds of the households have their solid waste collected from the vicinity of their homes. Most of the remainder (27 percent) dump their waste at nearby sites. Household waste is rarely composted (only by 2 percent of

the households), but about 18 percent of households burn at least part of their waste. Not surprisingly, the wealthy are more likely to have their waste collected from their home, and the poor are more likely to dump their waste away from home. As with sanitary facilities, the fact that poor households are more likely to have neighborhood rather than household services creates a greater need for collective local environmental management.

The most interesting and perhaps informative phenomenon of solid waste disposal is the prevalence of waste pickers (*pemulung*) and peddlers in the solid waste collection system in Jakarta. About half of all households in all but the highest wealth quintile sell materials to junk peddlers. Especially in the upper wealth quintile, where the servants rather than the householders sell the materials, there is likely to be some underreporting. The prevalence of waste picking is more clearly related to wealth, ranging from one-third of households in the poorest quintile to more than two-thirds in the wealthiest. The tendency for pickers to target wealthy households is often ascribed to the value of materials in their waste. While this is likely to be part of the explanation, it should also be noted that poorer households tend not to store their waste outside their homes. Of the households in the poorest quintile that store their waste outside, about 70 percent have pickers go through their waste.

The importance of informal sector waste recyclers reflects another common feature of environmental management in low-income cities and communities (Furedy 1990). Informal sector actors often work alongside of, though not always in cooperation with, the formal sector. A successful strategy for waste collection and recycling in Jakarta must account for these pickers and peddlers, just as strategies for improving water supply to the poor must account for water vendors. In the right circumstances they can be important partners in environmental management. But it should also be noted that the work can be degrading and hazardous and has the potential of creating conflicts between the sectors if not managed properly.

The Poor Suffer More from Disease-Bearing Pests

Rats, flies, cockroaches, and mosquitos are another collective environmental problem. They

spread many diseases. In Jakarta, the *Anopheles* mosquito is now confined to areas offshore, but the *Aedes aegypti*, a day-biting mosquito, can transmit dengue hemorrhagic fever, which has become a pervasive health concern in recent years. The *Culex fatigans* mosquito attacks at night, also spreading disease. Flies and cockroaches are mechanical carriers of fecal oral disease, and rats create a variety of health risks.

As with all environmental problems discussed here, the poor tend to be affected more heavily than the wealthy. There are significant wealth-related differences in the prevalence of rats and of all insects except cockroaches. The prevalence of all these pests also varies according to areas of the city, with Central Jakarta having considerably lower levels of most pests (Surjadi and others 1994).

And as with other environmental problems, insects and rats are collective problems, especially in low-income areas. Where crowding is high, it is not possible for a household to address its insect and rat problems independently from neighboring households. Unfortunately, individual households tend to try to take measures to protect their members from being bitten, rather than attempting the more effective and comprehensive measure of eliminating breeding sites.

Respiratory Diseases Hit Poor Women and Children Hardest

The three most prevalent sources of indoor air pollution in Jakarta are cooking stoves, indoor smoking, and coils used to control mosquitos, all of which are more prevalent in poorer households, with appreciable improvements occurring between the fourth and fifth quintiles of income. Overall, 83 percent of households use kerosene, 16 percent use liquefied petroleum gas (LPG), 2 percent use firewood, and 0.2 percent use charcoal or electricity. LPG, a comparatively clean fuel, is used by more than half of the households in the wealthiest quintile, but by less than 1 percent of households in the three poorest quintiles combined. While indoor smoking is common in Jakarta, it is appreciably less common among households in the wealthiest quintile.

Women and children spend more time at home than do men. Whereas 40 percent of men are away from home at least nine hours on a

normal working day, the same percentages for women and children are 10 and 20 percent, respectively. This already suggests that they are more likely to be affected by household environmental problems. The risks for women are heightened by the activities they pursue. For example, while only 2 percent of adult men play any role in cooking, 72 percent of adult women at least assist in cooking.

This environmental problem of indoor air pollution is perhaps of greatest concern in Jakarta, given its high rate of respiratory problems, especially among the poor. For the study on respiratory disease and distress, women were asked whether they or their children under six years of age had suffered from sore throat, hoarseness, dry cough, wet cough, or hemoptysis (bloody cough) in the two weeks prior to the interview. The study sought to link respiratory distress with the household environment, covering such factors as cooking fuel, cooking practices, crowding, humidity, and other household characteristics, such as cigarette smoke, exposure to ambient air pollution, occupation, socioeconomic status, and migratory history (see Stephens and Harpham 1991).

Among the 1,055 women interviewed, 25.7 percent had suffered from respiratory distress or disease. Five variables, in particular, were significantly related to the occurrence of a respiratory disease:

1. Use of a "smokier" primary cooking fuel
2. Absence of ventilation in the cooking area
3. Prevalence of dampness in the house
4. Use of a mosquito coil
5. Low income.

In all cases the greater the wealth, the less likely the environmental risk factor was present.

Only about half of the households in the study had children younger than age six. The only three factors found to be statistically associated with respiratory disease among children were living in a damp house, the presence of solid waste problems in the neighborhood, and living with a principal homemaker who herself has respiratory problems. Children who lived in a household with a solid waste problem near the house were found to be 1.7 times more at risk of respiratory problems than children who did not. The importance of the respiratory problems of the homemaker suggest that at least some of the other risk

factors are likely to be the same for children as for women. But it should not of course be assumed that the children catch the disease from their mothers; rather, it is simply the environmental problems that are the cause.

The Future: Improving Water Is a Must

The results of this study have important implications for policy at several different levels. First, they indicate some priorities for improvement, viewed from the perspective of existing physical conditions, identified health problems, the concerns expressed by the respondents, or some combination of these. The primary concern expressed by the respondents was for better water, and physical tests performed as part of the study confirm the severity of the water quality problem. However, perhaps because virtually all households boil their drinking water (for tea), there is little evidence that the potential risks of poor-quality water are actually realized, suggesting that a user-driven approach to improving water quality would be most appropriate. Yet from a health perspective, the results do identify some previously ignored potential health risks, such as the use of mosquito coils. For such problems, studying and disseminating information on the risks must itself be a central part of any improvement effort. More generally, collecting and analyzing information of the type presented in this discussion is clearly an important part of any attempt to develop an effective strategy for environmental improvement.

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Why Are Studies of Intra-Urban Differentials in Health and Environmental Conditions Significant?

Wilfried Kreisel

Motivation for studying intraurban differentials in health status is manifest in the heartbreaking statistics that come routinely from many countries of the developing world. Recently, a panel from the World Health Organization (WHO) Commission on Health and Environment, examining urban health issues, reported several comparisons between rich and poor areas within cities of the developing world. Just three of its findings alone would be enough justification for these studies:

- In Guatemala, Haiti, and Pakistan infant mortality rates are much higher in poor urban areas than in wealthier areas.
- In Panama diarrheal diseases are much higher in poor urban areas.
- In the Philippines malnutrition and tuberculosis rates are much higher in poor urban areas.

The Studies Shatter Myths

Policymakers armed with health research results often labor under five myths as they seek strategies to address the health problems of the poor.

Myth 1: Health status is related primarily to activities undertaken by the health sector and the health professions.

The WHO studies show clearly that conditions in the social and physical environment are the most important determinants of health status, and that the efforts of the health sector alone will not be enough to address the health problems of poor urban residents. The studies also provide convincing evidence to

support this contention—evidence that even policymakers and managers without epidemiological training can readily understand.

Myth 2: Nothing can be done to correct the health problems of the urban poor, and prevention is of limited use.

Studies of intraurban health differentials indicate that huge gains in health status can be made by promoting socioeconomic development and improving living standards and conditions. Such studies demonstrate that the shortcomings of local governments in providing such basic services as water, sanitation, and education are at least partly responsible for health problems—but they also demonstrate that these shortcomings can be overcome.

Myth 3: Wealthy communities are not interested in the conditions of the poor.

The amount of publicity and promotion generated by these studies in the newspapers and other media dispel this myth. While it is naive to suppose that simple information alone can lead to reform in local government and elsewhere, public scrutiny of results like these creates space and opportunities for reformers to operate.

Myth 4: Poor people lack services because they cannot pay for them.

Many of these studies show that poor persons do pay—that they in fact pay relatively more for

water than the wealthy, and that they may be paying considerable sums for private medical services.

Myth 5: Poor people must participate more actively in the provision of basic environmental and health services.

The studies indicate that the urban poor currently are shouldering great and sometimes total responsibility for their basic health, welfare, and employment needs. The concept of collective welfare provision is little more than a pipe dream. In many cases, local governments are simply not providing effective means of support for these efforts.

The Studies Provide a Strong Foundation for Intersectoral Work

Environmental health work has long sought to ensure that health and environmental issues are addressed as part of municipal and national development plans by many key development sectors—housing, transport, industry, agriculture, and local government. This function is often termed “intersectoral collaboration” or “integrated development.”

Although intersectoral collaboration in health issues has been an essential part of WHO’s primary health care policy—especially since the International Conference on Primary Health Care, Alma-Ata, Kazakhstan, 1978—WHO’s Chapter 6 of the Agenda 21 report to the United Nations Commission on Sustainable Development in 1994 indicated that developmental planning in key sectors of many countries frequently does not address health issues. One of the reasons is the persistence of myths, as well as a misunderstanding of the nature of health, sometimes by people within the health sector itself.

But another reason is that, in blaming the housing sector, or the industry sector, or local government for ignoring health considerations in their work, we may be overlooking a serious problem within the health sector itself—that is, the absence of capacity to undertake studies of the health impacts of developmental activities. Until the health sector develops this capacity, its ability to participate in sustainable development planning or intersectoral work may be limited.

But researchers must concentrate not only on the impacts of development on health, but also on the *health opportunities* created by development programs.

How the Health Sector Can Contribute to Intersectoral Work

Intersectoral work on health and the environment starts by measuring and drawing attention to health impacts and health opportunities, based on rigorously developed health and epidemiological statistics. In most countries the Ministry of Health has responsibility for developing these statistics, with important contributions often coming from universities. But their role is limited by the lack of capacity to:

- Monitor health status *in relation to* environmental conditions and indicators
- Integrate analyses of the entire range of impacts on health status by development activities in all relevant sectors
- Develop health policies and participate in health-related measures and health promotion in developmental planning, and in relation to activities in other sectors that affect health.

Beyond attracting staff who offer expertise in epidemiological and policy analysis, the health sector must undertake two new fundamental functions.

- *Information gathering.* Measuring and monitoring health status and the contribution of various environmental factors to health problems, followed by analysis of health requirements and of those opportunities in various developmental sectors that can contribute health opportunities.
- *Policy and advocacy.* Formulating sector-specific health policies for each developmental sector (urban, rural, labor, industry, education, agriculture, and local government) and advocating them at the legislative and administrative levels.

A Health Sector Communications Strategy

The health sector needs a strategy for communicating with decisionmakers, convincing them that the issues are significant for future action. A communications strategy has six major components:

- *Understanding who is actually or potentially involved in taking action on the findings.* Relevant actors in the health and environment arenas in cities include various municipal and government agencies, individuals from community groups, university and training institutions, and private sector companies.
- *Addressing incorrect or misguided attitudes and perceptions among decisionmakers.* For example, in one city, a well-executed study showed poor health in low-income areas due in part to the absence of municipal services for these areas. When the researchers discussed this finding with the authorities, they discovered that the authorities were aware of the health problems and the lack of services, but had not acted on the problem because they thought the people in these areas were lazy and did not deserve their attention. The attitude toward poor people was the foundation of the problem, and not, as the researchers had assumed, a lack of knowledge, technical ability, or resources.
- *Tackling the perception that “nothing can be done.”* Consideration must be given to the possible range of actions by decisionmakers in responding to the results. How can change be obtained incrementally? What is the first step? What are the specific causal factors or environmental determinants over which the decisionmaker has some control, and can influence the commitment of resources?
- *Offering quantitative analysis.* Specifying the individual factors and related actions to address them will facilitate risk-based assessments of problems and influential factors. It will also give decisionmakers themselves an opportunity to use science-based analysis as a basis for debating with colleagues on municipal government issues.
- *Reaching the decisionmakers.* Such techniques as personal interviews with decisionmakers, city consultations, study tours, and the recruitment of local communication experts—all can be used to develop and coordinate options at the policymaking level.
- *Identifying the possible motivations of decisionmakers.* Difficult and politically risky decisions must be made sometimes by policymakers in devoting attention to the problems of low-income areas. Decisionmakers must have the necessary altruistic support to motivate them to make these changes.

Translating Information into Action

While gathering and communicating information on health differentials is an important first step, there are three mechanisms by which information can fuel policymaking.

- *Stakeholder participation.* The basis of decision-making should be widened to allow input from community organizations, nongovernmental organizations, the private sector—all those affected by urban service decisions. A “city consultation” to air and discuss issues would allow all sides to be heard.
- *“Enlightened self-interest.”* The spillover effects of health problems should be emphasized to encourage a citywide effort to reduce health risks.
- *Education.* Monitoring data should be used to inform all segments of society, and to make them aware of their actions and of what they can do to improve and protect the environment.

Discussant Remarks

Kamla Chowdhry

Health, poverty, and environment are closely linked and fit into a nation's overall policy of development. We must understand and clarify the paradigm of development in each of our countries in order to integrate the health sector into it, and then the environmental sector, and so forth. We know that the paradigm of development—which in the past 30 to 40 years has largely meant economic growth and resource efficiency—has been shifting in the past 4 or 5 years toward quality-of-life considerations.

At the heart of many of the presentations here is the fundamental question: Why are urban slums growing so fast? The experience of India points to two major reasons usually neglected in our discussion.

The first pertains to the ecological refugees that are coming to our urban areas. Agricultural soils are becoming degraded, deforestation is occurring, and poor mining practices are being pursued; the refugees that are created by some of these environmental practices drive people who are living on the margin of existence to seek their livelihood elsewhere. And those within 100, 150, or 200 miles of the city converge on New Delhi or on other urban centers for survival.

The second reason, not mentioned in many of our discussions, is that the rural poor bear a heavy weight of fear in the systems in which they live. They fear the moneylender, because of their enormous debt. They fear the revenue officer, who controls their land records and can throw them off the land at will. They fear the police officer, the forester, the landlord, and so on. And this tremendous fear—compounded by an inadequate legal,

management, or bureaucratic system and by the absence of any other type of support to enable them to continue living in the communities in which they have their roots—drives many of these very poor people to migrate to places where they have less fear of government systems.

No matter how bad urban conditions are in India—the poverty and the lack of adequate facilities—the conditions of rural poverty are far worse. And that brings me to another important point—that rural India and urban India for the poor are in fact two very different countries.

Within the urban context it is important to understand the priorities of the poor. We, at the Public Affairs Center in Bangalore, carried out a study of municipal services in three Indian cities, and we found that what slum dwellers really wanted was adequate sanitation. Their sense of satisfaction with access to health care facilities and the level of health care services that they received was far higher than I would have expected. Furthermore, slum dwellers went in groups to the municipality to air their grievances and complaints—going singly was fearsome! It is also important to note that the city dwellers were highly unsatisfied with the urban bureaucracy involved in metropolitan management; they felt it was too slow, too cumbersome, too corrupt to deal with their problems. It is imperative to redesign the management structures for urban areas to respond quickly and effectively to the needs of residents; public-private partnerships are one means of doing so.

The growth of Indian cities seems to be moving toward a Westernized model. Certainly, in

terms of health and health care facilities, the struggle toward a Westernized model is evident. In rural areas, however, 2,000 years of history and culture seem alive. And thus the growth and search for identity in rural areas is different.

We also know that, despite the considerable investment and political intervention in urban areas in the past 40 to 50 years, the quality of life in rural areas is better than in urban areas if the risks of economic marginalization and the fears, as I mentioned earlier, can be tolerated or coped with. As the philosopher Bergson said, "We think with a part of our past but we desire and want and act with the totality of our past." In our rural India it is really the totality of the past that

influences people; whereas in urban India it is the Westernized intellectual life that really finds its expression.

And so modern Indians—and this may be true of the populations of other developing countries—do not feel really at home in either rural India or urban India. They are partly Westernized and partly Indian, and their ability to lead a mass movement and carry political conviction to the larger masses of poor people is thus not very strong. As such, leadership to change the system politically, socially, and intellectually will have to come from people who have their roots in the social, economic, and cultural ethos of their societies.

Floor Discussion

Rapporteur observations (Mr. Grootaert): I have two brief observations. When we talk about the nexus of health, poverty, and environment, it is poverty that should come first, particularly in view of action. The cases presented here were all cross-sectional studies based on household surveys at one particular point in time. However, there is growing evidence that when the economic conditions in a country deteriorate at the macroeconomic level over time, health and environmental conditions tend to deteriorate as well.

The important point is that these conditions do not deteriorate to the same degree for everyone, but they do deteriorate rapidly and deeply for the poor. We need to be concerned not only with the current distribution as it is observed now, but also with the trends that occur as macroeconomic conditions accelerate.

This adds a layer of complexity to an already complex nexus, and we may not wish to deal with that immediately. But on the positive side, it also gives us a whole new array of policy instruments with which we can address the problem. For example, it is now relatively well accepted that economic growth is not necessarily a propoor process. What matters is the type of growth: growth that utilizes a great deal of labor, which is the poor's most abundant asset, tends to be much more propoor. I would argue that this type of growth would also be prohealth and proenvironment.

My second point is the issue of the convergence between personal and social priorities. Participation and the role of local communities dominate discussions of development issues today. From my experience, this must be

approached with care. I have noted that in very poor areas where most amenities are lacking—where there is no water, no sanitation, no electricity—residents will often choose electricity, over water or any other health service, as their first priority. Surely one could make the case that, from a purely social point of view, the benefits for the community at large might be greater by improving health and sanitation rather than by providing electricity.

This issue, wherein the priorities of the beneficiaries do not correspond to those that are perceived to be social priorities, has emerged a number of times in projects proposed for poor areas and is an issue that clearly needs to be raised and resolved at the outset, perhaps also in the health and environment areas.

Rapporteur observations (Mr. Boostrom): I would suggest some trends that I see in these fields, since the presentations drew on several fields. The analysis and data presented here seem to be moving from filling in the gaps in the data, to converting that data into useful information. The WHO presentation showed clearly the need for communication based on this newly available data.

Another tendency is the move from single variable analyses to multivariate analyses that try to look at factors from several fields at the same time. During the break there was some discussion about setting standards and whether universal standards exist for water, sanitation, immunization, and so forth. It seems to me that there is no "one size fits all," that each situation demands a

reevaluation of the standards according to the priorities in each community, in order to ensure that we are not developing unsuitable policies.

Finally, there is a trend from analysis to synthesis, which is clearly needed. We, both as people and scientists, tend to tear things apart into sectorial perspectives; now we need to reconstruct things based on the findings in these various sectors and to come to a synthesizing view of the problems. This is the basis for prioritization.

The final step is to move from opportunities to coordinated, concerted action with the community.

Audience observation: Mr. Grootaert said that one of the issues that we face in the nexus of health, poverty, and environment is the question of the convergence or divergence between individual and social priorities. It is very important when we are doing cross-sectional studies that we phrase questions carefully. If we ask focused questions, we will get focused answers: asking communities questions about their health and environmental priorities will generate different answers than asking them questions about socioeconomic problems.

For example, USAID recently sponsored a focus group study among women in an urban area of Quito, Ecuador. The focus group was not asked the broader question of their major socioeconomic concerns, but rather questions that focused on concerns in the arena of health and environment. One of the major concerns raised was food hygiene. Others were, more typically, water supply and sanitation problems. But the nature of the question is very important when we do cross-sectional studies.

Audience observation: Following on the point made earlier, there is a case to be made for giving a community electricity, if that is what it wants. Also, we should note that various studies have shown that the health impact of water depends heavily on how it is used by the community. If a user puts clean water into a dirty bucket, the health benefits are lost.

Question 1: The session today has clearly made the connections between poverty and health, and poverty and environment, and environment and health. We have plenty of documentation also on the connections between the macroeconomic

policies that have been widely forced on developing countries, and health status, in addition to the way these policies have polarized societies and exacerbated poverty. There are several responses to this situation: decentralization, compensatory funds, cost recovery, and so forth. Is there any evidence that these solutions work?

Dr. Stephens: I don't think that we have substantial evidence that would either substantiate or discredit current policies. The work on urban poverty done by Caroline Moser at the World Bank suggests that there is an increasing level of vulnerability among the urban poor that would, if it increases their vulnerability to debt and environmental problems, exacerbate their health conditions. It would also seem logical that if we increase the polarization between groups, either within urban areas or generally within countries, then we will increase the problems related to polarization of communities that were mentioned by Secretary Cisneros.

Audience observation: I am from the World Health Organization, and although we certainly consider the links between macroeconomic policies and health status, I don't know of any accepted standard methodologies for doing this. At WHO, we are interested in trying to determine indicators for health and environment, and in particular, the relationship between the two. We are considering aspects of infrastructure, the physical environment, epidemiology. It is a problem we are currently struggling with—the field is still very much undefined and will demand more work far into the future.

Chairperson Harpham: Longitudinal prospective studies are notoriously expensive, though such research is necessary.

Question 2: In today's discussions we did not quite address the problems of urban poverty. We took it as an axiom that the poor are the ones who need improvements in hygiene and health, and therefore a clean environment. We did not address the problems of urban poverty as being quite different from those of rural poverty.

I would suggest that there is a vested interest in creating urban poverty, because governments can then bid for larger development projects or

attract multinational companies with the low urban wage rates. Governments can also gain votes from the poor by making any small improvement in their lot. There is clearly a sociopolitical dimension to the issue.

Dr. Surjadi: We must be careful in what we define as urban poverty, because it is related to overall poverty. In my study, for example, some poor areas in Jakarta, slum areas, are different from other poor areas in the country. In fact, many of the urban poor send half their income back to their rural villages. So the distinction can become blurred.

Dr. Stephens: We do not mean to imply that urban poverty is simply related to hygiene and sanitation. Certainly urban poverty is at the heart of the environmental debate, and we need to bring issues of inequity to the heart of the environmental debate as well. However, this is complicated by the fact that we are not yet at the stage where many people recognize the importance of equity issues in this debate.

Audience observation: I would like to add to the presentation on Jakarta. I have also worked with World Bank experts, and our ministry is a recipient of World Bank assistance.

The case of Jakarta would seem to be an example of the World Bank intervening too much in national policy and not paying attention to the specific instrument needed to enrich our environment and the quality of life in Jakarta. Before World Bank intervention in Jakarta, conditions were better. The Bank has introduced a citywide water-piping system that was unfamiliar to our community and required some skills that Indonesians did not have at the time. But later, the Bank took on a more "human face," and dealt with issues of empowerment. The Bank's approach to the urban poor has changed also: it went from city-wide programs to those focusing on neighborhoods, in recognition of intraurban differentials.

Question 4: I am from the Embassy of Swaziland. Why is it we are talking about urban development? In Africa many rural people go to the cities to find work, to earn money to send home to their villages. These people are only in the city temporarily.

The focus on urban development creates a dilemma for these workers. They would prefer to

develop their rural villages, but the focus is on developing the city, their *second* home. They have no interest in investing in the city, but if they do not buy property there, they must live in slums. The government then tries to develop the slum, and the slum dwellers are forced to move elsewhere. What do you do in such a situation?

Mr. Surjadi: When we talk about urban poor, we can differentiate several types. Rural-to-urban migrants still have connections to the rural area. In Jakarta, and perhaps elsewhere, 20 to 30 percent of the urban poor are of this type. But there are those urban poor, who may have started out as immigrants, that stay in the city for many years without ever really settling into the city. Such immigrants do not have identification cards. They live in slums because they are so poor and because they do not want to invest in the city. These people actually need opportunity and more participation. Even if they do not want to settle in the city, participation will give them the means to improve their lot.

In Jakarta especially, but also all over Indonesia, we are trying to encourage community participation. For example, in the area of housing, we have successfully built the type of housing that fits the culture of the community. Land is very expensive in the city, so we have had to set up multistory housing. The government worked with the people and with a university and came up with a type of housing that community residents wanted to live in.

Mr. Doe: In African cities we have our roots back in the rural areas. It is expected that people who go to work in the city will invest in their native village. But this applies mostly to rich people. Those who do not earn so much in the city do not want to go home again, and they continue to live as urban poor.

Those who remain in the city often face the issue of gentrification: for every slum condition that we improve, there will always be a small percentage that will be pushed out because they cannot afford the new level of service provision. On the other hand, we cannot ignore the slums and not improve them.

Audience observation: The question as to whether Africans prefer to keep rural ties, or

whether they want to be given all the opportunities of the urban environment, remains unanswered. Currently, the Government of South Africa is trying to provide low-cost loans to make housing accessible to everybody, even though many people do not want houses in the city over the long term. The indications are that people are moving into squatter areas to get away from the debts caused by attempting to own a home beyond their means. We need to be aware that, although a Western-style solid brick home may be desirable—and may seem the ideal from a health and environmental point of view—it may not necessarily be the answer. Urban residents may actually dream of owning a small farm in their native rural area.

Chairperson Harpham: There is some evidence in the Indian slum improvement projects that when land tenure for squatter dwellings was given to the woman instead of the man of the household there was less tendency for the property and land to be sold.

Question 5 (Dr. Akerman): I would like to raise the issue of urban violence and the way it affects the urban environment. Do we deal with crime as part of the health agenda, the environmental agenda, the economic agenda, or the public security agenda?

Audience observation: South Africa's statistics for violence put it at the top of the list; our murder rates are the highest in the world. This does relate to the environment, and we are currently running studies to find community-based interventions that will deal with violence. These interventions range across the different sectors and involve schemes to create jobs, efforts to bring gangs together to solve community problems, and so forth. In the latter, gangs that are seen as a threat to the community are being mobilized to recognize the community as the place where they live and work in order to integrate them and give them a stake in the community. This scheme is beginning to work in parts of Soweto.

Another environmental aspect is the spatial arrangement of settlements. In many parts of the world public housing consists of regimented rows of houses, which may not be the answer. There is a certain haphazard arrangement in

informal settlements that appears to work. The social interactions between people in informal settlements are sometimes better than in our formal urban settlements. Therefore, we may need to reexamine the spatial arrangement of housing as one way to improve interpersonal relationships and reduce violence.

Audience observation: As a citizen of the United States I strongly favor trying to get at some of the root causes of violence, such as the problems of drugs and unemployment. However, a common attitude in this country is just to lock up criminals. That seems to be the popular approach being tried by the new governor of Virginia. And President Clinton proposed the "three strike" legislation, that is, after three felony convictions a person is sent to jail for life. Clinton did include some measures to try to deal with the root causes of crime, such as helping youths find a place to play basketball in the evening, but he was criticized for it.

Question 6: We have seen the importance of maps in locating pockets of poverty in cities. It would be illustrative if the income-based maps had an overlay of hazardous wastes, of dumps, of noxious materials, of polluted water, of freeways, of superhighways going over the tops of houses, of the many kinds of facilities in urban centers, to give a corollary of poverty. Would this kind of overlay show a disproportionate exposure and vulnerability in the poorer parts of the city to health and environmental hazards?

Dr. Stephens: The maps we used were indeed an attempt to overlay environmental problems on different income areas in the city. You may be extrapolating from the American experience in which you might find that questions of environmental justice, which are being hotly debated here in terms of the poor living near environmental hazards, become a strong corollary of other types of equity. This larger relationship is not something that can be addressed currently in some cities, although the level of environmental risk might be assessable.

In São Paulo the poorest people do not necessarily live in conditions of household deprivation or next to toxic waste or waste management problems. Even so, this does not dispel your underlying point of the usefulness of visually

showing the clear relationship between poverty location and environmental hazard. It is much clearer than simply saying, "And here is an epidemiological risk in terms of numbers." Policymakers may respond better to a picture of the problem.

In conclusion, the main message of the session is that there is a crisis in the quality of life of people living in cities and that this threatens urban sustainability. The impact of "invisible" problems of urban poverty considerably outweighs the effects of urban macroenvironmental problems such as citywide air and water pollution. The crisis is aggravated by the extensive polarization of socioeconomic and environmental conditions between communities within cities.

The debate following the presentations focused on poverty and equity questions, the intersectoral nature of the needed analyses and interventions, and the flows of money and goods between rural and urban areas as a facet of poverty and a determinant of the priorities of the urban poor. In particular, inequities as well as absolute levels of deficiencies must be considered to understand and address health-poverty-environment problems. Professionals in these three areas should not remain polarized but should join with each other and with communities in concerted action. Where people still have strong roots in their rural communities of origin, they may be less willing to invest in health and environmental improvements in their urban homes and neighborhoods. Along with considerations of affordability, this needs to be considered in program design.

Dr. Surjadi: In Jakarta we also used maps as a management tool in government planning exercises to pinpoint areas that need more resources. These needed resources may be for health concerns. For example, we are currently facing the problem of AIDS in Asia. We do not have enough doctors, but we can place a secondary doctor in public health centers in neighborhoods that need them.

Chairperson Harpham: Since my original training was in urban geography, I would just like to

caution against the temptation to use very sophisticated geographical information systems, GIS, in mapping. The mapping system that was used in these studies is free software from the United Nations—it is a very simple mapping software and is freely available to developing countries.

Question 7: What exactly do we mean by "poverty"? It is more a social condition than an economic one. In large cities poverty can be defined on the basis of inequities between the social strata. But communities that do not have great inequities—more often the case in rural areas than in urban—may be very poor, although not considered to be in poverty.

Inequities are caused by a whole series of constraints that make it difficult for any single intervention, be it water supply, sewerage, a food program, or a housing program, to address the problems of poverty. The problems are so interrelated that it points up the need for a more comprehensive and intersectoral approach to dealing with them.

Dr. McGranahan: One qualification to your point is that, in a sense, there will always be inequity when you have a community, even if everyone in the community is relatively equal. The reason is that the community is part of a broader community outside. There are international inequities that lead to people living in extremely bad conditions even though there are few inequities in their own community.

Dr. Surjadi: This points to the need to come up with intersectoral action to bridge these inequities. Unfortunately, at this point, action on issues of urban poverty, health, and environment is often scattered and piecemeal. It is natural for every person to have his or her own network, and even for international agencies to work with their own separate groups of beneficiaries. But in order to improve urban conditions, it is important to move beyond natural divisions to share information and to work together. Action must be coordinated and focused.

SUPPORTING MUNICIPAL INITIATIVES: REGIONAL NETWORKS

Introduction

Peter Kimm

Although cities throughout the world differ in size, geography, and human and financial resources, all share the same responsibility for providing urban environmental services—water, wastewater, and sanitation. Added to the challenge of service delivery is the industrial pollution that threatens city sanitation and waste management systems. Decentralization in the developing world has gradually shifted responsibility for service provision from state enterprises and national agencies to municipalities, posing a new range of challenges to local officials.

Municipal officials must naturally turn to the experience of other cities for successful examples of how these problems can be addressed. One such model is the “twinning,” or “Sister Cities,” strategy, which pairs municipalities in an exchange of cultural or technical information. Of specific interest here is the exchange of technical urban environmental management information between more experienced cities and those in need of experience. For example, several U.S. cities are involved with municipalities in Thailand to help identify and resolve urban environmental concerns.

Our session today focuses on *regional municipal networks* as a mechanism for sharing information on urban strategies for environmental management. Regional networks promote peer relationships and problem-solving, and, for resource-poor municipalities, they offer econo-

mies of scale in the provision of technical assistance and information. These networks also provide a mechanism for negotiating with government entities to ensure the revenue transfers necessary to support service delivery.

In Eastern Europe, municipal associations are fulfilling this important role as local governments move out from under the experience of centrally planned economies. For example, the Federation of Central American Municipalities, with assistance from USAID, is helping local governments respond to citizen demands for improved urban services. In addition to enhancing urban environmental management and accountability, the federation and municipal associations promote democracy throughout their respective regions.

These associations also promote the urban environment agenda at the regional, national, and even global levels. Regional municipal networks are currently addressing problems common to a specific region, as will be shown in the discussion here of the Baltic and Mediterranean city programs and the Metropolitan Environmental Improvement Program in Asia. An interesting variant is being administered along the border of the United States and Mexico, where Mexican and U.S. cities have a long history of collaborating on the resolution of environmental concerns at the border, particularly air and water quality. Today, an annual mayors meeting addresses transboundary environmental issues

and the shared concern of improving relationships among localities and between the two governments.

Because urban environmental issues involve many sectors and jurisdictions, municipal governments must also promote intracity networks, linking specialized institutions, professional

groups, local and other government agencies, and nongovernmental organizations in a partnership to identify, analyze, and resolve environmental problems more effectively. These networks, in turn, are key movers in the formulation and implementation of viable, long-term strategic initiatives.

The Metropolitan Environmental Improvement Program

David Williams

According to UN estimates, 2.3 billion people will live in Asia's cities and towns in the year 2020—an estimated one-quarter of the world's population and a number almost equal to the entire urban population of the world today. If these estimates hold, urban areas in Asia will have to accommodate an additional 1.4 billion people in the next 30 years—an average of 47 million new residents annually, or more than twice the annual addition of 19 million in the past 30 years.

It is difficult to overstate the importance of the new urban development implied by these statistics. Without improving their urban environmental management, many cities in Asia—particularly the megacities—could become the most polluted human settlements in the world. The result will be to slow down much of the region's economic growth, undermine the health and productivity of its citizens, and generate a major portion of the hydrocarbons and other pollutants responsible for global environmental degradation. But Asia's rapid economic growth also offers an opportunity to resolve many of the environmental problems.

The reasons underlying poor urban management are partly physical—the rapid growth of people and activities has outstripped capacity to supply services and to regulate development. But poor urban management also has social, political, and institutional roots that severely limit the capacity of societies to address these problems. Urban environmental problems are a subset of broader urban management issues, and they must be dealt with in that context. Some of the key causes of poor urban management include:

- Dominant and overstretched central governments unwilling to share power and resources with weaker local governments
- Fragmented responsibilities among agencies and between central and local governments, exacerbated by an absence of accountability and by weak intersectoral planning and budgeting
- Weak outreach by the public sector to obtain cooperation and assistance from civic and business groups
- Political reluctance to apply appropriate taxation and pricing for supplying resources and services and for managing waste
- Poor pay and incentives for public service officials and poor internal management of central and local agencies
- An absence of technical knowledge and education to respond to the emergence of new priorities, such as industrial and toxic waste, air pollution, noise, and traffic congestion
- A common attitude among policymakers that countries should “grow now, and clean up later”
- An absence of public concern, knowledge, and dialogue.

The Metropolitan Environmental Improvement Program in Asia: A Key Intervention

The Metropolitan Environmental Improvement Program (MEIP) was conceived as an approach to improve environmental quality in major cities in Asia by addressing some of these key political,

institutional, technical, and attitudinal shortcomings—a situation that has also meant that existing financial resources have not been used effectively. MEIP is predicated on channeling rising public concern about deteriorating living standards and conditions in the major cities and the negative impact of pollution on economic activities into a commitment to action both by government and society at large. MEIP's approach consists of several elements:

- Consensus-building based on a participatory approach
- Knowledge development and dissemination both within each MEIP city and among MEIP cities and countries
- Environmental planning, with a spatial, geographic focus on individual city regions from the perspective of land, air, and water quality and their impacts on city efficiency and equity (environmental management strategies)
- Environmental policy improvements, closely linked to and consistent with standard urban management policies on pricing, subsidies, cost-effectiveness, and central-local financing and management
- Evaluation of existing sectoral projects in relation to their environmental quality, and the preparation of sectoral and area-based action plans and projects emerging from the environmental management strategies
- The strengthening of management capabilities in the city region's environmental and sectoral institutions
- The initiation of pilot programs and projects with communities and small entrepreneurs for replication or mainstreaming into larger projects.

The organizational framework consists of a four-tiered structure: a steering/policy committee, comprising representatives from central and local government policy and implementation agencies, the private sector, and nongovernmental organizations (NGOs); a full-time national program coordinator; a broader environmental network; and close links to MEIP headquarters in the World Bank, which, in turn, cooperates closely with the Bank's country departments on borrower relations, sector policy, and project lending.

MEIP is supported by several institutions. The Bank provides for the time and travel of the program manager. The governments provide

support to the field offices. MEIP core operations (the salaries and travel of headquarters and field staff, workshops, community-level projects, case studies, and publications) are funded by UNDP at about \$1 million annually. MEIP staff have been able to raise another \$3.5 million annually (a total of \$15 million) from bilateral, multilateral, and private funding sources to undertake the in-depth work necessary in the cities. These resources have included funding for investment studies that are generating about \$500 million in new investment projects scheduled for Bank financing.

Achievements

MEIP is now well-established in five cities and has recently started operations in Nepal. Three MEIP cities are in South Asia (Bombay, Colombo, and Kathmandu), and three are in East Asia (Beijing, Jakarta, and Manila). About 60 MEIP projects are currently under way; they include city-specific endeavors and cross-country activities. Several are illustrative of the wide-ranging initiatives by MEIP:

- *Participation and networking.* The MEIP approach has sought to improve the participation and involvement of government agencies, civic and business associations, and NGOs in generating ideas and consensus through membership in the MEIP steering committee in each country, and the efforts of the MEIP national program coordinator in networking with local groups. Methods have included workshops, case studies, public awareness campaigns, school programs and information dissemination, discussion with local media, and conference presentations.
- *Exchange of experience and training.* Four inter-country workshops have been held, at which MEIP city groups exchange experience and arrange to provide assistance to each other. A major study on urban environmental experience in Japan has been completed, and MEIP groups have visited Japan to learn from this experience and make contacts for further assistance. About 60 local workshops have been held, involving civic and industry associations, NGOs, academia, the media, and government agencies, to discuss environmental management strategies and urban air quality

work and to focus on such special topics as cleaner industrial processes, economic valuation of environmental degradation, and community projects.

- *Environmental management strategies* for the metropolitan regions have been completed in Bombay, Colombo, Jakarta, and Manila, and the governments have begun to implement the policies, legal measures, and investments proposed by these studies. The remaining cities are in the process of completing work on environmental management strategies. Work on environmental management strategies in Beijing has led to adoption of the same approach by Shanghai and to interest from other cities. The air quality program (URBAIR) has now concluded its first phase with a set of specific action plans in three cities.
- *Investment development.* MEIP preparatory work has led to four types of investments in the cities, together with associated policy and management measures:
 - *Free-standing environment projects.* The Bank-financed Industrial Efficiency and Pollution Control Project in the Philippines and the Colombo Environmental Improvement Project in Sri Lanka are scheduled for appraisal in 1995; each was prepared largely by MEIP. An urban/industry environment project in Kathmandu is currently under consideration.
 - *Environmental components in other projects.* Significant components in upcoming Bank-financed projects prepared by MEIP include air-quality management and investments in urban transport projects in Bombay, Colombo, and Jakarta, as well as industry and urban infrastructure components in India, Indonesia, and Sri Lanka.
 - *Private sector investment.* MEIP has assisted entrepreneurs who are obtaining investment directly through local banks and stock flotations. These include municipal-waste resource recovery industries in the Philippines, commercial developers and industrial estate operators in Sri Lanka, and a hazardous-waste disposal facility in Indonesia.
 - *Innovative community-based investments.* Several pilot projects to minimize and reuse waste and improve community health are being fielded with community groups,

NGOs, and small entrepreneurs, to be replicated as a citywide approach. About 10 of these subprojects are being fielded in each of the six MEIP cities, financed primarily with bilateral aid raised by MEIP.

Implementation Experience Provides Valuable Lessons

MEIP staff and organizations have learned several lessons from experience in the past four years.

The broadly based and active steering committee working with the national program coordinator is the foundation for developing a comprehensive program. The steering committee plays a key role in nurturing the interagency cooperation demanded by the cross-sectoral nature of the environmental challenges, serves as a forum for coordinating bilateral and multilateral environmental programs at the city level, and prevents wasteful duplication of activities by different donors. The steering committees are becoming increasingly active in initiating and guiding urban environmental activities.

The city environmental management strategies are laying the foundation for negotiations and agreements for action among various civic groups, industrial and business interests, and government agencies. Concurrently, however, vociferous demands are being made for immediate action. Identifying and developing investment projects consistent with the environmental management strategies are necessary to maintain interest and momentum.

MEIP has emphasized *extensive consultation and workshops* in developing each component. While this attention to participation is time-consuming, it has effected a high level of support and a sense of MEIP ownership of MEIP among participating cities.

The environmental networks in each city are becoming active in providing links across different sectors of society. Community-level projects are raising great interest within the MEIP cities where they originate, and links are being forged with other cities in MEIP countries and among MEIP cities. Solid waste recovery and reuse, community-managed sanitation facilities, river cleanup, environmental education and awareness, and youth ecology camps—all are topics that are being taken up by the cities. Quick action on local projects helps generate confidence that something can be done to improve poor living conditions.

Careful assessment of the institutional and social context is key to success. In some countries and cities certain approaches have been more productive than others. The environmental management strategies and associated policy work have been more successful in countries where a strong economic planning ministry, environment agency, or metropolitan development authority is involved in the steering committee. In other cities success may be predicated more on the "bottom-up" approach, with the work being driven by community-level organizations, NGOs, and business and industry associations.

Intercountry cooperation and exchange of experience has become a major focus of MEIP and is increasingly valued by the cities; examples include Colombo's Clean Air 2000 Action Plan, the activities of URBAIR, the Japanese environmental management exchange, and the recent initiatives

in economic valuation and waste minimization—clean technology in industry. These efforts enhance the ability of MEIP cities to find affordable solutions to their environmental problems.

MEIP in the Future

MEIP is conceived as a rolling program from which cities graduate and in which others enroll. Several cities have asked to join the program but could not be accommodated due to management and funding constraints. Two MEIP cities should graduate during 1995 and another three during 1996; this will leave space for others of our MEIP countries to enter the program and for the possible addition of two more countries. During this time MEIP will also concentrate on publications and other communication methods and dissemination to other cities and regions.

Urban Environmental Audits: Networking and Participation in Six Mediterranean Cities

Ayse Kudat

Twenty-two cities on the Mediterranean coast have been the driving force behind economic growth throughout the entire Mediterranean region. Not only do they dominate industrial and commercial activity in the region, but they also account for 54 percent of its total population. And they are continuing to grow—the larger cities on the coast are expanding five times more rapidly than cities in high-income countries; the small and medium-size cities are growing at 6 percent annually. But with this population growth and commercial and industrial development have come increased quantities of domestic and hazardous waste that are being discharged into rivers, canals, and drains, thus contaminating both surface and groundwater. In turn, this waste discharge spreads to the very revenue base of the cities—the coastal regions, whose natural resources make the cities home to tourism and fishing industries, and to a variety of marine and land habitats.

As in other cities throughout the world, low-income populations are the groups affected most severely by the deteriorating physical environment within and surrounding the cities. The numerous informal housing settlements that have sprung up throughout the region lack adequate sanitation and wastewater collection services, health care facilities, and green spaces. They are becoming the dumping grounds of the cities. And inadequate land management has allowed informal housing to be constructed on steep slopes in the urban periphery, aggravating erosion and causing landslides that cost homes and sometimes lives. Thus, the poor have become not just the victims but also the perpe-

trators of environmental degradation throughout the region.

Lacking institutional, financial, and infrastructural resources, each city itself has not been equipped to redress these problems. But these challenges are not the domain of individual cities; they are common to all 22 cities in the coastal region—all share the vital resources of the Mediterranean. Confronting the environmental degradation of the region requires an environmental management system that engenders the participation of all stakeholders throughout the region.

The Mediterranean Coastal Cities Network

Recognizing the advantages of a cooperative, more embracing environmental management system, cities throughout the region have formed the Mediterranean Coastal Cities Network (MEDCITIES)—a regional network that is engaging collectively in capacity-building, resource mobilization, policy implementation, and infrastructural remediation. Under the auspices of the Mediterranean Environmental Technical Assistance Program (METAP, box 1), it is endeavoring to create the public and government linkages necessary both to redress institutional and technical deficiencies and to promote sounder environmental practices throughout the region.

The network was launched in 1991 at a meeting of mayors in Barcelona. The initial membership of 18 cities included Alexandria, Barcelona, Benghazi (Libya), Dubrovnik (Croatia), Gozo (Malta), Haifa (Israel), Izmir (Turkey), Lattakie (Syria), Limassol (Cyprus), Marseille, Monaco,

Box 1. Mediterranean Environmental Technical Assistance Program (METAP)

In 1990 the METAP Program was established by the World Bank and the European Investment Bank to provide direct support and assistance to Mediterranean countries for strengthening institutional capacity at the national and local levels, establishing sound policies, mobilizing resources to finance environmental investment in the region, and developing a pipeline of environmental projects. The program is a catalyst for regional cooperation and action, bringing together countries that share the Mediterranean coastline and common environmental concerns. Its four priorities include integrated water resource management, management of solid and haz-

ardous waste, the prevention and control of marine pollution from oil and chemicals, and coastal zone management. In the first phase of operations, METAP established several networks to bring together individuals to maximize participation and foster institutional development through shared experience. These include networks of managers of parks and protected areas (MEDPAN), national ministries or agencies to foster cooperation in environmental protection (MEDNEA), water agencies (MEDWAN), agencies involved in pollution monitoring and research programming (MEDPOL), and coastal cities (MEDCITIES).

Oran (Algeria), Rimini (Italy), Sousse (Tunisia), Tangiers, Thessaloniki (Greece), Tirana (Albania), and Tripoli/El-Mina.

At the heart of MEDCITIES is an urban environmental planning and management strategy that involves four basic elements:

1. *Urban environmental audits.* Teams of experts are assembled to prepare environmental profiles of cities. Gathering local documentation and holding consultative sessions with public and professional groups, the team targets key areas for remediation. Priority areas include hotspots—which are frequently coastal zones at risk of oilspills from offshore shipping, forests or wetlands that are not being protected, or neighborhoods whose inadequate sanitation and water is creating severe health hazards.
2. *Urban environmental strategy.* Teams prepare a “green” strategy for achieving the targets identified by the audit. The strategies assess the cost-effectiveness of options, the feasibility of various institutional frameworks, funding and investment requirements, and economic and environmental tradeoffs.
3. *Urban environmental action plans.* Teams prepare action plans that define the institutional, budgetary, and sectoral configuration of interventions. The action plans also identify the appropriate technical and financing mechanisms necessary to implement the interventions.
4. *Follow-up and consolidation.* Teams initiate the policy reforms and institutional arrangements and establish monitoring and evaluation procedures.

All of these activities are predicated on and undertaken with the participation of all stakeholders throughout the coastal region—national and municipal officials, professional and research organizations, resident associations and other community groups, and environmental and industrial representatives.

Phase 1 Implementation: MEDCITIES Has Conducted Five Audits

Audits have been conducted in five Mediterranean cities located on the southern rim: Tangiers, Oran, Sousse, Limassol, and Tripoli/El-Mina. Another audit is being conducted in Tirana. One of the audited cities, Sousse, has already embarked on Phase 2 implementation—initiating an action plan. All of these cities have experienced rapid population growth and lack adequate institutional capacity for environmental management. They are also considered to be regional hotspots.

Profiles Indicate Severe Environmental and Health Problems

The audits generated profiles of the environmental problems facing each city, and the severe impacts of those problems on living conditions, economic activity, and health status.

Tangiers. Only 40 percent of collected solid waste is delivered to the landfill. The rest ends up on the beaches, where it accumulates with discharge from industrial and port activity. Moreover, the port of Tangiers has been allowed to expand

unchecked and is now causing beach erosion at an alarming rate of 5 meters annually. The degradation and loss of beach area is damaging the tourism industry. Since 1983 the average number of nights spent in the city has declined by 17 percent, representing an annual revenue loss of US\$23 million for hotels alone. In turn, the decline in tourism has led to a 10 percent decline in official employment in the industry and to substantial revenue losses in associated industries and services.

Oran. More than 80,000 tons of untreated raw sewage are discharged daily into the Bay, the Daia Morselly (a natural lake), and the Grande Sebkha, Oran's largest saltwater lake. Pollution in the Daia Morselly has caused a 20 percent reduction in fish catch in the past two years. Pollution has also lowered the value of the area as a tourist destination. Poor-quality water is the source of waterborne disease and high mortality rates. In Oran, lost economic output associated with these deaths exceeds US\$20 million annually, which is almost half of Oran's municipal budget.

Inadequate land management has also created severe hardships for Oran's poor. About 30 percent of Oran's entire population live in the illegal Planters and Hai Bouamama settlements, whose population densities are almost 50 times higher than in the rest of the city, and whose growth rate is about six times higher. These areas lack electricity, water supply and sanitation, waste collection, paved roads, schools, health facilities, and green spaces. For instance, residents in these informal settlements get less than 10 percent of the citywide average quantity of water. They are also exposed more heavily to waterborne disease because they cannot afford bottled water. And more than 40 persons, usually living in cramped areas, die each winter from carbon monoxide poisoning due to inadequate ventilation of heating systems.

Sousse. Inadequate sanitation facilities have increased the rate of diarrheal disease, costing the city US\$2.4 million in health care annually. In addition, the pollution of beaches with industrial and domestic wastewater poses a medium- and long-term threat to tourism, which is entirely beach-oriented. Inadequate land management is having a severe effect on the poor. Low-income residential areas lie close to or within the city's industrial zones and the landfill site. Because the shortage of green spaces is acute in these areas,

children play in unofficial dump sites and near contaminated streams, and suffer from high rates of parasitic infections.

Limassol. Uncontrolled development in the coastal zone has had a negative impact on the appearance of the seafront, which has led to a decline in hotel occupancy rates of 30 percent since 1992. Although part of the decline can be explained by the general recession in worldwide tourism, environmental degradation is a contributing factor. Limassol's economy is being hurt. Every 10 percent drop in tourist arrivals represents a revenue loss of US\$44 million. Limassol also lacks adequate flood control facilities, which is causing economic losses of US\$3.3 million annually.

Tripoli/El-Mina. Water sources supplying the Greater Tripoli areas are contaminated with raw sewage discharges (both directly and from septic systems), olive-oil processing waste discharges, and petroleum spills from the El-Beddawi refinery. Intermittent supply only worsens water quality, and inadequate pressure has led to sewage inflows, leading to at least one outbreak of cholera in Tripoli. Moreover, Tripoli/El-Mina's solid waste dump encroaches on the sea. Solid waste litters the sea floor, and plastic waste travels hundreds of miles, polluting beaches as far away as Turkey and Cyprus. The Ministry of Environment has declared public beaches in Tripoli/El-Mina unsafe for bathing.

Regionwide. All five cities lack municipal institutions with a clear mandate for protecting the environment, as well as effective mechanisms for coordinating intersectoral actions. None of the cities has adequate environmental regulations or the capacity and commitment to enforce them. Poorly managed urban development has left all five cities with a shortage of green space. And despite their proximity to major oil shipping routes, none of the cities has adequate equipment or trained staff to respond to oil spills. Finally, all of the cities lack proper solid waste and hazardous waste disposal and treatment facilities. Hazardous waste is either dumped in the sewer or is commingled with municipal waste in landfills. In the absence of liners, leachate collection systems, and cover, these landfills pollute nearby lakes and groundwater.

The direct discharge of raw wastewater into the sea, illegal sand extraction from the dunes, the encroachment of structures near the sea, and

solid waste dumping in ponds and wetlands have degraded the coastlines of all five cities. The consequences are felt on marine life and health. For instance, the Mediterranean monk seal is reaching the category of an endangered species, and other wildlife is leaving the waters and environmentally sensitive wetlands and coastal forests in these areas. And chemical and bacteriological tests show that coliform levels in water supply sources exceed WHO guidelines by several orders of magnitude.

Priority Actions

The environmental audits have identified targets for strategic intervention:

- Rehabilitating, expanding, and providing new water supply and sanitation systems
- Instituting more effective wastewater management and resource use practices
- Relocating industries out of residential areas
- Formulating more rational urban development and coastal zone management policy
- Devising more effective pricing mechanisms for recovering capital and operations and maintenance costs
- Building institutional capacity, including the participation of all government, public, and private stakeholders.

Audits Have Motivated Action

For the five audited cities the process of developing commitment to environmental management for environmental protection is at an early stage. Nonetheless, some stakeholders have publicly expressed willingness to further the process, based on actions undertaken during the audits.

Tangiers. At the conclusion of the public meeting to discuss the audit results, the mayor made a public commitment to establish a Municipal Environment Commission. Industrialists have also expressed their willingness to take remedial pollution control measures, provided that appropriate infrastructure is made available. A consensus on possible collaborative action at the municipal and community levels was also expressed—including the control of hazardous waste in collaboration with industrial associations, the designation and maintenance of green spaces in collaboration with

environmental groups, and solid waste collection in collaboration with local residents.

Oran. A “green” strategy was immediately prepared and endorsed by the public and government. A small measure of progress has been made in devolving responsibility; the municipality and its strategic partners—private companies and resident associations—are launching an ongoing information campaign to promote better water management. Given the more than 2,000 nongovernmental organizations (NGOs) and resident associations in Oran, participatory environmental planning and management has great potential.

Oran’s coastal neighbors—Ain El-Turch, Arzew, and Bethioua, which are the region’s principal industrial and tourism zones—are also beginning to coordinate efforts to preserve their rich natural resources.

Sousse. To follow up on the municipal audits and strategies, efforts are now under way in Sousse to prepare a municipal environmental action plan. One year after the municipal environmental audit, one local and two foreign consultants prepared a proposal for developing an action plan. The proposal was discussed at a public workshop, culminating in an action plan that has identified priority targets, defined short-term and immediate needs, and developed evaluation and monitoring tools. The governor of Sousse will oversee the implementation of the environmental action plan.

Limassol. To address coastal erosion, the decline in tourism, and deteriorating water supply, Limassol recognizes that it must coordinate strategy with the adjacent municipalities of Ayios Athanasios, Kate Polemidhia, and Mesa Yetonia, and the improvement boards of Amathus and Yermasoyia. To that end, consultations have been held among such diverse groups as hotel associations, environmental NGOs, and municipal officials from these areas. The sessions have led to a strong expressed desire to do something about the problems. This willingness has been more forthcoming in Limassol than in the other cities largely because the proliferation of “green” NGOs in the city has created a greater overall awareness of environmental issues. This participatory process should now be strengthened with the preparation of a joint strategy for coastal zone protection.

Tripoli/El-Mina. The mayors of both cities are strongly motivated toward environmental protection. In fact, they successfully launched a solid waste-reduction campaign and have pledged to restore historic buildings. In addition, the Environmental Protection Committee (EPC) for the cities has been actively promoting youth environmental awareness campaigns and has established a nature reserve. It has also coordinated a range of environmental activities with other local NGOs and the media, including conferences, news campaigns, and fieldwork (cleaning up streets and beaches, planting trees). The mayors are working closely with resident associations, and have formed networks of environmental protection advocates. The municipality has also been able to work with unions and commercial associations. Federations of businesses in north Lebanon are supporting municipal environmental protection efforts and have stated their willingness to be involved in launching action plans. At their own initiative, the federations have begun to develop industrial emissions standards and have agreed to participate with the municipal authorities in registering establishments.

Activities Are Proceeding, Largely with World Bank Funding

Linkages with investment operations are critical elements of the environmental planning process initiated by the municipal audits. These investments can be expected to yield high returns over the long term, as all groups begin to work toward a balance of environmentally and economically sustainable development. Although existing and planned investments address some of the priorities facing these cities, much remains for international support, particularly in addressing hotspots where immediate and multisectoral action is required. The following investment activities are planned or are under way in each city.

Tangiers. Morocco has signed a US\$100 million loan agreement with the World Bank to develop

the municipal sector. In addition, the Bank is supporting a study on managing and improving the living conditions within squatter settlements. The study is expected to form the basis for a subsequent World Bank loan.

Oran. Algeria is implementing a US\$100 million World Bank loan to rehabilitate the water sector. The project will cover the diagnosis of the water network to evaluate its operational performance, estimate water losses, identify equipment that should be replaced, and prepare a program to rehabilitate the system. The loan will also cover the development of a public education and participation program for water conservation and demand management that would increase the availability of water.

Sousse. Tunisia has a US\$75 million investment project under way to develop the municipal sector and strengthen the institutional efficiency of local authorities in decisionmaking and resource mobilization. The Bank is also planning to finance a sewerage project that will support improvements in the sewage network and the construction of a treatment plant.

Limassol. As a direct follow-up to the audit, the European Investment Bank is expected to provide US\$18 million to finance the sewerage component of a larger ongoing World Bank project in Limassol. The appraisal for this investment is planned for next year. Additional interventions proposed under METAP II address hazardous waste management, the conservation of the Akamas peninsula, and the use of fiscal instruments for environmental management.

Tripoli/El-Mina. Lebanon has obtained a US\$175 million loan from the World Bank to help implement its US\$1.5 billion National Emergency Recovery Program, which included improvements in water supply, sewage rehabilitation in the Greater Tripoli area, and improved solid waste management in the Tripoli districts. In addition, the European Union is funding a study of solid waste disposal options, and the European Investment Bank is funding a study of wastewater treatment, which it expects to follow up with a project.

Union of Baltic Cities: Regional Cooperation for Environmental Protection

Piotr Krzyzanowski

Cooperation in the Baltic region must account for a vast range of culture, traditions, and political systems, stemming from the array of ethnic roots—Balts, Finns, Germans, Scandinavians, and Slavs. But for hundreds of years, as these Baltic groups have been cultivating the shores and coastal zones of the sea, they have been united by one common trade—fishing. Although the importance of this industry has diminished in the region, the spirit of all these traditions of the Baltic region—families and local associations working together to fish, to rescue the drowning, and to build houses, roads, and harbors—has survived.

Union of Baltic Cities

In September 1991, despite years of divisive political barriers, representatives of 32 towns and cities on the Baltic coast met in Gdansk, Poland, to form the Union of Baltic Cities. The union was established to encourage and contribute to positive democratic and economic development in the region. Today, the union consists of 52 member cities, including all capital cities, and has established working contacts with other European organizations, among them METAP, which was discussed by Ayse Kudat.

Two trends have met and united in the Union of Baltic Cities: the delayed development of Baltic cities after World War II, which now look forward to establishing contacts and gaining knowledge and experience from cooperative partnerships; and the availability of cooperation and support from highly developed cities, which, affected by recession, are also looking for

new stimuli. Everyone has been united by the will to act and to improve the standard of life in the Baltic.

Environmental Protection: The First Priority

The goals of the union are far-reaching—expanding cultural awareness, enhancing the role of women, confronting such social issues as unemployment and cultural adaptation, and improving transportation and telecommunications. But environmental protection is the top priority of the Baltic Union. The natural vulnerability of the Baltic Sea to pollution is seriously aggravated by anthropogenic causes of environmental change and degradation. Municipalities and industries in the catchment area discharge pollutants directly into the numerous rivers that feed into the Baltic Sea and into many estuaries, bays, and gulfs. Many pollutants are also transported through the atmosphere and from agriculture practices. The majority of the pollution sources are located in the southeastern part of the Baltic Sea, home of the former centrally planned economies.

Most of the water bodies—the rivers, channels, and aquifers—have received an excessive amount of untreated or insufficiently treated municipal wastewater. Existing facilities, including sewer systems and treatment plants, are generally inadequate, overloaded, and poorly maintained and operated. Moreover, a large quantity of highly toxic industrial wastewater and chemical liquid waste is discharged into the municipal sewerage system. For example, in the late 1980s the city of St. Petersburg alone was

responsible for discharging 80 percent of the chromium and copper into the Finnish Gulf.

Public utilities in the cities are making progress toward a new, decentralized water and sanitation system. The system will be adapted to the various municipalities, each with detailed organizational structures. But this transition is being made in the face of several hard realities. Some water enterprises, especially those outside capital cities, are desperately short of cash and face a set of basic services that have long been deteriorating. Compounding this problem are previously distorted tariffs and charges that allowed water enterprises to receive excessive payments from industry, which, however, is no longer able to pay because it lacks work and cash. Finally, in some countries, the enterprises in charge of managing water and wastewater do not have financial and regulatory autonomy.

Joint Comprehensive Action Program

The riparian governments have launched a joint effort to stop and reverse the degradation of the Baltic Sea. The long-term program for specific action—the Joint Comprehensive Action Program—contains six components: (1) policy, legal, and regulatory measures; (2) institutional strengthening and human resource development; (3) investment activities; (4) management programs for coastal lagoons and wetlands; (5) applied research; and (6) public awareness and environmental education. The program will require huge investments over at least 20 years, as well as a variety of other activities, including capacity-building and participation by international organizations at the city level. The cities must be prepared to handle financing and investment requirements; thus, they must prepare their institutions for the necessary cooperation and must attract staff who are well trained in the operation and management of utilities.

Discussion within the union and debates focusing on the priority and scope of required activities for program organization led to the adoption of the Baltic Sustainable Cities Program in 1993, which consists of two main action-plan strategies under the overall joint government program. The first is the *Cooperative Program*, which addresses institutional strengthening and human resource development. The Cooperative Program endeavors to respond to the local dimensions

associated with implementing the overall action plan. It is targeted at municipal administration as well as at the staff of public utilities. It is being operated as a series of workshops, seminars, courses, training programs, conferences, and evaluation sessions to support implementation of the joint government program. For the six components of the longer-term program, one eastern and one western city coordinate joint responsibility for organizing each of the activities. Each activity then will be open to the rest of the member cities of the union. Thus far, 51 cities have expressed interest not only in participating in the action plans but also in assuming full responsibility for organizing those activities.

The second strategy is the *Baltic Municipal Environmental Audits*, worked out on the basis of the methods and principles developed by the World Bank and recently implemented in the Mediterranean Sea region. The audit concept from the Mediterranean scheme is being adjusted to the conditions specific to the Baltic region.

The audit project will be implemented in five cities from the southeastern part of the Baltic; one city from each country will participate. Each of these cities will have one or two “sister” cities from the western part of the Baltic. The western cities will provide technical assistance for the audits, which will be conducted by joint teams from each city involved.

The expectation is that this configuration will enhance public awareness and understanding of the local environment. The Baltic Union has sought external funding to implement the action plan. With strong support from the regional governments, the Baltic Union applied to the Local Initiatives Facility for the Urban Environment (LIFE) Program, and the audit phase started in late 1994. The World Bank agreed to coordinate the municipal environmental audits, based on its experience from the successful implementation of the Mediterranean audit projects.

This example of international cooperation at the city level, focused on common goals and based on political commitment, shows the tremendous potential that has been mobilized in the Baltic region. This process of long-term reform being undertaken by the Baltic cities will face many obstacles. But it is a valuable first step toward fulfilling the Baltic Union’s goal to move the region into the twenty-first century.

The Urban Management Program

Pablo Trivelli

The Urban Management Program (UMP) is a 10-year technical assistance intervention begun in 1987 to strengthen the capacity of cities and towns in the developing world to address five thematic areas: municipal financing and administration, urban infrastructure management, urban land management, urban environmental management, and poverty alleviation.

The program is a partnership of the international community: UNCHS (Habitat) is the executing agency; the World Bank is the associated agency; and UNDP provides core funding and overall monitoring. Bilateral donors, multilateral agencies such as the World Health Organization, and nongovernmental organizations (NGOs) provide various other types of support.

In the first phase of the UMP, activities focused on developing generic policy frameworks and discussion papers that described current experience with implementing urban management programs across regions, as well as the mechanisms and tools used to do so. Phase 2 of UMP, currently under implementation, is translating the output from phase 1 into operational support for policy action planning and programming at the national, regional, and city levels. The program relies on two mutually supportive processes to facilitate capacity building in the five thematic areas:

- *City and country consultations*, which bring together national and local authorities, the private sector, community representatives, and other stakeholders to discuss problems and propose reasoned solutions.

- *Regional networks of experts*, which provide technical advice and cooperation to sustain and support consultations and their follow-up actions. Follow-up includes facilitating the implementation of action plans and mobilizing investment resources.

The regional networks of experts are the core of the program's human resource base; at the program's conclusion, they will have to be anchored firmly to institutional bases to sustain the country and city consultation in the future.

Through its core teams—the UNCHS in Nairobi and the World Bank in Washington, D.C.—the UMP has supported program activities in four regions: Accra, Ghana, for Sub-Saharan Africa; Cairo, Egypt, for the Arab states; Quito, Ecuador, for Latin America and the Caribbean; and Kuala Lumpur, Malaysia, for Asia and the Pacific Rim.

To date, 56 UMP-supported city and country consultations and demonstrations have been undertaken, are under way, or are planned. In addition, the program has supported 49 seminars and workshops at both the regional and municipal level. The program has also sponsored 65 support studies at the local, national, regional, and global levels (48 under the auspices of the Nairobi and Washington core teams); 25 of them are ongoing.

UMP activities are spread fairly evenly across the five thematic areas: 25 projects in urban land management, 29 in urban infrastructure management, 30 in municipal financing and administration, 49 in urban environmental management, and 23 in poverty alleviation.

Consultation and Network Strategies Vary across Regions

The UMP in Sub-Saharan Africa serves a brokerage function, not only by initiating country and city consultations but also by building communications strategy and mobilizing support from donors for downstream activities. The regional team in Accra has also begun cooperating with the African Development Bank to help it develop its own urban development support agenda.

In the Arab states, the UMP structure for capacity-building differs from that of the other regions: country coordinators and panels have been selected in specific countries, rather than formed at the regional level. In addition, the program has identified several rallying points for addressing the major areas of UMP—protecting the heritage of urban areas, supporting the development of microenterprises, raising awareness about gender roles in urban management, and exchanging experience in municipal solid waste management.

In Latin America and the Caribbean the UMP regional team is targeting several strategic themes that are regionally applicable, rather than municipal-specific. As such, it is fostering partnerships among national and local governments and community associations, as well as information exchange across municipalities. The team also sponsors sequenced series of activities across the region; for example, a series of national workshops on decentralizing urban management responsibilities were held in Bolivia, Ecuador, and Peru in 1994. However, the main task has been to foster national urban policy dialogue through city-national consultation in several countries.

In Asia and the Pacific, the UMP is strengthening the capacity of municipal authorities, mobilizing non-land-based sources of revenue, and facilitating access to housing finance by the poor. Activities are currently under way in 12 countries. As an alternative to the country consultation panels, the regional UMP has developed a network of urban management experts throughout Asia, who are in turn developing country-specific networks. The regional team has also begun cooperating with the Asian Development Bank to promote country-specific activities, a joint effort that is expected to expand significantly in 1995. The UMP regional team is

also developing a communications strategy—preparing and disseminating a discussion paper series and regional newsletter, and creating partnerships with other publishing houses.

Real Implementation Practices from the Regions

Several UMP projects and activities illustrate how the regional offices mobilize implementation strategy and resources, and how they integrate specific thematic areas in their region.

African Research Network on Urban Management

Responding to the dearth of documented research on urban poverty in eastern and southern Africa, UMP-Africa collaborated with HABITAT, the Ford Foundation, and the African Academy of Political Science to develop the African Research Network on Urban Management (ARNUM)—a cross-country network for compiling and disseminating research on urban management and how it affects the poor.

Its first activity was to sponsor a research competition among individuals, research institutions, and nongovernmental organizations (NGOs) to formulate proposals for research programs on urban poverty. The competitions have fostered a cooperative spirit between the policymaking and research communities and have already built a solid body of literature on the nature and causes of poverty and possible strategies for alleviating it.

Grants have thus far been awarded to 11 research teams. All are gender-balanced and have an appropriate mix of researchers and policymakers. Program teams are now operating in Botswana, Kenya, Lesotho, Malawi, Namibia, Tanzania, Zambia, and Zimbabwe, thus illustrating the strength and reach of ARNUM.

UMP-Africa: Joint Efforts in Property Rating

Four organizations—UMP-Africa, the Municipal Development Program, the World Bank, and the Economic Development Institute—have embarked on a joint endeavor to support country-level efforts to improve property rating and tax assessment mechanisms. The expectation is that knowledge of and practice with more effective

mechanisms will enable the countries to generate more revenue for investment. The World Bank and the U.K.-based Overseas Development Administration (ODA) have already commissioned a regulatory and financing manual on property rating and are following up by sponsoring a seminar on feasible implementation strategies. Recommendations have been made to strengthen institutional capabilities, tap sources of technical expertise, and ultimately create a regional network under the umbrella of a lead institution to support local projects and communications activities.

*Arab States: NGO Network
on Urban Environment*

In conjunction with the Arab Network for Environment and Development and the Arab Office for Youth and Environment, UMP–Arab States organized a regional NGO workshop on environment and development. Discussion and learning activities centered on implementation of the United Nations Conference on Environment and Development (UNCED) biodiversity and climate change treaties; functional activities included the creation of a network of NGOs that will cooperate with policymakers in shaping environmental and development agendas. At the workshop, organizations from 13 countries were chosen as contact points for further activities. This network will eventually be expanded to support regional-level projects and to open communications channels with Arab-region and international NGOs.

*Arab State Cities: Collaboration
on Solid-Waste Management*

The UMP–Arab States office also launched a regionwide program to improve solid-waste management in Beirut, Cairo, Casablanca, Sanaa, and Tripoli. A 10-day field study to the *zabalin* (rag picker) settlement, to Damietta composting plants, and to some small waste management enterprises in Alexandria, Cairo, and Damietta provided valuable hands-on familiarity with new innovations in solid-waste recycling and reuse. In particular, the study highlighted the importance of low-cost systems and public-private partnerships for enhancing cost-effectiveness, operational efficiency, and resource investment.

Other participating cities and countries have since prepared detailed profiles of their own solid-waste management practices and have developed strategies for expanding recycling and reuse activities and for institutionalizing policies and programs. They have since submitted reports on these activities to country consultations and then to a regional workshop. One of the lessons from these activities is that decentralizing solid-waste collection, disposal, and management will not only improve services at the local level, but will also generate employment in the areas.

*UMP–Latin America: Collaboration
on Training and Information Exchange*

In an effort to mobilize information exchange among municipal officials and NGO staff, the UMP–Latin America regional office sponsored training sessions in solid-waste management, disposal, and recycling for 10 countries in the region. Twenty representatives from these countries visited six cities in Brazil and Colombia that were chosen as best-practice cases for replication efforts. After gathering information and discussing techniques with practitioners, the representatives are jointly disseminating information on solid-waste management and services to their respective cities, eventually culminating in a regionwide information exchange network. This positive experience in information exchange activity is now being used as a model for targeting solid-waste management needs in the Caribbean and Central America.

As a follow-up, UMP–Latin America is collaborating with the Fundación Social of Bogotá to hold sessions on specific facets of solid-waste management practices. Stakeholders from six countries—waste pickers, NGO staff, and municipal officials—will meet to debate processes, organization, sustainability, public-private partnerships, technology, and intersectoral policy. The goal is to stimulate new projects in the participating cities and countries.

*Brazil: A National Network
for an Improved Urban Environment*

UMP–Latin America is fostering national networks in country-specific settings. For example, in Brazil, the World Bank core team and

UMP–Latin America staff are collaborating with national institutions to organize a city-country consultation on infrastructure and urban environmental management. A two-stage consultation has been taking place, at the municipal level, in 14 metropolitan areas and medium-size cities, and at the national level. The consultation will culminate in a workshop to analyze the conclusions of city environmental reports, a general management strategy, and a policy statement, together with discussion on support activities in research, policy analysis, information exchange, training, and institutional strengthening. The vast mobilization of human resources citywide is expected to lead to the consolidation of a national network of municipal-level support, able to follow up on the rich number of proposals for action originating during the consultation.

*Regional Latin American Network
to Support Municipal Environmental Activities*

UMP–Latin America is developing a Regional Urban Environmental Network as a bridge between existing information systems and networks of professionals, local government officials, and advocates concerned with environmental protection. In five countries NGOs have been identified as national network nodes; they were selected not only for their expertise in environmental issues, but also for highly regarded work in promoting information exchange and interaction with municipalities in their countries, the lack of which has been one of the major bottlenecks to concrete working relationships with local government and urban practitioners. Selected institutions in Bolivia, Chile, Colombia, Ecuador, Paraguay, and Peru have been participating. Additional funds are being requested to extend the network to Central America. Thus far, UMP support has been to organize the network and finance a fax modem, and to provide a small fund for dissemination across media. After an initial period of implementation, a regional workshop on monitoring and evaluation is being organized,

which will include node members and other networks operating in the region.

URBNET-Asia: A Regional Panel of Experts

URBNET-Asia is a network of technical and policy experts and organizations that provide operational assistance and human resources throughout the region. This association underscores commitment in the region to establish collaborative interventions in urban management and to communicate across municipalities and sectors. The network is helping to establish lead institutions to assume responsibility for coordinating and mobilizing resources under the auspices of the UMP-Asia office.

Members of URBNET-Asia come from 13 countries in the region and belong to governmental, academic, NGO, and private organizations. They collaborate on technical assistance or applied research projects, cosponsor workshops and seminars, and prepare cross-sectoral publications and films. In addition to organizing more structured panels to address each thematic area, URBNET-Asia has created a broad directory of 450 people and institutions, complemented by an index of 40 organizations and programs in the region that provide expertise in different aspects of urban management.

**Sustainable Cities Program:
Cooperation among Networks**

Closely linked to the UMP is the UNCHS Sustainable Cities Program (SCP). The SCP was designed to complement the environmental activities of the first phase of the UMP, by focusing on building capacity and facilitating stakeholder participation in urban environmental management. To this day, the UMP and SCP continue to coordinate and reinforce urban environmental activities. The SCP also complements and reinforces the initiatives of the Metropolitan Environmental Improvement Project, described earlier, and the World Health Organization's "Healthy City Project." The Sustainable Cities Program will be presented by its coordinator, Mr. Jochen Eigen.

The Sustainable Cities Program

Jochen Eigen

The Sustainable Cities Program (SCP) is an operational arm of the Urban Management Program's environmental component (UMP/E). As my colleague, Pablo Trivelli, has just described, the environmental component was added to the UMP in 1990 to help development practitioners in developing country cities cope with the environmental problems they encountered.

The UMP/E has initiated a series of research activities around urban environmental problems that has resulted in a number of case studies and background papers. One of the most important of these studies, *Toward Environmental Strategies for Cities* (Bartone and others 1994), synthesizes the results of research activities over the five years of the initial phase of UMP/E.

The Sustainable Cities Program was set up by UNCHS (Habitat) to translate the results of UMP/E's research and analysis into specific city projects to address urban environmental problems. The SCP has developed an operational framework for the environmental planning and management process in cities, has mobilized the required technical and financial resources, and has initiated city-level demonstrations in some 15 cities around the world. These initiatives are carried out in cooperation with UMP Regional Coordinators.

The Environmental Planning and Management Process

The environmental planning and management process, which forms the basis of SCP work, is a

bottom-up approach consisting of three steps. The first step is the development and operation of a city-level demonstration project. Once this is put in place, the next step is a national consultation and follow-up, to integrate the project into national environmental planning and management. The third step represents country support for the initiative, through participation and regional exchange of expertise and cooperation.

Environmental Planning and Management at the City Level

Our approach at the city level is similar to that of the Metropolitan Environmental Improvement Program (MEIP) described by David Williams. It begins with a preparatory process to clarify the environmental issues through an environmental profile of the city. The next step is the most important: involvement of the stakeholders in each of the issues that have been identified. Once the stakeholders have been involved, we hold a consultation in which the priorities are set, and all partners agree on the mode of proceeding to meet these priorities. This consists of first agreeing on the issues, developing and agreeing upon environmental strategies on an issue-specific basis, developing action plans consisting of mutually supportive activities, and developing the projects to be undertaken. We also make sure that the necessary funding is in place. At this point the range of funding for the demonstration activity is between US\$500,000 and US\$1 million. Throughout, the major goal of the SCP is to develop the

capacities of those in the public, private, and community sectors whose cooperation is essential for successful environmental management.

Currently, the program is well advanced in 8 of the 15 SCP cities worldwide, including Concepción in Chile, Dar es Salaam in Tanzania, Ismailia in Egypt, Katowice in Poland, and Madras in India. Seven other cities are in the pipeline.

The program in Dar es Salaam is the most advanced of all of the demonstration activities and has been very successful. The demonstration project there has attracted an additional US\$15 million in support from 17 assistance agencies for the purpose of building capacity and funding technical operation activities. The program is currently at the second step, the national consultation.

The National Consultation

In the national consultation the priorities that have been identified at the local level are addressed at the national level. At this point the focus shifts from demonstration to replication. The key factor here is to initiate a "snowball effect," to carry through the impetus that has been built in the city-level demonstration project to a national application. In the case of Tanzania the national process has started, and the demonstration project has been replicated in some eight intermediate cities.

Development of Regional Cooperation

The third step in the process is the development and establishment of a national agenda for regional cooperation, to support three basic objectives.

The first objective is the exchange of expertise and technical cooperation among developing countries. This is a common thread throughout the presentations here today, and forms the basis for most interurban networks.

The second objective, the sharing of common resources, is a little more difficult to achieve. However, we have been quite successful in achieving this objective through the regional net-

works already established under the UMP. The result has been the establishment of centers of excellence and pools of regional expertise. This step is critical in moving the process from demonstration to replication and self-sufficiency.

At this stage, the process feeds back into the UMP/E, which captures the operational lessons of experience—the third objective in support of regional cooperation. Currently, the U.K. Overseas Development Administration (ODA) is funding a UMP activity to collect the lessons of experience and to bring them together in regional workshops for synthesis. We expect these workshops to feed into Habitat II, and to allow us to develop a program guidebook to support future exchanges of expertise.

Translating Experience into Action

The SCP strives with its partners in developing country cities to advance a new understanding of environmental issues—one that goes beyond the technical and political aspects, to consider the range of stakeholder interests that must be reconciled for effective environmental management.

The SCP does not simply advance modern management techniques to deal with these environmental issues. Rather, the program seeks to institute a broadly based participatory approach to identify and gain consensus on strategies; it thus involves the full range of actors: all relevant levels of government, private sector groups, community-level groups, and other stakeholders.

The SCP also concentrates on advancing strategies to leverage the necessary resources to effect change. These consist of a resolute focus on capacity building rather than direct support, on demonstration and replication strategies, on the regionalization of external support, on networking among cities, and on technical cooperation among developing countries.

Reference

- Bartone, Carl R., and others. 1994. *Toward Environmental Strategies for Cities: Policy Considerations for Urban Environmental Management in Developing Countries*. Urban Management Program Policy Paper no. 18. Washington, D.C.: World Bank.

Floor Discussion

Question 1: What has been the actual impact of these network programs on the environment? If it is still too early to measure impact, what indicators would you use to evaluate progress?

Mr. Williams: In the case of the Metropolitan Environmental Improvement Program (MEIP), the work we are doing is just a small part of the many activities going on in the city. Let's not fool ourselves. But these programs have resulted in visible improvements in the urban environment, such as the greening of *kampung* (slum) areas in Jakarta, installation of public sanitation facilities in these same areas, river cleanup efforts, and so on. These local-level activities, which have produced visible results, provide a base for communities to share experience and establish linkages to other efforts.

Some of the larger-scale efforts are still works in progress, and their effects are not yet clear. However, we do see in some of the clean-technology work that industries are taking up specific recommendations and are using them to come up with loans from local banks in order to improve their technology process and reduce their wastes. So there has been some expansion beyond the program.

Mr. Eigen: In a sense this is quite a difficult question. For example, we cannot wait until the air quality starts improving before we make our decisions to pursue a certain direction or change it. The solid waste cleanup campaign in Dar es Salaam was designed to show quick results and get public support. In this case there has been a

radical improvement in places around the central market where formerly the garbage layer was at least a meter thick.

However, we also have to be conscious of whether we are on the right track, whether the project has a participatory approach to decision-making and facilitates stakeholder involvement—things that are indicators of success.

It is essential to remember that the necessary expertise is in the cities of developing countries, not just in Washington or London. The only alternative for mobilizing this expertise is through organization and networking.

Ms. Kudat: In the case of MEDCITIES we have done a rapid cost analysis for each of the elements of environmental degradation: how much, for instance, the unreliability of the water supply is costing. We also measured the effects of unreliable water supply in terms of diarrheal and other diseases. We then asked what it would take to remedy the situation. And this provided a relatively rough but easy answer to the question.

We are now working on a major investment in Oran that has an environmental dimension. The city had the option of extracting water from ever-greater distances using more and more energy in an infrastructure environment where nearly 60 percent of the water was getting lost because of the mismanagement of the system. Instead, they decided on a program of leak detection and an environmental campaign for water conservation. This will have a positive environmental impact, measurable in terms of both investment and energy use.

There is a long list of benefits from networks, but I will mention only two. MEDCITIES does not work with large megacities because they attract other assistance, they have basic services, and they have political power. Individually, the member towns of the MEDCITIES network do not have political power; together, they are powerful. Together, they were able to draw attention to the need for a proactive environmental agenda.

Many urban environmental problems stem from the activities of other cities or peripheral settlements. And many are the effects of bad policy at the national level on such things as energy prices, energy substitution, and so on. Cities have done two things to address such problems. First, by networking within their vicinity, they have broadened environmental-action peripheries to correspond to the actual interjurisdictional areas being affected, rather than just the official administrative peripheries.

Second, they now know that only by working together can they solve these problems, and many cities in many countries are forming unions to take advantage of their collective strength and knowledge.

Question 2: Indicators still have to be developed to allow comparisons among programs. For example, how would one compare the achievements of the MEIP with the MEDCITIES Program? How do we know which programmatic approach has produced the best results?

Ms. Kudat: This question has a number of ethical implications. The question is also highly political, since these programs are trying to empower each city to deal with its own problems. These ethical choices should never be made; each human settlement should be able to solve its own problems.

Audience observation: Every time someone makes a decision to spend aid money, those ethical choices are being made, even if by default. The question is how one makes them.

Ms. Kudat: For the MEDCITIES audit we have used common indicators starting the same day in all audited cities. We can take this as a baseline and look at it in another five years to have comparable, measurable statistics.

But what would that comparison mean five years from now? Two cities looking at the same degradation data may decide to try different approaches. Each of these cities has its own set of resources and problems, and the choices each makes may not be based purely on the risk assessment that I presented.

But perhaps most important, the major lesson that we have learned from our experience is that there is really very little that the city can do alone to solve its problems. The national government may not respond to the city's problems with changes in energy policies. Neighboring cities may continue to discharge their waste upstream. There are many externalities, and that is why indicators alone are not going to give us all the information we need to solve urban environmental problems.

Chairperson Kimm: At USAID we are devoting a great deal of attention to indicators and the measurement of results. In the environment field, there are two aspects to consider and to try to measure. One is the overall impact—are things getting better or worse—which is important to an understanding of whether the basic strategies are sensible or not.

The second aspect is to consider and measure only those things that are reasonably within the span of management control of the program being evaluated—that is, what is it that the program could be expected to achieve, and is it achieving that goal?

We have put considerable effort into these issues during the organization of a new environment center at USAID. Evaluating an activity is very complex and subjective, and I am not sure that the process entirely gets around the subjectivity.

Audience observation: The point is to clarify the basis on which a particular choice is made, otherwise there is a risk that these decisions will be made based on subjective or political judgments.

Mr. Williams: Another aspect to indicators is that they help cities allocate scarce funds among competing, serious environmental problems. It is really a question of how serious the problems are, how many people are affected, and how badly they are affected.

Indicators can also be a motivational tool for cities or national governments to take action. If governments can measure the problem, and then measure the progress, they may be more willing to address the problem.

Mr. Krzyzanowski: The Union of the Baltic Cities has focused on upgrading the municipal institutions and on developing human resources. Part of this has been accomplished by twinning arrangements between Western cities and Eastern cities. There is some improvement, but it is hard to measure. It is hard to use a mathematical approach on what is essentially a qualitative improvement of capacity in those cities.

Capacity building is a long-term process, so that incremental improvements are hard to measure. For now, improvement can be seen in the growing capacity of these cities to better absorb financing, both internal and external, and to undertake complex projects. Perhaps at the end of the process, we will be able to measure improvement in the quality of the Baltic Sea.

Mr. Leitmann (session rapporteur): It is simple to come up with indicators, but the issue is which are the most useful ones. In 1990 the Bank brought together about 20 international and national organizations and academic institutions to discuss environmental indicators, and we generated 50 pages of them. We have collected data for at least 20 cities. These data are cumbersome and do not always compare the same quality and level of service. Interpretation becomes very important.

On the other hand, the World Bank and UNCHS, in preparation for the Habitat II Conference, are working to develop a reduced set of indicators, not only for urban environment but for poverty, for the efficiency of municipal finance and administration, and for the functioning of a land market and the housing market.

The Bank has had a successful housing indicators program for the past few years. This program has tried to develop a small set of indicators that allows comparisons among cities. Where environmental indicators are concerned, we must try to reduce the 50 pages of indicators to 12. It is difficult to choose the ones that are relevant for every city.

This is something we need to consider carefully. In certain areas, such as air pollution, we may come up with useful indicators of exposure

to pollutants or incidence of respiratory ailments. But as Mr. Williams has said, that should not distract us from some of the more important questions about political commitment and action on the ground.

Mr. Williams: Some of these indicators, especially if they relate to a specific service agency, such as a water supply agency or a sewerage authority, could be quite useful in the cities as a tool to raise public awareness.

Some ambient environmental indicators, such as the degree of air pollutants, are already publicized in some cities on a daily basis; thus, concerned citizens bring pressure to bear on the government to do something about it.

Mr. Trivelli: As illustrated by metropolitan areas in Latin America, it is very difficult to come up with urban indicators as such because, with the exception of Bogotá, Montevideo, and Quito, most other big cities in Latin America are under multiple administrations. For example, the municipality of São Paulo covers only one-third of the metropolitan area and is surrounded by 14 municipalities. The same is true for Buenos Aires and Mexico City. Santiago is an extreme case consisting of 34 municipalities and no metropolitan government.

So if you are talking about efficiency in garbage collection and provision of services, what are you talking about? Which municipality? In addition, as Secretary Cisneros noted about the United States, many Latin American cities are also extremely segregated—the poor live and work in separate areas of the city from the wealthier segments of society. The worst environmental indicators are registered in areas where the poor live.

Mr. Eigen: Basically, these indicators are to measure the competence of local government. But we should be asking, competence in what? We are in the process of refining the role of local government and are starting to understand that the role is larger than we had thought, but that local government is also just one of the players in the process, along with the private sector, the community sector, and the national government. Local government is understood to be more a facilitator—a mobilizer—of local resources, rather than just a provider of services.

We may have difficulty trying to measure competence 10 years from now by the same means we have used in the past few years, because the role of local government will be very different.

Mr. Williams: Whatever the difficulties in measurement, the burden rests on the development agency to demonstrate that it is producing results, especially to justify expenditures on programs and to qualify for more funding. In the United States, our accountability runs to the Congress. Therefore, we do need some indication of the success of our programs.

Question 3: The question of incompetence and corruption on the part of local governmental institutions is crucial. The resources of the rich, the self-help of the poor, the expertise of the experts will all be wasted if they get bogged down in the quicksand of incompetent or corrupt institutions. How do you deal with this issue so that resources are actually invested and produce results instead of just going into somebody's pocket?

Ms. Kudat: The best way is to involve the stakeholders from the beginning; to instill in them a sense of ownership in the project and the process. The process should be as transparent as possible. That is exactly why MEDCITIES has focused on participation.

Audience observation: We have this problem here in the District of Columbia: everything is open and transparent, and there is still corruption and incompetence.

Audience observation: Incompetence, which is probably the flip side of corruption, is very much a factor in Asia, definitely in India. In Bombay, which may be regarded as "efficient" in the Indian context, municipal expenditures are greater than those of many Indian provinces. We have politically strong municipal agencies that follow their own agendas. So networking, in the context of the Asian city, is an extremely important approach.

We have organizations that traditionally deal with information, and as we know, knowledge is power. These organizations try to control access to information and to avoid transparency at all costs. Networks are all about sharing information, and they help to counteract this tendency.

Mr. Trivelli: This question touches on the issue of whether municipal governments are accountable. For the past 20 years there has been a trend toward decentralization throughout Latin America. This has meant a decentralization of functions and responsibilities, but not of funding—except in the case of Brazil and Colombia. How can a local government be made accountable when it has little control over funding for local services?

Audience observation: To follow up on this point, two interesting cases were discussed in a recent meeting on urban development in Brazil. One is the experience of Porto Alegre, where community involvement in municipal budget discussions has brought high visibility to where the money is going and much discussion about allocation of the next year's budget.

The other case is in São Paulo, where some groups are trying to work with communities to require the municipal governments to publicize their yearly allocation of resources in different areas—environment, infrastructure maintenance, housing, and so on. Once the process is more transparent, the community should be able to press for better service in priority areas of environment, be it water, sanitation, or garbage collection. They would understand the pricing of those services and be able to do a community audit of the performance of a given municipality.

Question 4: This session has revolved around three phrases—capacity building, professional competence, and accountability. Most of us believe that networking has to occur between the government and public authorities, on the one side, and all the nongovernment and community-based organizations, on the other side. But if networking is to be successful, shouldn't all of these stakeholders, not just the government agencies, be accountable, professionally competent, and capable?

Ms. Kudat: In the MEDCITIES program nongovernmental organizations (NGOs) are quite active and are expected to hold to these standards. The Technical Secretariat of the MEDCITIES is an NGO, United Town Development Agency, that specializes in bringing cities and their local governments together.

Mr. Williams: We also work with NGOs in MEIP. Of course, there are many different kinds of NGOs—some academic, some community-based. The task is to determine the real competence of the range of NGOs, and who can help effectively. Using an NGO is not always the answer; often an arm of government or local government may include community-oriented staff and can be more effective, because it provides the necessary link with government.

Ms. Gozun: I am the national program coordinator of MEIP in Manila. In Manila we also believe that the only way we can address these problems is to be able to bring in all sectors concerned to play their role actively. When there is a lack of capability for any one sector to assume its role, there must be an effort to build capability.

In all of MEIP's programs we conduct workshops and special sessions just for the NGO communities to help them understand exactly what the work entails and how they can contribute.

When governments started closing down the open-dump sites in Manila and moved toward landfills, the NGO community in Manila was against landfill. But it turned out that this was only because they did not understand what landfill was. We educated them about what landfill is and showed them two operating landfills in Manila, and they realized that landfilling is a more environmentally friendly way of disposing of garbage, although, in itself, it is not the solution. We also teach people at the community level to reduce, recycle, and reuse waste as a more sustainable solution. We are in the process of packaging a proposal to set up a Brown Fund to be used to improve the institutional capability of NGOs to deal with urban and environmental issues.

Audience observation: Tokyo's solid-waste management project uses NGOs, but also requires strong governmental control, supervision, monitoring, and evaluation. The more effective the NGOs are, the more effective the public sector must be in coordination and supervision.

Audience observation: The expectations and results of networking between or among unequal partners—between patron and client, guide and student—will be quite different from what can be

expected from networking among partners that are more on a par.

Mr. Trivelli: The UMP is trying to institute in Latin America the notion of tying municipalities with environmental problems with those that have experience in dealing with the problems. There have been very interesting cases. In Recife some slum dwellers have organized to build sewerage systems and to manage them themselves.

In Colombia a national law was passed that brought about a substantial decentralization of functions and fund-raising to the municipal level and compels municipalities to provide a certain percentage of urban land to be used by the community according to its own priorities. This is called *verdurias populares*. Several mayors have been expelled from office because they have not complied with this legal mandate by the community. More responsive mayors go out to meet with community leaders in each section of the city to discuss projects. The community leaders know exactly what is happening to the funds allocated for investment in their neighborhoods.

The point is that when you have dynamic measures, and transparent administration, people are ready to follow an accountable leadership.

Chairperson Kimm: It is U.S. foreign policy to support democracy and market economies in all of the countries with whom we have relations. But one has to be something of an optimist to believe that democracy will, in fact, produce the benefits that we have heard described. Winston Churchill said it best: "It is a terrible system, but there is no better one."

Corruption will be with us until the end of time, but a truly democratic process is probably the best protection from it.

Question 5: The discussion of indicators seemed to indicate that, although there is no problem analyzing individual components of individual cities, these analyses are rarely put together in a comprehensive audit. Cities are their people, and each city will be unique according to the preferences of its residents. We cannot have the same set of indicators in two different cities, in two different countries. How, then, do networks define common problems and enable cities to cooperate on these common problems?

Mr. Trivelli: Finding common ground between disciplines is a fundamental challenge faced in all fields. The UMP and other networks are trying to bring policymakers together with other stakeholders in an open dialogue so that they understand what cities are all about. To really achieve

development and productivity, policymakers must consider the cities, and the problems and opportunities that are common to cities. We are optimistic that this process of fostering dialogue on policymaking is showing promise in a number of countries.

LAND RESOURCES: DIFFERING PERSPECTIVES ON THE SHAPE OF FUTURE CITIES

Overview

Alain Bertaud

Critics of the urbanization process of large metropolises usually express two major concerns about the cities' impact on the environment: they consume too much land (urban sprawl), and they expand indiscriminately into environmentally sensitive areas or into valuable agricultural land. Thus, their perceived land-use inefficiencies are both *quantitative* and *spatial*: large cities use too much land and in the wrong place.

The assumption that inefficiency is inherent in large-scale urbanization is so universally accepted that practically every major city in the world is subject to growth control regulations. In command economies (such as China and the former Soviet Union), regulations seek to control migration toward cities and between cities directly. In market economies, the growth control strategies constrain urban expansion by establishing strict greenbelt regulations (as in the Republic of Korea), or by restricting the creation of industries around large cities (as in India and Korea). None of these strategies has prevented the expansion of metropolises when and where economic forces have been favorable to growth. In addition, growth control strategies have not only failed to meet their original objectives, but, by distorting the land market, they have also created negative side effects on the welfare of low-income households and on the environment. The case of Seoul discussed during this session will provide ample illustration of these side effects.

This double failure should prompt us to re-examine the very premises that triggered the creation of growth control measures—that households or firms use land more efficiently if they remain in the countryside or in small cities than if they move to a large city and that the dispersion of pollution in a low-density area is preferable to its concentration in large metropolises. Evidence shows that both premises are wrong. Obviously, firms or households would use land more carefully and economically where land is expensive—in the large city—than where it is cheap—in the countryside. As for pollution, a more global approach has shown that the real problem is the total amount of pollutants that are released, rather than where they are released. Thus, by making pollution control more difficult to enforce, geographic dispersion aggravates the problem. The environmental problems caused by cities will not be solved by inventing new ways to prevent cities from growing, but by managing urban growth to make cities more efficient in how they consume land.

Land Consumption in Rural and Urban Areas

Households, enterprises, and governments consume land wherever they are—in the countryside, in villages, in small cities, and in metropolises. Growing evidence from several countries shows that land consumption per person for nonagricultural activities is inversely

proportional to settlement size. In Korea in 1992 households in villages and rural areas were consuming six times more land per person for residential purposes than were households living in Seoul. Consequently, the residential land used by the 10 million people living in rural areas is 32 percent larger than that used by the 34 million city dwellers. It is ironic that had the strategy used to control the growth of Seoul been successful, it is likely that more land would have been converted from agricultural to urban use.

In countries where arable land is scarce, the development of large cities represents the only option to relieve pressure on agricultural land. High rural densities may pass sensitive ecological thresholds and cause irreversible environmental damage (as in Bangladesh, Java, and Nepal). In contrast, high urban densities can always be accommodated by adequate infrastructure. The development of large, well-managed, high-density cities might well be the only solution for countries in which rural densities are high.

Searching for a Definition for Land-Use Efficiency

While city dwellers generally consume less land for residential use than do rural residents, the consensus is that land-use efficiency in many cities can be improved significantly. However, no convincing definition has ever been forwarded about what constitutes efficient or inefficient land use. Many urban planners are claiming that higher densities would be more efficient. But most urban regulations—often established by the same planners—set an upper limit on densities, never a lower limit. Thus, one can assume that if land markets were shaping cities, without the constraints imposed by regulations, urban densities would be higher than they are now.

What efficiency objectives would be served by densities unconstrained by regulation? Higher densities would reduce the footprint of cities in the countryside and relieve pressure on adjacent agricultural and ecologically sensitive areas. They would normally also reduce distance to work and lower transportation costs—and thus energy consumption and pollution, given a transportation infrastructure commensurate with density. Bangkok's legendary traffic jams prove that market-driven density, with all its cost advantages,

has serious drawbacks when not matched with an adequate transportation infrastructure.

But high densities alone cannot be taken as an indicator of efficiency. High densities might be the result of a terribly constrained land supply or inefficient land use. Densities might be high when people are able to consume only little floor space while large tracts of urban land remain unused or underutilized. In this case the low consumption of residential land compensates for the inefficiency of land use, creating high densities.

The pattern of densities across the city is a better indicator of land-use efficiency. In cities where the land markets function reasonably well, density declines as distance from the city center increases. This pattern tends to reduce distance to work. Cities in which the land market is very constrained (as in Johannesburg and Seoul) or absent (as in Moscow and St. Petersburg) tend not to follow this pattern of decreasing density. The result is a dispersed population at high density. This is the utmost of inefficiency—city dwellers have the simultaneous disadvantage of consuming very little land and having a long distance to travel to work.

“Urban sprawl” is often cited as one of the major causes of land-use inefficiency. At the edge of many urbanized areas, a large belt of semideveloped land often constitutes a waste of both land and infrastructure. The positive aspect of sprawl is that it is temporary; eventually, plots will fill in. While some sprawl may be necessary for the functioning of land markets, an inordinate amount of land occupied by the sprawl belt is a strong indicator of a deficient legal and regulatory environment. The large areas of undeveloped land might be caused by tenure fuzziness or by cumbersome building permit legislation. Planners should monitor sprawl belts, measure the time they need to fill in, and propose corrections to any legal or regulatory impediment that may be responsible for an inordinate extension of the sprawl belt. In Jakarta, for instance, a number of studies have shown that the building permit process is responsible in large part for the sprawl. So far no indicator has been designed to measure sprawl, so that discussion of sprawl is often impressionistic without leading to any practical solution other than recommendations to “bring urbanization under control” or to “curb speculation.”

Finally, in several countries, subdivision regulations are the primary determinant of land-use inefficiency. Unreasonable space standards for land subdivisions increase the consumption of urban land without generating many benefits to residents. In many countries these standards are responsible for making developed land unaffordable to a large portion of the population, for increasing pressure on the land market by artificially raising land consumption, and for increasing the volume of storm water runoff as the pavement of grossly oversized residential streets prevents groundwater absorption.

The manner in which cities expand depends on the internal pressure generated inside the existing city by the land market. The more inefficient the land use in the built-up area, the greater the pressure on periurban areas. Thus, the spatial aspect of the expansion of cities cannot be separated from the issue of densities and density patterns. The absence of both appropriate infrastructure that can support higher densities and adequate land regulations prevents the recycling of urban land and pushes cities to expand farther than necessary into agricultural land.

When ecologically sensitive areas are located in the immediate peripheries of cities, the only way to protect them is to provide new primary infrastructure that opens new land up to development, replacing the land that has been removed from the market in the protected areas. It is often impossible to protect ecologically sensitive urban areas from urbanization if the areas have no alternative public uses.

Density Patterns in Selected Metropolises

To illustrate these points, I have selected several metropolises across the world with different economic and regulatory systems (figure 1). The pattern of land consumption in these cities varies significantly. Two land-use parameters are important from an environmental viewpoint: the amount of land consumed, and the pattern of density as one moves farther away from the center. The more land that is consumed per person, the greater the pressure on surrounding agricultural land or on ecologically fragile areas, and the more expensive it is to build and to maintain the infrastructure. When the pattern of density stays constant or increases as distance from the

center increases, commuting distance becomes longer, more energy is expended, and more pollution is created.

Compare the dispersion of population for six cities: Shanghai, Paris, Seoul, Bangkok, Moscow, and Washington, D.C. Within a six-kilometer radius, Shanghai accommodates more than 6 million people, Paris and Seoul 2.5 million, Bangkok slightly less than 2 million, Moscow 1 million, and Washington, D.C. about 200,000. Thus, a person living in the central part of Washington, D.C. uses 30 times more land than does a person living in the center of Shanghai. This large variation of density in the two cities shows the futility of adopting a normative approach to density.

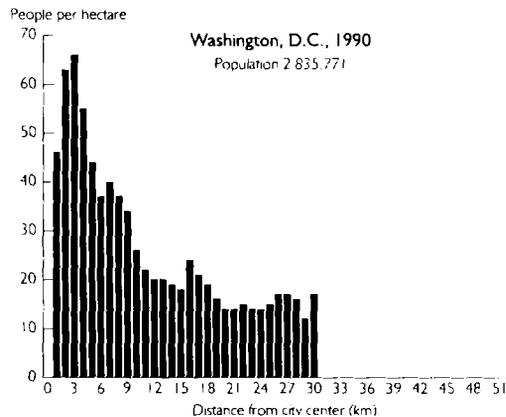
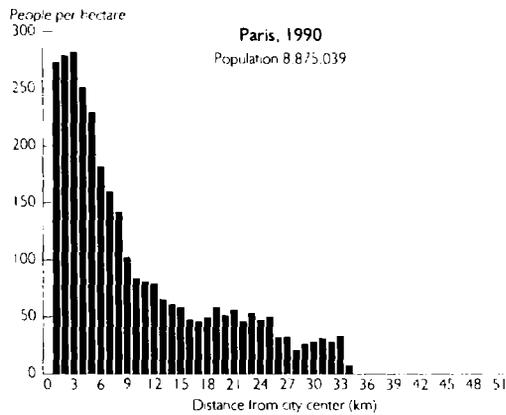
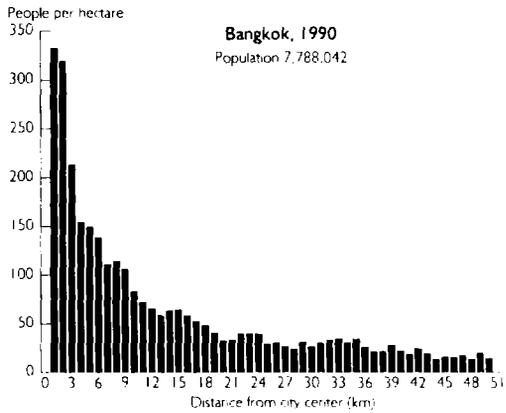
Now compare the distribution of densities out from the city center. A clear typology of densities emerges. The first type contains cities where the land market works relatively freely—Bangkok, Paris, and Washington, D.C.—and where the high densities of the center shrink progressively out toward the suburbs.

The second type—Chinese cities—follows the same pattern as the market cities, but with much higher density peaks and much steeper decreases, for the following reason. During the 10 years of the cultural revolution, practically nothing was added to the housing stock, thus increasing the density of the cities to very high levels. Since 1978 enormous construction activity has taken place, and suburbs of uniform normative densities have been built. However, because China's government never invested much in city infrastructure and public transport, the bicycle has remained the main mode of urban transportation among the majority of the urban population. The bicycle put a real cost on distance—in terms of time and effort—mimicking the effect of the market on the desirability of proximity to the city center. Thus, while rents were uniform, the cost of transport contributed to the densification of the central area, while suburbs stayed at their low normative densities.

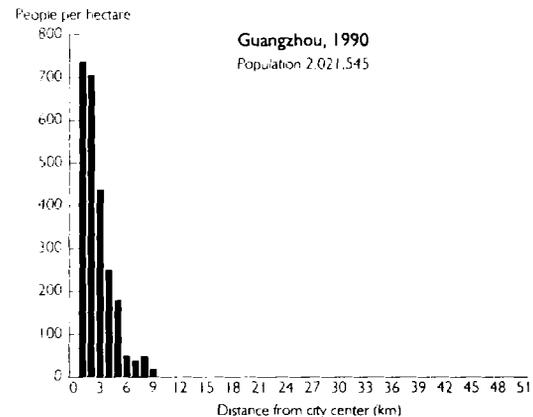
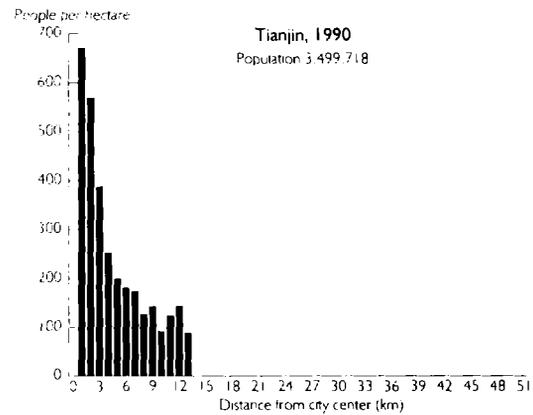
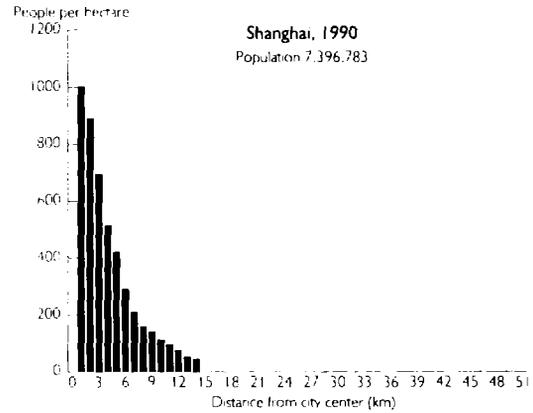
The third type of density pattern is found in cities where the land market either does not exist or is perturbed by drastic regulations. In this category belong Capetown, Johannesburg, Moscow, St. Petersburg, and Seoul. In these cities the density pattern follows what apparently are random curves.

Figure 1. Population densities in built-up areas in eleven cities

A. Market economies



B. Chinese cities

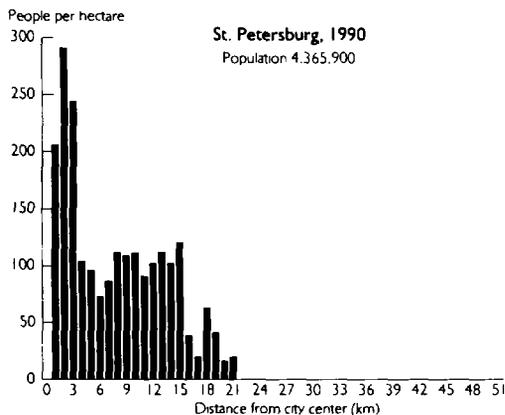
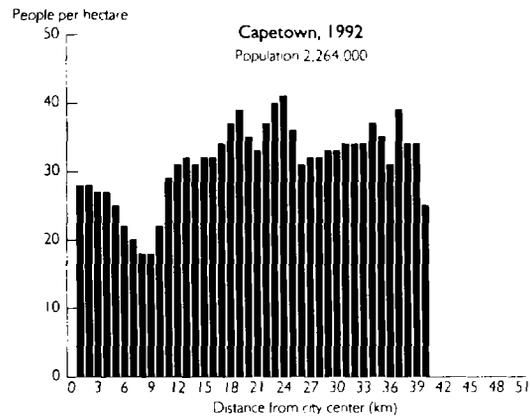
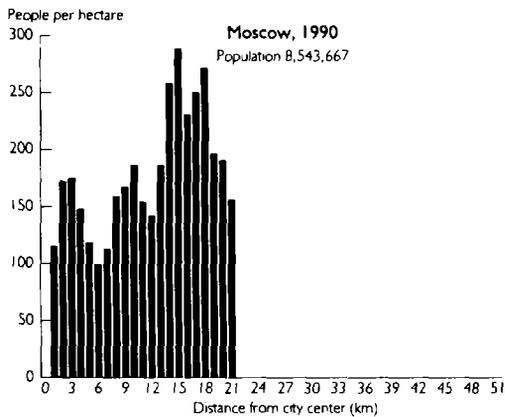
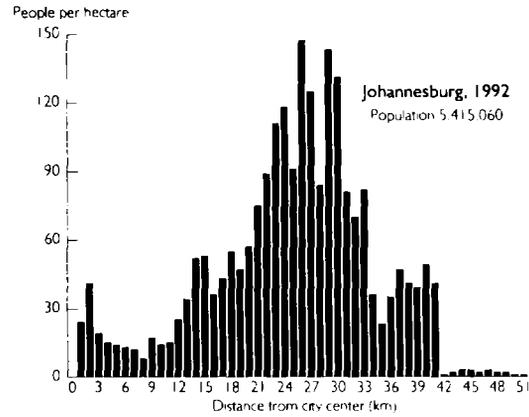
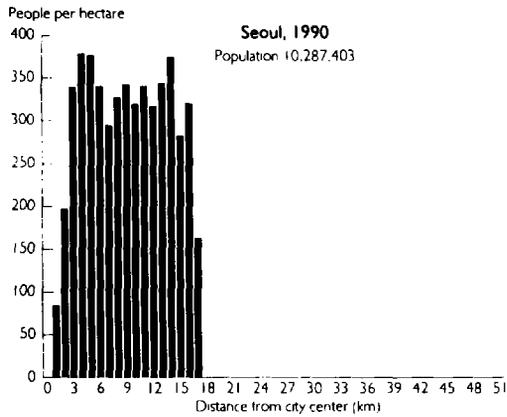


Addressing the Quantitative and Spatial Aspects of Land Use

Should city shape be a consequence of the unpredictable evolution of land markets? Or should the shape be predesigned using strictly enforced master plans? Empirical evidence shows that shaping a city by administrative fiat while ignoring the market is full of dangers. The outcome is never satisfactory and never what was intended in the first place.

Comparative land-use efficiency studies between command economies and market economies suggest that the signals sent by a well-functioning land market are essential for guiding urban planning decisions. In particular, land recycling can be done only with a buoyant land market with large locational price differential. However, it is necessary to develop a new type of regulation and land-use planning, with clear and explicit ranked objectives. The new regulations and planning process should be much more

C. Socialist cities and severely constrained markets



attuned to demand, and market forces in general, than the traditional master plan approach.

In our quest for a definition of efficiency, it is impossible to be normative; there are no efficient or inefficient densities, no magic numbers. Land is used efficiently when all of it is valued at market price and can be traded freely. This avoids the large areas of obsolete industrial land found in cities under command economies. In market economies, however, the regulatory environment is often responsible for land-use inefficiency.

Periodic regulatory audit should be performed in every city to remove the regulations whose purpose has been lost in time or that are responsible for unaffordable developed land. Densities should be established by the land market. Infrastructure should be built to support these densities, not the other way around. The cost of infrastructure should be recovered from the price of land. If such principles were applied, the resulting densities would probably be higher than they are now in most cities. The environment would

benefit in two ways: first, cities would occupy less land and put less pressure on agricultural land or natural reserves; and second, commuting distances would be reduced, saving energy and reducing pollution. In conclusion, densities or

land-use efficiency cannot be “designed.” They are always the result of a process. It is this process that planners should streamline, using density patterns as an indicator of progress made in the right direction.

Jabotabek or Pantura: The Case of an Expanded City

Hendropranoto Suselo

What is the human face of a city, the main theme selected for this conference, and how does it pertain to land resources, the focus of this particular panel? The city is its people, and every physical dimension of the city reflects the characteristics and behavior of the people, and how they choose the many options available to them in the city. These choices in turn depend on the social, economic, cultural, political, and technological climate of the city, and on the values, will, and capacity of its people. The demographic profile of the city is one indicator of the city's human face. The way people use urban land resources—or the study of urban land use—is another indicator of human life in the city. But what are the public decisions that can be traced from government policies and the urban master plan on how the city is expected to grow and meet the anticipated demand of the urban population?

This discussion focuses on Jakarta, the capital city of Indonesia. With a population of almost 8 million people within the city's administrative boundaries and 17 million throughout the entire metropolitan area, Jakarta is one of the largest metropolises in Asia. The growth of Jakarta has extended to a major portion of its surrounding regencies (*kabupaten*)—covering Bogor, Tangerang, and Bekasi—and the entire area is now known as the Jabotabek Metropolitan Region.

Jakarta illustrates the case of an expanded pattern of urban land development, with urban sprawl, which the city administration and central government have tried to guide without much success. It is of course relevant to ask whether the giant metropolis is really sustainable in the long

run, but this is a question that no one seems to be able to answer, despite the fact that it is a real phenomenon from which urban administrators cannot escape.

Jabotabek and Pantura: Two Phases of Urban Planning

Jabotabek represents the third phase of Jakarta urban planning since 1948; it captures the entire urbanized area of Jakarta, including areas and small towns in the surrounding regencies of Bogor, Tangerang, and Bekasi, which have received the spillover of population from Jakarta. Jabotabek was founded with the formulation of the Greater Metropolitan Plan of Jakarta, followed by the Jabotabek plan initiated by a Dutch technical assistance team, then by the Jakarta Metropolitan Development Strategy financed with a World Bank loan. In 1990 a Jabotabek Metropolitan Development Planning Review Study was conducted, which put into motion the concept of wider regional planning for the Pantura (the Northern Coast of West Java), marking the beginning of the fourth phase of Jakarta urban planning.

The Jabotabek Metropolitan Development Strategy pursued two important developmental conditions. One, it stimulated and justified the development of satellite urban settlements around Jakarta for certain single or mixed urban functions indicated in the Jakarta plan. It set a certain target population limit for each of the urban settlements, and sought to prevent sprawl, or the ribbon pattern of development. Two, it called for an east-west urban expansion of Jakarta as the

most feasible way to avoid expansion into the southern aquifer zone, which it was assumed would damage the groundwater supply, and into the northern tier, whose lowlands and wet soil would, it was also assumed, be unsuitable for development. The east-west pattern of development was further reinforced with the construction of a new toll road—Jakarta to Merak in the west and Jakarta to Cikampek in the east.

Yet the stream of development, mostly for recreation and tourism, has continued to the south and north—this despite pressure against it by both the government and the World Bank. Politicians and policymakers now feel that the concept of Jabotabek has become outdated, since its coverage of development is too narrow to control the expansion of Jakarta. Jakarta simply cannot be prevented from exploding as a metropolis.

Thus, Pantura is a recent developmental concept to deal with the expansion of the “urban field.” The entire east-west corridor has become an attractive belt for urban development, taking the form of a ribbon pattern along the highway or more systematically planned “new towns,” such as the Bukit Indah City and Lippo City. Pantura is seeking to define an appropriate metropolitan planning region, clarifying the structure of and functional linkages among industrial estates, residential estates, ports, new towns, service centers, recreational and cultural centers, and the infrastructure—the toll road, the railways, mass rapid transit, and the series of dryports and other terminals along the corridor.

Pantura underscores the government’s concern about the impact of the currently “uncontrolled” east-west development on environmental sustainability. The unlimited expansion of Jakarta along this coastal plain corridor has caused massive change in land use from irrigated and fertile rice fields to urban settlements. Stricter land-use control has been urged to prohibit such change, and developmental permits can be granted only with the approval of the president.

Another policy change is to allow city expansion to the north. Despite Jabotabek development policy that termed the northern territory as uneconomic and unsuitable for development, this area has attracted many private investors, who wish to build a waterfront city, replete with residential and recreational facilities. In fact, huge private investment has already filtered into this

area for large-scale land reclamation, making North Jakarta an attractive investment option. A Dutch mission visiting North Jakarta several years ago recommended land reclamation of the coastal water up to 5 meters of the sea depth, or about 1 kilometer from the coast, which would make 3,000 to 4,000 hectares of new urban land available. The government has recently issued permits for private land reclamation of 60 kilometers of coastline from Tangerang to the west, an area adjacent to the North Jakarta waterfront. All development in the north of Jakarta will provide a new direction for growth.

A recent study on Jabotabek water resource development revealed the fallacy of the groundwater aquifer issue, and called for more intensive development of Jabotabek to the south. If the findings of the study can be confirmed, then Jakarta would be opened up in all directions.

Residential Land Development

Residential land development in Jabotabek was originally haphazard, undertaken largely by individual dwellers. But in the boom days of the Indonesian economy, when oil prices were high, housing came to be demanded by high-income families working in the oil business, and housing developers responded to the demand by building large luxury housing complexes within the city boundary, capturing prime land for residential development. Private housing developers also began developing exclusive housing in such enclave suburbs as Gunung Putri in the early 1970s. The entire residential scene was suddenly changed when the National Housing (Urban) Development Corporation (Perumnas), a state-owned corporation, was established in 1974 to build large-scale public housing. Depok—a new settlement in Jabotabek located close to Jakarta—was selected as the site for the first new town built by Perumnas with emphasis on public housing. In the west Klender became a new site for the development of sites and services and low-cost housing by Perumnas, with loan assistance from the World Bank.

Perumnas Pushes Jakarta Outward

Under Perumnas the construction of luxury and exclusive housing gradually declined, and low-

cost housing and moderate-income residential areas increased rapidly. Private developers increased their activities in building low-cost housing projects, stimulated by a home ownership credit program established by the government through the National Savings Bank (BTN). But a growing number of private developers opted for moderate- and middle-income housing, which offered the greatest market potential in the developing economy of the metropolitan area. New residential areas soon occupied the closest fringe areas of Jakarta, pushing its growth outward in all directions. The urban fringe became the most dynamic area of development within the administrative area of the capital city.

As inner-city land became scarcer, small urban centers, such as Bekasi, Tangerang, and Serpong, soon became the next logical target for private residential developers. A consortium of private developers began to develop the first new town financed fully by the private sector in Bumi Serpong Damai (BSD). Much later, other private-sector towns were built, such as Lippo City in the Bekasi/Cikarang area, Lippo Village in Tangerang, Kapuk in the north, and Cariu and others. New town development also spread to the capital cities of the regencies, such as Tiga Raksa, the new capital city of the regency of Tangerang in the west, which moved from the city of Tangerang. The latter was upgraded to the status of an autonomous municipality (*kotamadya*).

But Jakarta Also Begins to Expand Upward

In the meantime, residential development in the inner city kept expanding in the form of condominiums and high-rise apartments, which became fashionable for the young executives and expatriate families who preferred, could afford, and were accustomed to the apartment style of living. Palmcourt, Park Royale, and Rajawali condominiums are examples of the growing trend toward high-rise residential development in the city. The construction of apartment towers by major hotels followed the same fashion of residential development in the central area of the city.

Although high-rise living has been strongly encouraged by the government, including the president, it has not been accepted as a common mode of living by the lower-income urban population. Beyond the issue of affordability, the slow

acceptance of high-rise flats and apartments is due to social and cultural considerations. Public high-rise residential dwellings were constructed in Tanah Abang/Kebun Kacang under an urban renewal scheme in the central business district area to promote low-cost rental housing, as well as in selected locations of Perumnas housing projects. Although public housing policy can significantly influence the pattern of urban growth, prevailing constraints against high-rise residential development among the urban masses is the underlying reason behind the continuously outward expansion of Jabotabek development.

Despite the fact that high-rise living is still being accepted with reticence—thus limiting the possibility of developing a more compact city in Jabotabek—growing trends have had a positive impact on land consumption. In particular, economic affordability and a gradual decline in household size have reduced the average size of a house available for a Jabotabek family. A conscious public policy to establish lower costs for public housing is having a direct impact on reducing the housing-size trend in Jabotabek.

The government intends to maintain social stability in residential development by promoting more mixed and socially balanced residential quarters. One public policy mandates that developers of private housing adopt a “one-three-six formula,” meaning that for every high-income house they must provide three moderate- and six low-income houses in the same location.

Employment Center Land Development

The description of residential land development clearly indicates that housing promoted the expansion of the urban population and led to the creation of urban sprawl and new urban communities in the region. An analysis of the growth of the service sector of employment also shows this trend, particularly among commercial enterprises, which have expanded rapidly in just the past decade.

Office Blocks

In 1978 total office supply in Jakarta was around 100,000 square meters; by 1992 the figure had already reached 1.9 million square meters, almost 19 times the 1978 level. By 1996 the total supply

is projected to increase to 2.5 million square meters. Demand has also been strong throughout that period, although investment in office development from 1990 to 1992 has led to an oversupply on the order of 10 to 12 percent, and perhaps as high as 20 percent. But by 1996 the oversupply is expected to drop to around 2.2 percent of available stock.

In the past decade commercial business district office development has gradually shifted south and is now focusing on Jalan Sudirman, where two "superblocks" are to be developed. If developed as planned, they would account for most of the office demand in commercial districts to the year 2000 and beyond. The main locational criteria for new office blocks include good access to main roads, and a central or prestige location. It appears that growth in the office sector will typically come from the center outward, along the principal commercial thoroughfares, with some additional growth along the outer ringroad. But a recent proposal has suggested that a reclaimed area on the North Jakarta waterfront should also be a potential location for a second commercial business district.

Shopping Centers

Service sector employment has also been created in a dispersed form, following the development of residential areas; this has particularly been true of freestanding shopping centers. An estimated total floor space of 733,000 square meters was available at the end of 1992, and another 200,000 to 300,000 square meters of new floor space was made available at the end of 1992. This trend reflects an increase in the level of disposable income among middle-income and upper-income households, and the growing popularity of recreational shopping. Investors are clearly becoming more interested in developing these shopping centers, along with major department stores and food markets, in the urban fringe areas and growing new settlements. These structures will certainly have an impact on the development of urban subcenters in Botabek, the suburbs of Jakarta.

Industrial Estates

The industrial sector will become the new engine for employment along the east-west corridor of Jabotabek. The growth of manufacturing and

other industries was facilitated by a government policy that opened up the development of industrial estates in 1990 by providing incentives to take advantage of regional and global trends precipitated by the industrial transformation of developing countries in Southeast Asia. In the Botabek area a total of 6,500 hectares of land has been granted to new industrial estates, of the 18,000 hectares available in all of West Java. However, only 815 hectares of industrial estates in Jabotabek have been developed. In other words, although the growth of the industrial sector in the east-west corridor offers great potential for generating future employment, it has not yet been a significant driving force for diverting the Jabotabek population from its current service sector employment.

The development of the two major employment sectors—services and industry—illustrates that services are still the predominant employers in Jabotabek. Although the location of these services was dispersed in the manner of residential development, the major concentration is still in the municipality of Jakarta. Thus, although the Jabotabek population resides in the urban periphery, it still depends on Jakarta for work, creating travel congestion from residences to work places in the center city.

Land Development Lessons in Jakarta

Housing and employment—as well as recreational activities—were the major determinants of the expansion of Jakarta, especially to the east and west. Beyond those factors, weak physical planning control in the neighboring nonurban regency administrations, the relatively cheaper cost of land, and the availability of both productive and unproductive agricultural land that could be converted into urban settlements propelled the outward growth of Jakarta. The developmental patterns of Jabotabek to the east and west proves the success of the implementation of the east-west urban development strategy adopted by DKI Jakarta and its respective regencies, Bekasi and Tangerang.

More recent factors, such as government policy that has encouraged the development of privately managed industrial estates, and the construction of the major toll road to the east and west, have forced expansion into the entire northern low-

lying plain of West Java province, or the Pantura. In the meantime, the removal of obstacles to the north and south, as well as recreational land development, have counterbalanced the east-west development with a northern-southern axis. In addition, it is likely that future urban settlement in the Jabotabek metropolitan region will increasingly be concentrated in new towns or large-scale urban settlements as new towns are built by private investors or initiated by local government.

Furthermore, the majority of families in Jakarta still depend on the service sector for

employment, whose pattern has evolved into modern, sophisticated, and large-scale white-collar establishments concentrated in high-rise buildings in the commercial business district of Sudirman-Thamrin-Kuningan-Gatot Subroto, known as the golden triangle, and a more dispersed type of service, consisting of retail commerce and smaller-scale services that have followed the patterns of residential development. Both residential development and service employment have tended to push the city out toward the entire urban fringe.

Controlled Development and Densification: Seoul, Korea

Kyung-Hwan Kim

Rapid economic growth and urbanization in developing countries creates a certain spatial redistribution of people and jobs. In this process, the largest cities, frequently the capitals, tend to grow most rapidly. Residents of these cities are likely to see a deterioration in environmental quality, an increase in traffic congestion, and increases in the price of housing, forcing government intervention in order to contain further growth.

This description aptly fits Korea's experience since the mid-1960s. The government has enforced numerous regulations, first to discourage the growth of Seoul, the capital city, and later to mitigate the excessive concentration of population and economic activities in the Capital Region comprising Seoul and the surrounding province.

Land-use regulations have been a major building block for growth control policy in Korea. These regulations include the creation of greenbelts around Seoul and its satellite and provincial cities. The national government also administers the entire process of land development, except for very small projects. In short, Korea is a prime example of how stringent land-use controls are used as a mechanism for keeping urban expansion in check.

But as we look more deeply into this issue, it becomes clear that the control policies in Korea not only were ineffective, but also generated adverse side effects. Although it might be difficult to establish quantitatively what would have happened had spatial policy not been pursued, it is clear that it failed to promote an equitable and environmentally sustainable use of land resources.

One positive development in Korea is that policymakers now realize that land prices cannot be stabilized by antispeculative measures alone, and that supply constraints are equally important. Consequently, the overall framework of land-use regulation is being rationalized. Some changes have been made on greenbelt policy as well, but they have not been fundamental changes. The magnitude of regulatory reform has not yet emerged, since it will depend on how detailed action plans are drawn up and implemented.

How the Capital Region Has Grown: Evolution of Policy

The Korean public and its government began to worry about the rapid urbanization of Seoul as early as the mid-1960s. In 1960 Seoul's population was 2.4 million, or 9.8 percent of the total. By 1966 Seoul accommodated 3.8 million people, representing 13.0 percent of the Korean population. Then in December 1969 the Korean government published its first policy document addressing the problem of excessive concentration in the capital city. This policy statement was followed in 1971 by the designation of a greenbelt around Seoul, in which all urban development was banned. The government also placed strict controls on the construction of new factories, schools, and universities. At the same time, it began granting tax concessions and soft loans to induce firms to relocate out of Seoul.

These instruments were powerful. The pace of population growth inside Seoul decelerated from 9.4 percent a year during the second half of the

1960s to 4.9 percent during 1970–75. Yet as the population declined inside the city, population growth outside the city accelerated from 1.5 percent to 4.1 percent during the same period. This change in the growth pattern prompted the government to redirect its growth control policy to the entire Capital Region, comprising Seoul, Incheon, a coastal city west of Seoul, and the rest of Kyung-gi province, which surrounds Seoul.

Despite measures taken throughout the 1970s to reverse the growing concentration of population in the Capital Region, the region continued to register a growth rate much higher than the national average throughout the 1980s. By the late 1980s it had become evident that the government's policy to contain growth was ineffective. The government began to turn its attention toward promoting balanced development throughout the nation.

In 1989, in direct conflict with its previous policy of discouraging Capital Region growth, the government began constructing five new towns inside the region. The new town project was planned as an integral part of a nationwide drive to build 2 million dwellings during 1988–92 to counter the urban housing price hike that hit the nation in the late 1980s. Although some experts expressed concern that the project might worsen population concentration in the Capital Region, their voices were not loud enough to silence the public's outcry for stabilizing housing prices.

In February 1993 the new administration introduced a more fundamental change, announcing a plan to streamline and relax some growth control measures and to rationalize land-use regulations. The major objectives of the move were to strengthen the competitiveness of Korea's industries and to bolster Seoul's chances of serving as an international hub for the Asian region. The announcement was met by criticism from many planners and media commentators, who were afraid the plan would intensify interregional disparities.

Why Growth Control Policy Was Ineffective

Korea is one of the most densely populated countries in the world, and steep mountains cover two-thirds of its total land area. Korea also enforces some of the world's most rigid regulations on land use. The consequence of the

combined natural, topographical, and regulatory constraints is that urban land is in short supply. As of 1993 only 4.4 percent of total land area was in urban use: 2.0 percent for residential and commercial developments, 0.2 percent for industrial developments, and 2.2 percent for schools, roads, and other public facilities.

The amount of residential and commercial land in the entire country has increased more rapidly than has the population during 1973–94; consequently, per capita residential land has increased. In urban areas, however, the quantity of land available for residential and commercial purposes shrank by 20 percent per person during the same period. This pattern suggests that an insufficient amount of land has been converted into urban use in response to the growing demand for urban space.

Very little empirical research has been undertaken to estimate the magnitude of the shortage of urban land in Korea. Kim (1994) conducted the first systematic analysis on this subject, followed by Son and Kim (1994). The second study, using a set of negative exponential land-price equations for residential land and agricultural land as a function of the distance from the city center, concluded that urban land is indeed in short supply in almost every city in the Capital Region and that the shortage is due primarily to artificial scarcity created by land-use regulations.

Policy Has Increased the Price of Urban Land and Housing

High and rising prices for urban land and housing have been a major headache for Korea's government. Between 1974 and 1992 the land price index increased by 17.7 percent annually for the nation as a whole and by 22.1 percent annually for Seoul. Housing prices in major cities increased annually by 15 percent. The rate of increase in housing and land prices was much faster than the rate of inflation, which stood at 7.8 percent during the same period (Kim and Suh 1994). In Seoul house prices to annual household income was 9.25 in 1990, one of the highest among countries surveyed by the World Bank–UNCHS Housing Indicators Program.

Few people in Korea seem to realize that greenbelt policy and other tight controls on urban land use are a critical determinant of the high

prices for urban land and housing. Many people, even some experts, blame the phenomenon on "speculators." It may be difficult to isolate the impact of land-use control regulations on the increase in land prices from the impacts of macro-economic variables, land taxes, and price expectations. Nonetheless, the contrived scarcity of developable land raises land prices just as much as natural scarcity does. Besides, land is not a favorite object for speculators unless it is in short supply to begin with.

Cross-sectional data can be used to quantify the extent of land-price differentials attributable to greenbelt regulations and stringent controls on land-use conversion. Son and Kim (1994), using estimates from a simple model of land prices based on the approach of Rose (1989), concluded that the median price of residential land is positively related to such demand factors as population, its growth rate, and household income, but is negatively linked to the amount of developable land for urban use.

Land-Use Control Creates Inequities

The little developable land that has been made available for urban use has been developed and supplied by the public sector; private sector development has been limited to very small projects. In the 10-year period since 1981, in which the Land Development Promotion Act was promulgated and the Korea Land Development Corporation was established, the public sector's contribution was almost two-thirds of the total volume of land development. Thus, the most important factor in the urban market is a public monopoly.

The government-controlled supply system of developable land has led to inefficiencies in land resource use. It has made the land market unresponsive to consumer demand in terms of location and the size of developed plots. Criteria for locating development projects are not based on the preferences of the final consumer, but rather on the availability of raw land in large quantities. Developed plots are sold to home builders at a price marked up to over the purchase cost of raw land and the cost of servicing the land. Since the price set by the public sector developer does not necessarily reflect the market demand accurately, some plots sell very quickly, while others are not popular at all.

The current land supply system has critical equity implications as well. High and rising land prices translate into high and rising prices for urban housing, thereby threatening affordability (Kim 1991). Many urban households in Korea, let alone low-income families generally, find it difficult to afford buying a decent home from the open market. Yet the relatively well-to-do who are lucky enough to be selected to purchase new apartments at controlled prices receive a lump-sum capital gain that is worth several years of salary (Hannah, Kim, and Mills 1993).

Spatial Policy and the Urban Form

One important feature of the spatial development pattern in Seoul and other cities in the Capital Region is that the regulatory constraint dominates urban land use (Bertaud 1990; Kim 1991). Greenbelts start at 10 to 18 kilometers from the center of Seoul, and extend 10 to 15 kilometers outward to cover parts of Incheon, 14 other cities, and 8 counties in the Capital Region. The amount of developable land located inside greenbelts in the Region is equivalent to more than 50 percent of land currently in urban use (Son 1993).

Since urban development is not permitted inside the greenbelts, new developments are being built in five new towns located 20 to 25 kilometers from Seoul's central business district, and with much greater density (table 1). For instance, the size of the land area in the new towns ranges from 4.2 to 19.7 square kilometers, compared with Seoul's land area of 605.34 square kilometers. Planned population for the three smaller new towns is 170,000, whereas the two larger ones are planned to hold 390,000 and 280,000 residents. The average gross density of the five new towns is 235 persons per hectare, much higher than the 181 persons per hectare in Seoul. Net residential density figures are more dramatic. The average for the five new towns is 686 persons per hectare, compared with 364 persons per hectare in Seoul.

There are a few economic reasons that high-density development does not take place in central locations. One reason is that plots that were developed long ago are too small to qualify for high-density redevelopment that complies with building codes, and that land pooling is expensive

Table I. New towns in the capital region

Indicator	Bundang	Ilisan	Pyongchon	Sanbon	Jungdong	Average
Area (square kilometers)	19.68	15.71	5.11	4.19	5.45	10.03
Planned population (thousands)	390	280	170	170	170	236
Residential land (square kilometers)	6.33	5.25	1.92	1.82	1.87	3.44
Gross density (persons per hectare)	198	178	333	406	312	235
Net residential density (persons per hectare)	616	533	884	935	909	686
Distance from Seoul (kilometers)	25	20	20	25	20	22
Total settlers (1992-93, thousands)	231	106	160	57	180	147
Movers from Seoul (thousands)	176	88	118	44	98	105
Percentage of settlers from Seoul	76.2	83.0	73.8	77.2	54.4	71.4

Note: The Capital Region comprises Seoul, Incheon, and the rest of Kyung-gi province.

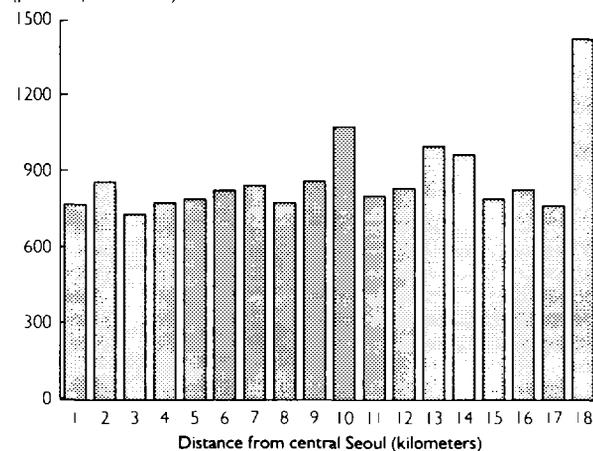
Source: Korea Research Institute for Human Settlements and the Ministry of Construction and Transportation.

and time-consuming. Another important reason is that land prices do not vary much with distance from the center. This explains the flat net density profile within Seoul's city limit. (figure 1).

The density pattern in the greater Seoul metropolitan area implies longer commuting and larger infrastructure costs than under the typical declining densification observed, for example, in the Tokyo metropolitan area of Japan (figure 2). Although most of the cost of infrastructure investment in Korea's new towns was financed from the incremental land value associated with rezoning raw land into urban use, the extended commuting does impose additional social costs. Consider the finding of a 1987 survey by the Korea Transport Institute, which reports that about 600,000 people living outside Seoul's greenbelt commute to work or to school daily. This figure is substantially greater than the figure in the Transport Institute's 1981 survey, and will increase further when the new towns are completely developed.

Figure 1. Net density profile, residential area, Seoul, 1990

(persons per hectare)



Note: Net density = population/net residential area.

Source: Bae 1990

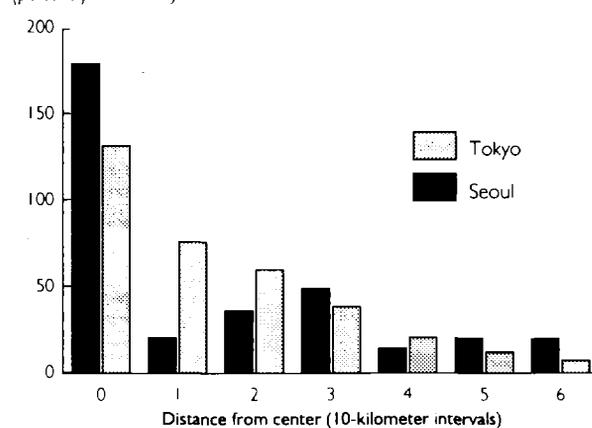
Spatial Policy and the Quality of the Environment

Growth control measures are sometimes identified as environmental policy. The Urban Planning Act of Korea mandates that environmental protection be a rationale for designating greenbelts. The underlying logic is that external diseconomies are positively linked to city size, and that the environmental quality of urban areas can be improved if population and industrial growth can be contained.

Research in the United States, however, reveals that the quality of environment is not related directly to population size. Rather, the lifestyles of the population and the nature of economic activities are more important determinants, and large cities can afford to spend more resources to arrest environmental degradation (Orishimo 1982).

Figure 2. Gross density profile comparison between Seoul and Tokyo capital areas

(persons per hectare)



Note: Gross density = population/total urban area

Source: Constructed from data provided by Dr. S. S. Bae of the Korea Research Institute for Human Settlements.

Similar results hold true in Korea's cities. Sulphur dioxide levels fell substantially in the 1980s in Seoul, despite the continued growth of population, primarily because the use of liquefied natural gas was made mandatory. An empirical study by Kim (1993) confirms that air pollution is affected not only by population size but also by the number of automobiles, population density, the type of fuel used by residents, and precipitation.

A more important point to be made is that spatial relocation of population from larger to smaller cities would not necessarily reduce the pollution level of the entire nation, even if the level of air and water pollution rose with population size. Pollution would be reduced only if the incremental damage to the environment were also a positive function of the number of residents, automobiles, and factories. Analysis by Kim (1993) of limited data on 13 cities in Korea reveals that the condition is not satisfied.

A casual analysis of data also suggests that growth control measures might have had a negative impact on the environment. A tight control on industrial establishments in the Capital Region has spawned small unregistered workshops within the Region. Since these workshops do not have a broad awareness of the environment, they cannot mobilize enough resources to meet the installation and operating costs of pollution abatement facilities, and the government has greater difficulty in tracing the unregistered premises. Thus, it is reasonable to believe that environmental protection was not served well by the growth control measures.

There is more visual evidence on the negative impact of the greenbelt regulation on the environment. The strict enforcement of greenbelt policy ultimately protected land within the belt that is not "green" (about 42 percent of all land covered by the greenbelt) while allowing some "green" area outside the belt to be developed. A

good case in point is the new town projects discussed earlier. Prior to development, for example, 90 percent of the Pyongchon project site was forest or green area, but only 16 percent of the green land survived the project. Bundang was not much different. These examples show that the land that is worth preserving to protect the environment has been compromised for the sake of keeping the "belt" intact.

Finally, leapfrogging development beyond the outer edge of Seoul's greenbelt has accelerated the trend of suburbanization, thus increasing commuting distance and hence fuel consumption, traffic congestion, and air pollution.

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Infrastructure for the New Social Covenant

William Morrish and Catherine Brown

We must distinguish ourselves from many of the panelists here in the past two days. We are physical planners, designers, and educators, and our work is with a “student body” that consists primarily of citizens, elected officials, and the municipal staff working for those officials.

In working at the grassroots level, we work with these individuals to help them understand some of the linkages and dynamics among the social, economic, and physical environment. We also try to help them understand what the term “urban landscape” means. And at this session on human urban landscape, one idea that we want to discuss is the concept of using rather than simply conserving or mitigating the environment as a building block for the community—as a valuable capital asset that can be leveraged and used as a tool for building the social covenant.

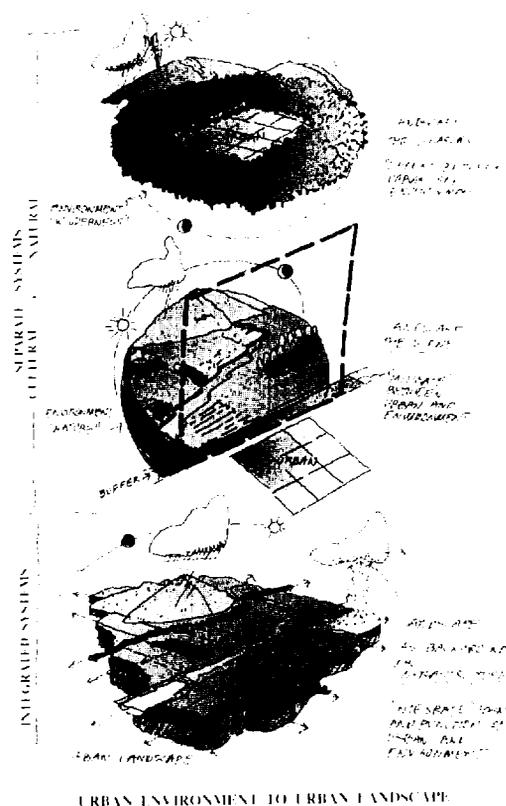
From Concept of Urban Environment to Urban Landscape

All of us seem to work historically from a notion of the landscape from the Middle Ages: one in which the urban area is in the center of the clearing and the wilderness is around the edge (figure 1). This is an example of “greenbelt thinking,” which goes back to that fear of the outside edge, the perfect nature against the perfect city. We still use that dichotomy, and what we do is defend between “urban” and “environment.” It is a *mitigating* language.

The second notion comes from the idea of landscape as scene. This concept from the eigh-

teenth century frames the view of the perfect landscape, which is a composed scene of picturesque elements set within nature. In this view nature and environment are viewed and acted upon as separate from urban. To protect this view, essentially what we do is moderate between one place and another—the classic

**Figure 1. Traditional idea of “landscape”:
wilderness on the edge of civilization**



buffer zone. What is inherent in this view is that cultural and natural systems exist separately, in opposition to each other, and what we do, essentially through our technology, is mediate between them.

But in reality we live in both worlds, which compose our urban landscape today. So we must begin to tie these things together into this third notion of an urban landscape where those systems coexist to create the background infrastructure of a city. This notion is in contrast to the way we implement projects, the way our laws are written, especially in the United States, which is framed in terms of land-use overlays—things that are superimposed on the land parcel, things that are top-down. Every agency comes down with its rules and regulations, and makes its imprint on the specific land. And so as we begin to talk about community environmentalism, nothing in our process is pushing up into that system. We do not have a regulatory structure that actually allows that into the debate. We need to develop a language and approach for understanding the complexity and intersections of natural and cultural infrastructure and how this can begin to tie the pieces together into towns, neighborhoods, and communities.

Tying the Pieces Together

One way to tie the layers of cultural and natural infrastructure together is to put the “public” back into the public works. This strikes fear into the hearts of some engineers when they hear that regular people will be out there talking about pipes and water. But as we know, users of a system, when they understand the system, are better users. For instance, Phoenix has recently opened a garbage recycling center developed together with the city staff, engineers, artists, and neighborhood people. The popularly acclaimed and award-winning project includes an environmentally sensitive site plan and building, and extensive environmental education programs. In this concept, people begin to understand that their garbage is part of a much larger system that affects their community’s livability and sustainability.

Another way to tie cultural and natural infrastructure together is to strengthen those access points of connectivity between community net-

works. We talk about making huge bridges, big links across areas covering 20-mile distances, and 40-kilometer distances, but what we ignore is the failure of the small bridges between one neighborhood and another. In Los Angeles, as someone always says, it takes a gallon of gas to get a gallon of milk, because the smaller links are missing.

The third way to tie the systems together is to maintain the resources of a community household, both natural and cultural. We talk a lot about biological diversity, but we never talk about social diversity—say, about the social diversity of the sustainable community. When we do, what we begin to see are the linkages between the natural world and our cultural overlay. We begin to see the city as a mosaic of neighborhood watersheds.

Farmington, Minnesota: Leveraging Limited Resources

The town of Farmington was planning to expand its boundary and allow new housing, and a developer had a proposal on the table trying to understand what the town valued most about the physical environment in its community. It came down to the Vermillion River and the park system that existed there. Our challenge was to try to build on the idea of that system and to go beyond the traditional engineered solution of retaining ponds and concrete-lined ditches and pipes that would have handled a water problem and allowed the town to expand.

The challenge was to find a language and approach that moved from the idea of mitigation through retention ponds and piped water toward something that would handle the water but that would also be amenable and sustainable in that community. As a result, Farmington developed a system, named the Prairie Waterway, as a form of green infrastructure for the community (figure 2).

The Prairie Waterway is a constructed tributary to the Vermillion River, which winds past Farmington and drains to the Mississippi River, through a landscape of flood plains, agricultural fields, and riparian wildlife habitat. The waterway, an artificial stream, is designed first as a civic amenity, its form inspired by the meandering and lushly vegetated river. In addition to

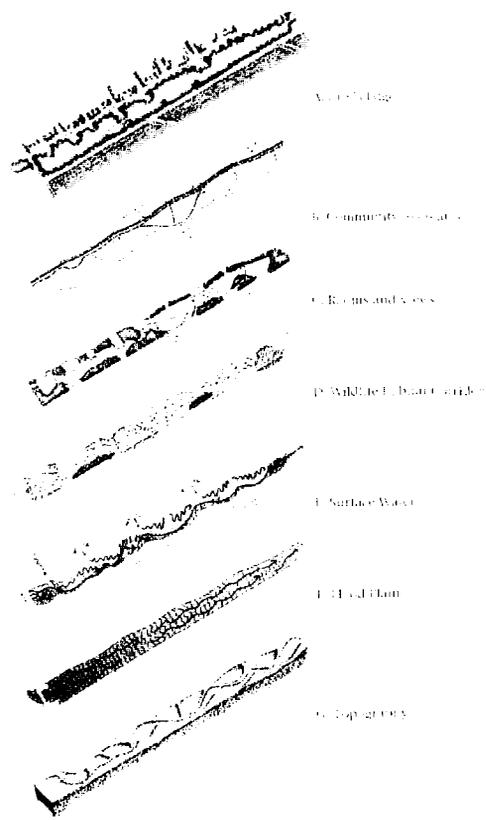
providing a civic infrastructure uniting existing neighborhoods with a new residential development, the proposed Prairie Waterway also serves as a multiple-use corridor for recreation, flood control, storm-water filtration, and wildlife habitat.

The Prairie Waterway is important in Farmington because the town would never have had the money for such an amenity if it were not managing the water and achieving multiple functions. This structure not only helped the developer handle the surface and groundwater, but it also provided the community with a linear park, a wildlife habitat corridor, and a transitional edge between agricultural farmland and the community, and it provided some topographic relief and variety on this flat site.

Because the waterway had multiple uses and functions, it was able to draw from multiple budgets. This is extremely important in these little towns, because while they might strive and hope to be sustainable, they cannot afford to be sustainable in the way they do business now. Just like other places in the world, they have limited financial resources—and where they might in the past have had \$3 for public works, recreation, and economic development, they now have only \$1 to do all three.

The Prairie Waterway represents a move toward the idea of achieving sustainable development by first accomplishing responsible and

**Figure 2. Farmington, Minnesota:
plan of the Prairie Waterway**



creative community development. By leveraging its environmental resources as well as its financial, Farmington provides a model for a dynamic and useful system that is both connective and resourceful.

Discussant Remarks

Saad Eddin Ibrahim

These discussions have been very stimulating. It seems that the language of urbanization has changed dramatically over the years, as has its emphasis.

One thing that struck me was the tone of modesty that ran through these papers. It seems that urban studies and planning have changed from the arrogance and pretense that dominated the field some 30 years ago and have given way to a sense of humility, and an admission that we need to learn rather than prescribe. In all likelihood this stems from the realities of dealing with the unwieldy beast that is the city or the metropolis.

First, it seems that the so-called blueprint designs do not work in most cases. And in the few cases where they do work, as in Seoul, they bring some negative results. So if they do not work, they are criticized for not working; if they do work, they are criticized for not having worked according to the objectives of their original design.

The presentations are a plea for letting the processes—the organic processes—unfold without undue intervention. Had we left things to their own spontaneous unfolding, with minimal intervention—just enough to nurture the process and to guide it humanely with a light touch—we

probably would be better off than we are now as a result of our heavy, sometimes arbitrary intervention.

One thing missing from three of the presentations seems to be the *human* face of the urban environment. The discussions seemed to concentrate on the physical aspects of city growth and city dynamics, rather than on the “human and interactive,” or symbolic aspects of the city—and this is important because it has its costs. The overview argued that urban areas are more efficient than rural areas in their consumption of land. Is efficiency the only criterion for evaluating land use in urban or rural areas? The urban area is a matter of physical density, of course, but it is also a matter of social density and moral density. The experimental psychologists would argue that compact physical density creates all types of adverse social-“psychological” phenomena—for example, stress, nervous breakdown, and violence.

So while the use of urban space or urban land may be more efficient in the big city, there are other things to look at—such as how to turn an urban space into a public space, into a social space, into a *communitas* where people connect and interact for more than just brief moments.

Floor Discussion

Mr. Bertaud: Dr. Ibrahim raised a point on urban densities and their effects on social behavior. We have all heard how rats in a cage will begin attacking each other when their numbers rise beyond a certain threshold. It is interesting to note that, of the cities on my urban density chart, Washington, D.C. had the lowest density, and the highest rate of crime. It seems that there is really very little direct correlation between urban density, *per se*, and urban violence. The tendency toward urban crime is perhaps correlated with social structure, and urban design as a function of that social structure.

Cities such as Hong Kong and Tokyo have extremely high population densities, but also have extremely good urban design that makes good use of the land. Even though their densities are more than 20 times those of South African cities, Hong Kong and Tokyo are quite livable. By the way, South African cities have a relatively low population density, but a high rate of violence.

Dr. Ibrahim also said that resource consumption is higher with higher population densities. Perhaps more resources are used per square meter or per hectare, but not per person. Whether consumers are in the countryside or in the city, they will still consume those resources. But I would argue that incomes tend to be higher in cities than in the countryside, and we might be witnessing an income effect on consumption: that people will consume more at higher incomes. But then the issue is more one of income than of density.

Mr. Hendropranoto: I have a comment on Dr. Ibrahim's observation that master plans do not

work—that government should not interfere, but should allow the city to grow in line with organic forces.

In the case of Jakarta we do not have a blueprint for the entire Jabotabek region because there is no legal or institutional base for planning such a broad region as Jabotabek. A regional strategic study has been prepared, but has never been formalized into a plan, and has no legal or institutional base.

However, as I have shown, planning projections do work. Jakarta's east-west pattern of development was predicted during a planning study in the early 1980s, and supported by the results of the two censuses.

Now this east-west pattern is being challenged by market-based development to the north and to the south. The future of Jakarta will be greatly influenced by its past patterns of development. In particular, the toll road that the government is building from Jakarta to the east and to the west has mobilized the private sector to provide dynamic roots of new towns, residential areas, and industrial development in that particular direction.

In the case of Jakarta the public sector did not foresee that it might have been able to use infrastructure as an instrument to guide the physical growth of the metropolitan area.

Mr. Kim: On Dr. Ibrahim's question as to the ideal form of urban development, the answer depends on one's starting point. For example, if we just consider total commuting costs in a city, including the costs of congestion, the ideal urban form

would be that of a compact city to save time, energy, and infrastructure costs.

Everything boils down to public choice in the end. Economists merely present the menu of choices, and their implications. While this in no way discredits urban planning or command-and-control instruments, such policies often skew public choice.

People who choose to settle in the suburbs often are trading ease of commuting for more space and a bigger house than they could get in the crowded city center. And that is what happens when there is a decline in density and declining land price gradient. But if the density curve is flat, then people get the same amount of space no matter how far out they are from the center of the city. And that is not fair.

One can find large cities with a good record of environmental protection, and small cities with a terrible environmental record, because urbanization also generates money that can be spent to improve the urban environment. It all boils down to how people behave and their lifestyle choices.

Ms. Brown: To answer Dr. Ibrahim's question of how to build consensus on environmentally sustainable urban design, I would like to go back to his praise for humility in the planning profession. The planner has physical design skills, but must also approach the project as an educator, to try to draw out community preferences and illustrate for the community the alternatives that answer those preferences. Planners cannot come with a grab bag of solutions.

First we have to spend a fair amount of time understanding the resources and needs of the area, and developing a vocabulary and language that we share with the community to understand what resources might be leveraged and used. Then, and only then, can we begin to imagine and design alternatives to meet the area's needs using the available resources.

Mr. Morrish: Our urban design plans are not meant so much as a blueprint from which to build, as an embodiment of ideas and principles that should guide urban development. And we are going to test out the ideas, not endorse them as the only possible option.

In our experience public housing authorities and, especially, mayors respond very well to

this. They understand the options and the resources. So they are not just holding the blueprint, saying, "I'm going to steer this course, no matter what." Mayors understand the system and their constituencies. Barcelona is an excellent example of how to take fractured pieces of city and knit them together.

Question 1: One of the projects Mr. Morrish and Ms. Brown mentioned, the Hennepin Community Works, shows that the urban landscape can be used to bring together the community, local government, and private business to revitalize a neighborhood that has declining population and revenues. Is this kind of project more feasible in communities that are becoming less dense? Is it really feasible in a rapidly populating area? And how feasible is it in a context where you're trying to accomplish a number of interrelated things dealing with different environmental conditions? How feasible is it where environmental regulation is highly segmented programmatically?

Mr. Morrish: This is a very volatile process. The city and the county, who have never worked together on a common project, are coming together because of demand and pressure from the community. Interestingly, the "community" in this case was represented on a 14-person commission by interests that ranged from being very pro-union to almost anti-union, but whose members all felt that this was a process that might balance out disparity.

So in rapid growth or in rapid decline, such a project seems to be giving this diverse community, the city, and the multijurisdictional county a common basis on which to form coalitions for action. It was a very simple idea. It was a bridge to both sides of the river.

Since this is a *new* process, we are still working with the city and county bureaucracies, who tend to regard this as a traditional public works project. They are interested in putting in tangible infrastructure, a "big bridge" as it were, while the project is really more about the "little bridges," which are the connections to the community.

Audience observation: I am chair of the commission that Mr. Morrish mentioned. And as he said, there are all kinds of little intricacies between the agencies that we have to work out—

the process is very volatile. But there is a compelling argument for action. We can show that, historically, building good public works, parks, improvement projects, and so forth tends to sustain land values around them, especially when these amenities form part of a network that connects the neighborhood communities to other parts of the city.

If the city goes to the community and offers to work with them on a project that has a common goal and a common purpose, the community will support them. That gives the politicians the incentive to try to make all of the various agencies work together to facilitate the project.

The challenge has been to change the notion of infrastructure from a sectoral one—concerning only one agency—to a more comprehensive one that ties into a larger city agenda that the politicians can understand.

Ms. Brown: In our situation, the fact that we have a lot of available land and a declining tax base was a driving force for the city. Here is a productive resource that is going idle. People often talk about how much it costs to rebuild public infrastructure, to clean up and control pollution, to provide water; but what we should be focusing on are the opportunities in which we are investing. We should be thinking creatively about how to get multiple benefits from our investments in these things.

In our work we are advanced in envisioning the possibilities from a physical design standpoint; but we must begin to think holistically and creatively about funding and implementation, such as tying the infrastructure project to a really good jobs program to sustain the community.

Question 2: The urban population density graphs were quite seductive and convincing, but I wonder whether they hide as much as they show. They seem to represent the old monocentric city model, in which everyone commutes to the downtown but lives in ever-increasing urban peripheries. This model has been replaced by the Berkeley model, recently applied in Seattle, which is based on a web of high density urban villages around transportation nodes, to enable residents to live, work, and find recreation in their local area, instead of having to go to the city center. How does this new model relate to the density graphs?

Mr. Bertaud: I agree with you entirely on two aspects. First, the graphs do not represent the ideal density slope, but rather the slope one gets when people are able to move where they like and consume as much land as they can afford. It just represents consumer demand under the present conditions of transport, and topographical and cultural constraints. At other times, and with other systems of transport, under other working conditions, such as the shift to home offices, the slope will be different. Ideally, the planning objective is to encourage mobility.

None of the graphs shows the ideal density. But the focus should be on mobility. We should not be burdened by preconceived ideas. In my opinion, the worst cases are those in which there is no mobility, no choice of where to live, no choice of density pattern, as reflected in the graphs of Johannesburg, Moscow, or Seoul. There is no tradeoff there. Some are more dramatic than others: apartheid is a more dramatic policy than the green belt of Seoul. But both result in a similar outcome in terms of density patterns, transport, and use of energy.

The first part of your question was on the data. I differentiated between three types of density, each of which has a different meaning. The first one showed gross density, but only gives a general idea of how many people are living at different distances from the city center. It can be used to get a rough idea of the amount of infrastructure needed at different distances from the center.

The second type of density is the built-up density. This uses what has been built in terms of urban infrastructure to calculate the population densities at different distances from the city center. This gives you an idea of the way the city has been built. For example, if we compare the density of two areas of Hong Kong, we find that the gross density of central Hong Kong is not very large because of unoccupied space—the mountain, the Bay of Hong Kong. However, we also find that in another area, the residents of Hong Kong have compensated for the constraint of topography in the center by developing the area at a much higher density.

The third density, the one that Professor Kim used for Seoul, was a residential density. This is tightly linked to land markets, and it is the density one really feels, because it is the amount of space one consumes in one's community.

The definition of these three densities is very important because they have different meanings. Many urban economists do not define density very well. They present data, but the interpretation of the data depends on the basic definition, the context. Before Geographic Information Systems (GIS), it was quite difficult to do this type of analysis, but now we have no excuse not to do it.

Question 3: Mr. Bertaud's comments about the potential efficiencies of some high-density developments were an important correction to some environmental thinking. However, this argument might encourage higher-density development, if one accepts the premise that higher-density urban form is equated with lower levels of consumption of oil and other efficiencies—and this premise is supported statistically. Should public policy promote higher density? And how should it be accomplished, given the criticism of land use controls, green belts, and subsidies for public housing? What instruments would the World Bank encourage?

Mr. Bertaud: I agree that such instruments are not optimal: densities should not be designed. Densities should happen by public choice. This, however, makes planning of infrastructure very difficult, so urban planners, city engineers, and city managers tend to avoid it in favor of something more predictable. They make the tradeoff on behalf of the people—figuring how much land they will want to consume at each distance from the center—and then they design an infrastructure to support this density, backed, of course, by regulations. Once the sewerage network has been designed and installed for a density of 50 people per hectare, the land is frozen and it is difficult for it to support a higher density.

Audience observation: What is a “natural density?” Density is conditioned by a variety of institutional factors. It depends not only on lifestyles and housing preferences but also on the nature of the development industry in an area—the availability of land parcels, their size, the financial arrangements.

Lurking beneath this whole discussion is a prototype plan. Present and future trends toward either gradual or explosive motorization throughout the world is going to cause increas-

ing decentralization. The model that we are working with assumes that the city center should be made clean and accessible for workers, but that the rest of the environment, continually decentralizing, ought to be clustered. This model is supported by high-volume transport modes and land-use regulations that reinforce the center and extend and cluster the periphery. One sees variations of this prototype everywhere, in Bangkok, Boston, and Santiago.

We need to identify the institutional arrangements, market instruments, and regulations on institutional regulations and understand their effects on urban densities.

Mr. Bertaud: By “natural density,” I mean present conditions, the institutional framework—mortgages, interest rates, infrastructure, culture and subculture—which of course condition people's tradeoffs. Densities will change as these conditions and this framework change.

But there is a difference when the conditions and the framework are changed willfully, so that it obstructs the choice of where to live or where to invest. We must be very careful with environmental regulations and calculations of environmental risk from density, for this reason.

Every city must have an underlying plan to guide infrastructure. Transport planners have a special responsibility in this regard because transport networks, such as fixed light rail, enforce a pattern on the city that becomes self-reinforcing and is difficult to change.

Still, planning decisions have to be made and should be based on a projection of densities. But it is very risky. The Chinese tried this in Shanghai by building six satellite towns and constructing most of their infrastructure in linking Shanghai to them. This has deprived central Shanghai of quality infrastructure, since most of the investment is going to the new towns and the connections to them. However, the result has been that high densities remain in central Shanghai, but they are served by low-quality infrastructure. People prefer to live in Shanghai and commute to jobs in the satellite towns.

Mr. Morrish: Often, local geography is such an influence that people will go to certain areas, even if they have to do a reverse commute, because of habit or the reputation of an area. And the influence

of geography is more evident if one considers metropolitan areas as geographic subsectors.

Often, these geographically and culturally determined patterns are transplanted in the planning of another city, where the new context makes them inappropriate. For example, Phoenix, Arizona, incorporates many urban design elements from Boston, Massachusetts, such as high central density, and it does not work.

Audience observation: The idea that densities should be established by the land market, and that infrastructure should be built to support these densities, ignores the fact that prices in the land market are determined to a large extent by the infrastructure in place. And any land market is itself supported by policies, such as federal subsidies and tax incentives. What makes a free land market?

Mr. Bertaud: On the question of free land markets—we must consider this issue in relative terms: land markets in Moscow or Seoul are much less free than in other cities, despite the presence of policies and regulations. Enforcement of zoning regulations in the United States are very strict by European standards. But at the same time, local communities in the United States are decentralized and self-governing to an extent unknown in Europe. So in a certain way, although American zoning is very strict, if it goes beyond what I will call its natural density there will be a public outcry.

Audience observation: I must confess to being a city planner, and the notion of the imperial city planner that has been suggested through these presentations has made me quite envious. Unfortunately, I have never had the luxury of practicing the profession in this fashion. City planners, at least in the United States, face a difficult situation: they are constantly being asked to reconcile a number of very different agendas. We must balance the agenda of the pro-development city counselor, the anti-development city counselor, the community group, the “militant” environmentalist, the neighborhood activist—and

must articulate a development agenda made up of conflicting pieces.

Local-level participation has been romanticized. Often, concern for the environment may mask hidden racism or deep-seated fear about one’s property value. How do we get beyond that? How do we forge consensus among competing interests, and will that consensus be optimal for the environment?

Mr. Bertaud: The role and influence of the planner is very much determined by the country in which he or she practices. The United States has very democratic local government, and so the planner is not as powerful as in other, less democratic countries. China and Russia are the only places where planners have such power, and this is largely because there is no land market—everything is centrally planned and is implemented according to plan. However, even in those countries, it was the Communist Party, not the planners, that made most of the decisions.

Audience observation (Mr. Alonso): To wrap up this discussion, I would like to call attention to William Cronin’s study of Chicago’s development in the nineteenth century, entitled *Nature’s Metropolis*. He develops a concept that is behind much of what is being discussed here—the concept of “second nature.”

Chicago’s promoters presented the city as a natural passageway through St. Louis and New Orleans, and as a seminatural passageway through the Erie Canal to New York. Chicago has a natural port and is near the prairies, making it conducive for shipping grain. It didn’t matter that the natural port froze over and was unusable in the winter, or that the prairie was too muddy in the spring and fall to facilitate transport. The good image of Chicago encouraged investments in an artificial port and railroads and so forth, and created a “second nature.”

This undermines the idea that nature is pristine and that all else is artificial. “Nature” is in fact a historical process in which some already-existing elements are modified by human habitation over time.

Part Three

Governance and the Future

ROUNDTABLE OF MINISTERS: THE IMPORTANCE OF THE URBAN ENVIRONMENT

Statement

Klaus Töpfer

We are all aware that over the past 150 years we have been reaping benefits from the Industrial Revolution. We have been able to move to frontiers that no one would have thought possible and to open up new opportunities. But we are also aware that the Earth is increasingly threatened by the greenhouse effect, the hole in the ozone layer, food problems, a shortage of drinking water, mountains of solid waste, and the depletion of natural resources. And so we recognize that our Industrial Revolution must be followed by another revolution: one of sustainable development.

Integration and Cooperation: Strengthening Networks and Bridging Gaps

It was the recognition of the urgency of environmental sustainability issues that gave the key purpose to the UNCED meetings in Rio de Janeiro: to discuss possible environmental solutions at the global level and to seek cooperative partnerships among industrial and developing countries.

A Monitoring Instrument

One of the main outcomes of the discussion at Rio was a decision to adopt an instrument for monitoring results, especially those of Agenda 21. The monitoring instrument is the Commission for Sustainable Development. I was elected chairman of the commission in May 1994 for a one-year term. At our first meeting we discussed the

so-called sectoral cluster—health, water, waste, and human settlements. And we adopted a resolution to coordinate all efforts to address the sectoral cluster under the UN system.

Thus, I am extremely pleased that we can also bridge the gap somewhat between the UN system and the Bretton Woods system. And many congratulations go to the World Bank for inviting us to discuss these problems here—and for the work that it has already achieved in this field. All of the discussion and work at this conference provides the necessary preparatory work for the Second UN Conference on Human Settlements—Habitat II, to be held in Istanbul in 1996.

Coordinating Solutions

As ministers for the environment in our countries, we are acutely aware that many problems cannot be solved at the local level alone. Decisions at both the national and international levels are required as well. And so we must integrate our efforts. We must of course ask the local communities to present solutions, but we must also be responsive to how solutions can be coordinated. All of the main challenges confronting the Commission for Sustainable Development—for example, how environmental costs can be internalized so that prices reflect ecological realities, or how the direction of technology can be reoriented to reflect the internalization of environmental costs—are in focus as we discuss local problems.

The most important factor to remember is that local communities are particularly affected by the ongoing environmental and developmental problems. The effects of overpopulation, food shortages, environmental degradation, and the overexploitation of resources are felt most acutely at the local level. And in recognition that the point of contact between citizens and the government is at the level of the local authorities, it is little wonder that these officials will play a key role in overcoming these problems. On-site infrastructure—drinking water supply, sewage disposal, waste recovery, waste disposal, energy supply, and so forth—must be provided to help them meet their challenges.

Thus, I must mention that the commission decided to call on governments to strengthen their networks of small and medium-size settlements in rural regions in order to provide attractive living and employment opportunities in an effort to ease the migratory pressure on large metropolises. I repeatedly emphasize this need. As a former university professor for regional planning, I was directly confronted by this prob-

lem—not to isolate cities and urban development, but rather to integrate them into a regional planning network. My colleagues and I emphasized this approach repeatedly. In fact, I started my career by seeking a solution to stabilize the rural areas of Brazil, so as to halt the influx of people into the large cities, and I have to confess that in those days I was not very successful.

Perhaps it was because we were trying to isolate the problems as a responsibility only at the local level, or only at the federal government level. Rather, what we must do is integrate technical solutions—make them part of broadly based organizational solutions and institutional solutions. Structural change must get under way today, in full recognition that the structure of the market economy today always reflects the prices of yesterday; to change prices is also to change structures, and the other way around. With regard to the outstanding relevant problems, it is also necessary that we not set our goals too high—small changes, implemented a million times, can have a tremendous effect. This is a very old truth, but it is often forgotten.

Statement

Abdoulaye Bathily

My discussion comes from the African perspective, which in turn is largely from the colonial perspective.

Former Colonial Cities Drain Their National Economies

The majority of African cities are not, as they try to present themselves today, the product of autonomous social development throughout the centuries. Rather, with the exception of just a handful of cities—such as Cairo, some cities in northern Africa, and some cities in Nigeria that have existed for a thousand years—most African cities are products of colonial political economies. Indeed, colonial periods have been a type of parentheses between such traditional cities as old Timbuktu and the famous city of Zimbabwe—whose imposing ruins tourists can admire today—and the new cities that have emerged as attendants to the colonial economy.

But even 40 years after colonial rule, many of these cities have not evolved to the point where, as has been suggested several times at these sessions, they are the engines for growth. Rather, the history of these colonial cities until now shows clearly that they have drained their national economies. Most of them are fed from the outside with imports, and they are divorced from rural areas within their own country.

Urban Setting Constrains Integration

These urban economies are a type of stronghold, linked with the outside world but shut off

from their internal world. Many factors have created this situation—cash crop economies, pervasive drought, and the desertification of many regions on the continent of Africa. In short, agricultural production and rural economies basically do not cater to the urban sector, and the prices for primary commodities are extremely low. Because the rural areas are not linked to the urban sectors, rural residents are forced to migrate to the cities in search of a better life, which, unfortunately, they usually do not find.

The urban setting of African cities also militates against a flourishing national culture. For instance, in my own capital city, Dakar, in Senegal, or in Lagos or Nairobi, the traditional system of housing that reflects the culture—the world outlook—is not considered in the blueprints of the architects.

The urban setting in Africa also militates against national integration. It is true that people from different walks of life, from different cultures, from different ethnic groups, and even from different races are brought together in the urban setting, but in African cities they do not mix. This question has been aptly touched upon by Secretary Cisneros.

That is why the urban setting in our region of the world is usually a composite of complex but disintegrated social phenomena, and complex but disintegrated political phenomena. In fact, African cities are milieus where, although social changes are occurring, changes do not move in a direction that is favorable to the flowering of what I call the national culture.

Making Cities Accountable to the People

Many experts have addressed how African cities are governed. In short, the governments of most of the cities do not make themselves accountable to their people, despite widespread democratization in city life. Cities are often governed not in the interest of the majority of their populations, but rather by the minority voice. Millions of people have no say in how their city is run. Thus, one

important element of the sustainability of our cities is the participation of the populace, which in turn ensures such crucial ingredients as public transparency and government accountability.

Until we address these issues—integration between the rural and urban economies, the city's role in promoting a flourishing national culture, and the accountability of governance—we cannot address how, in both form and function, to improve the quality of the urban environment.

Statement

Henrique Brandão Cavalcanti

My comments center on three dimensions of the urban environment in Brazil. I listened carefully to U.S. Secretary of Housing and Urban Development Cisneros's presentation, and although the scale and stage of development differs between the United States and Brazil, we are both addressing similar problems.

Quantitative Dimension

The quantitative aspects of our urban environment provide a good starting point for discussion. By the year 2000 half the world's population will be living in urban areas. If we exclude India and China, the figure is closer to 70 percent. And that is about where we are in Brazil right now—nearly 75 percent of the population resides in urban areas. And I hasten to mention here—because half of our territory falls within the Amazon region—that more than 70 percent of the population in the Amazon region also resides in urban areas. Altogether, Brazil has about 5,000 cities—12 with a population of more than one million, 13 with between 500,000 and one million inhabitants, and 85 with between 200,000 and 500,000 inhabitants.

Large to medium-size cities seem to dominate our urban perspective as well. In the past 10 years all of Brazil's population growth has been in urban areas; the size of the rural population has declined slightly. So we have had migration both from rural to urban areas and from small to medium-size to large cities—all consisting of people looking for jobs, better health care, and better educational services.

About a quarter of our population resides in nine of our largest metropolitan areas. But the most interesting aspect of our recent development has been that the population in those nine areas has actually declined. These figures, generally speaking, are the quantitative dimensions of the main issues facing Brazil's urban environment.

Qualitative Dimension

As in most countries the qualitative domain is where the decisions are made; where most of the research, educational, cultural, political, and industrial activities take place; and where the Brown and Green Agendas meet, because most of the Green Agenda is in fact decided in the cities. We want to resolve our major problems; most of the solutions will come directly from the main cities or from abroad, but through the urban areas. Cities are where the mass media reside, with a consequent impact on our expectations, and with a rebalancing of cultural heritage among our various regions.

Unfortunately, the quality of life in these cities is not good. About 10 percent of the housing is inadequate, and at least another 10 percent requires renovation. About 60 percent of urban homes lack adequate sanitation facilities, and most recent estimates indicate that we will require about \$21 billion to get adequate services in these cities.

An interesting aspect of these figures is that they pertain to cities with heterogeneous populations. The tendency in Brazil is for people to leave fairly homogeneous communities and to

converge into urban settlements, where inequality often predominates. That, of course, is a result not only of incomes, but also of access to land and to services and facilities.

Institutional Dimension

The third aspect of the urban environment is institutional. Brazil is a fairly large country, as you know. We have a complex institutional matrix, with three levels of government and significant sectoral diversity. For instance, we have 20 ministries at the federal level and about the same number at the state and large-city levels. We also have a third element—the spatial dimension of different regions. We are a “north-south” country, rather than an “east-west” one. Brazil runs all the way from the equator to the tropics to the subtropics to the temperate zone. That geographic immensity makes our urban problems more complex.

Until 1980 our urban transformation was proceeding well. But the 1980s in Brazil, as throughout most of the developing world, were a lost decade. The paradox—and the irony—is that as we regained our full democratic system in the 1980s, government became visibly less efficient. Political and intellectual progress fell far short of our gains in industrial productivity and efficiency.

One of the main problems facing the central government was to regain and retain its identity during a strong decentralization process. This movement has caused considerable confusion.

We have tried to establish a bilateral relationship with most states on the basis of performance, but the process has been politically complex. All states in the federation consider themselves equal to the central government. And in a way, our hope now is that such new concepts as stability, sustainability, and environmental protection will again seize our attention, will re-create certain priorities, and will establish a more rational view of our supervisory and supportive capacity as they pertain to individual states and regions.

Signs of progress are in fact emerging. We are moving from a preoccupation with separate freedoms and equalities toward fraternity, recognizing that government handouts cannot replace generosity. For example, we have embarked on an antihunger campaign that has shocked many people in Brazil—but some 30 million Brazilians have made individual contributions to this campaign. More than 3 million executive committees have been formed across the nation, and they are based exclusively—with some logistical support from the government—on individual contributions. This may not be new to the industrial world, but it is largely a new chapter in our own history.

In the end we feel that this new attitude will motivate our heterogeneous new communities to look into their own identity and develop a new role in this urban network—one that will move us constructively toward the future and serve as a legacy for our new generations.

Striking a Balance: Questions about Urban Environmental Priorities in the National Context

Ismail Serageldin

What we have heard from speakers throughout this conference is, yes, we must deal with urban problems at the local level; but we also recognize that urban problems are a national concern and even an international one. This brings up some tough questions that I would like to pose to the participants in this ministerial roundtable:

- Should fiscal authority be devolved to the local level, and would doing so compromise the ability of the national government to bal-

ance the competing demands of large and small cities, and rural and urban areas?

- Would adopting a multidisciplinary, cross-sectoral approach create such large transaction costs that it would cloud the focus required for action?
- How do you respond to the NIMBY (not in my backyard) problem, particularly if local communities and both the local and the national governments are empowered?

Roundtable Discussion

Klaus Töpfer: My responses to my colleague's questions come from our experience in Germany. We are federal republic with 16 states. And each of those states realizes the importance of having its own financial resources and, in turn, of giving the municipalities the authority to decide how those resources should be allocated. But addressing the first question—whether fiscal authority should be devolved to the local level—goes beyond the mere availability of money. If a municipality decides simply to be a recipient of funds, that decision will limit local level participation in choosing funding priorities. Rather, we must focus on how local communities can begin to finance themselves by investing the money that is channeled to them.

Of course, there are some bottlenecks in investment financing at the municipal level. Cities that are in a good position right now will be better off financially in the future; they will experience a positive financial cycle. But cities that are not as well off in the start-up period will need access to additional money from other institutions. Otherwise, developmental disparities will emerge between the haves and the have-nots. These poorer municipalities must also begin to pursue a type of investment commonality. That is, local government resources can be obtained from investments that at first glance are not necessarily compatible with the environmental or other objectives of the municipalities. For example, communities might link their financial resources with industry—not traditionally a desirable environmental bedfellow. But if local governments can begin to build financial

resources directly in partnership with industry, the two sides will begin to share a common ground, facilitating more effective dialogue and more equitable compromises between them. Both sides benefit. Bottlenecks can therefore stimulate breakthroughs.

As to the second question, I preface my response by noting that, besides serving as environmental minister in my country, I am also now president of the European Union. In that capacity, one of my several functional responsibilities is to help integrate our 12 member states and 4 others in the near future. This activity calls to mind the well-known proverb that national governments are too small for the big problems and too large for the small problems. So what we in the European Community are now witnessing is a renaissance of regionalism. We are seeking regional profiles. People want to feel at home. And the pursuit of that conviction was one of the key decisions made by the framers of Germany's Constitution—to have a federal republic in which vital decision-making responsibility can devolve effectively to the level of the constituents, giving them a greater sense of community. An, in turn, when a city or region becomes integrated into a larger profile, it starts to feel responsible, accountable to the neighbors within its parameters. Achieving this integration is of the utmost importance to the European Union. We are seeking to effect a Europe of regions, not just a Europe of nations.

The third question—the NIMBY problem—is of course as well known in my country as it is in others. The fundamental need for addressing this question is more information, so that we can make

more informed decisions. But I am not a utopian. We cannot address the NIMBY problem with information alone. We need an investment and commitment of time, and we need appropriate incentives. For example, in Germany, people who live next to a landfill have no incentive to invest in it. People from other cities bring their waste to the landfill and then advertise: "Please come to us. We have no landfill in our neighborhood." But they will not pay for additional investment in the landfill. We need incentives. I believe it was Austria that made this public offer: "Who wants to have an incineration plant? We will pay for it. The first local community that accepts the offer will receive the money for it." So you try to supplement information with incentives.

But as many others will concur, one of the most important prerequisites for resolving the NIMBY problems in broad-scale public education. Yet I am afraid that this takes too long. For instance, at home, whenever I mention education as a possible solution, people respond by saying: "You're a politician now. You have to make decisions *now*—we can't wait for the next generation to come along and do the right thing." So we have to *integrate* these factors—information, time commitment, incentives, and education. Doing so can be the first step toward overcoming the NIMBY problem.

Abdoulaye Bathily: I frame my response to the first question posed by Mr. Serageldin—whether fiscal authority should be devolved to the local level—within the parameters of taxation. People will tend to pay taxes when they know how the taxes will be used. In my city, Dakar, many people suspect that the central government will not apply locally generated taxes in ways that will actually benefit the local communities. When people are clearly informed, and when they know that their local governments—through their municipalities, town councils, or rural councils—will use taxes properly to improve their living conditions, they will come forward to pay them. They do not want to hear that their taxes are going simply to the national budget, for the "national interest."

My response to the question about local participation comes from an interesting phenomenon that is occurring in Dakar. Four years ago, young people from every quarter of the city

decided to clean up the city—the roads, the houses, and so forth. The movement has become extremely popular because the people are keeping the city clean, a function the municipality has been unable to perform well. It is this spirit—of people involving themselves to help resolve problems—that transcends some of the transaction costs. Resolving problems does not always require having huge financial resources at the municipality level. When people become aware, they consciously try to remedy problems themselves. And they are capable of doing so.

And, of course, this response by the people leads to my answer to the third question. In short, resolving the NIMBY problem will require putting environmental education on the agenda. And we must do so not just at the broader national level, but, more important, at the local level.

Henrique Brandão Cavalcanti: The ideal strategy for resolving problems at the local level is to give those who are closest to the problems the power to respond to them. But the question here is whether local communities are capable of accepting that responsibility by themselves. And so, as power is devolved, one of the primary roles of the national government is to establish guidelines for the system as a whole, to monitor how it works, and then to provide the support necessary to make the system successful.

Whether fiscal authority itself should be devolved strictly to the local level depends on the type of fiscal structure that prevails throughout a country. For example, in my country, Brazil, decisionmaking authority has been decentralized, but it is also evident that decentralization has occurred too rapidly. That is one of the main points I make in my presentation—that rapid decentralization has prompted each of our 5,000 cities to focus too narrowly on its own problems, ignoring the fact that effective action will come only from an integrated network of cities. In Brazil, we need a bilateral approach by the national government and the municipalities to work out compromises that will benefit all 27 of our states. Although we cannot expect an ideal situation in which each city makes sacrifices to other cities at the behest of the national government, we can gradually move closer to the overriding goal in our country—to reduce

regional inequalities, and to have the main cities in the various regions play a dominant, effective role in achieving that end.

The second question pertains to the matrix for active problem-solving and whether the matrix by itself will ensure constructive, mutually beneficial resolutions. It is clear that effective action is not simply a matter of bringing all interested parties together. One of the easy temptations is to believe that complex questions are simple when they are not. This is one message we try to convey—that oversimplification is dangerous. But the complexity of the matrix involves costs—both in the short term and in the medium term. Again, these costs demand that the national government take the initiative in communicating, guiding, and understanding. It must serve as an intermediary because the less

time it must spend executing directly, the more time it will have to play a supervisory role and to guide proper performance.

My response to the NIMBY question is to educate the people. Environmental issues are being taught in the schools, and they are being taught to decisionmakers, to those who have a say in how natural resources should be used. But environmental education must be extended to everyone—to those without a direct involvement in how natural resources are used and to those who are at the lower rungs of the ladder of resource disposition. I include in this second group those who handle our refuse, since that too can be a good raw material. The preservation of our natural environment must be made part of the people's mindset, and the way to make that happen is to educate them.

Floor Discussion

Question 1: In order to balance the development of the rural areas and the cities, would a valid strategy be to try to stimulate the development of modern technologies such as solar energy to provide in the countryside some amenities that people come to the cities to enjoy?

Mr. Bathily: I think the question of balancing the relationship between town and countryside is a very broad issue. Ask people who come from the countryside to the city, "Why don't you return to your village"—and even list the difficulties they will face in the city, such as expensive or inaccessible housing and services. They will still tell you, "I prefer to stay in the city."

We really have to compare the quality of life between town and countryside. Gone are the days of Jean-Jacques Rousseau. And I personally believe that bringing amenities, such as electricity, into rural areas can transform these areas in untold ways.

There is a story of a Swedish Nobel Prize winner in physics who was asked by journalists on his 100th birthday, "What is the most important event in your life as a famous physicist, and as someone who has lived for 100 years?" And he answered that the most important event in his life was when electricity came to his village. Through electricity, there is an opening up. It is symbolic not only of technical progress, but also of transformation.

Electricity is very expensive in developing countries. But alternative sources of energy, such as solar power, can be efficiently used. We should

invest in research on solar and other alternative sources of energy.

I would like to emphasize that bringing technology to the countryside is only part of the story. We cannot forget the economic problems and the financial aspects of the countryside in terms of availability of employment, and generation of revenue in the rural area. Even if you have electricity, after electricity, what next? It is just one dimension of the quality of life.

Mr. Cavalcanti: I will add a few comments to Minister Bathily's. Enabling rural communities to have access to modern technology is not only a social question, but, as he noted, it is also an economic question. If a country is able to add value to rural product, and to create other jobs and strengthen the rural communities, it will, indirectly or directly, be solving some of its urban problems.

Another aspect is that less-qualified people will tend to migrate to where they think there are job opportunities. However, the reverse also happens: people who are well equipped to face the difficulties of rural areas will migrate to the city if they do not have a minimum amount of amenities in the countryside.

Mr. Töpfer: As Chairman of the Commission for Sustainable Development (CSD), I am directly confronted with the question of transfer of technology. My main concern is the kind of technology we have to transfer. Technology development, as I learned as an economist, is always

prompted by bottlenecks. In the past, labor was a bottleneck in industrialized countries. So we have developed technologies that save on labor, and are capital- and energy-intensive.

Now we learn that environment is a bottleneck, but this also becomes an opportunity to change technology. I am not sure that it is best for developed countries to transfer energy technologies to the developing countries, when the developed countries themselves are still trying to develop other energy solutions at home.

The same holds true for traffic and transportation. A recent international meeting of cities in Heidelberg decided that, by 1997, they would actively promote the use of renewable energy sources within their areas of jurisdiction to reduce global warming. However, since use of these energy sources is still being researched and adopted, transfer is difficult at this time. Even where technologies have been developed, their transfer can be difficult. For example, agricultural work in Germany is highly capital-intensive; it is second only to the chemical industry in capital-intensiveness. Such technologies may not be applicable or appropriate to the country of transfer. I agree with Vice President Serageldin that we must do our utmost to have more scientific research into rural technologies. You cannot always transfer the rural agricultural technologies of the developed countries because they have different bottlenecks of productive factors than in developing countries, and the results will be different.

Question 2: Yesterday, Lewis Preston stated that reducing urban poverty is an essential precondition for reducing urban environmental problems. Do the ministers think they have a role to play in reducing urban poverty? And second, if the precondition of reducing urban poverty is not met, what other achievements can help in reducing urban environmental problems?

Mr. Bathily: We have to look at this not in terms of just reducing urban poverty, but in terms of the concrete measures that can be taken to reduce urban poverty. Again, this relates to the economy, because in many developing countries the urban sector has not yet become an engine of growth. Unemployment is very high. How can we reduce poverty without creating new jobs?

And how can we create jobs without giving people purchasing power?

Mr. Cavalcanti: It is important and essential to reduce poverty. But poverty exists also because some of the people in cities are not qualified for the kinds of jobs that the city has to offer. Therefore, it is important to strengthen their skills to enable them to have access to adequate jobs. By the same token, poor urban residents must also have access to land tenure and to basic urban services.

Mr. Töpfer: On urban poverty, in our last CSD meeting, we called upon governments and international agencies to support and encourage local small and micro-enterprises engaged in developing and providing environmentally sustainable building components and related products, as well as environmentally sound energy systems for local development.

Building the environmental dimension into the development process is a precondition for everything. In the so-called developed countries we often use the "polluter-pays principle." For instance, urban residents and industries must pay for the treatment of sewage water per cubic meter of water treated. This creates an incentive to decrease the use of water. We had this experience after the unification in Germany with the former GDR. Per capita consumption of water has decreased dramatically now that we charge for water and for wastewater treatment.

But where there is widespread urban poverty, a city cannot charge the full price for providing services and protecting the environment. There is a vicious circle, and we have to stimulate local activities and the local economy to overcome the environmental problems as well.

We are confronted with the same problems in the countries of the former Soviet Union and the Eastern Bloc. The question they face is whether to pursue economic development first and deal with the environmental consequences later, or to integrate environmental technologies into the ongoing development—a slower, more long-term strategy. This dilemma is central to cities as well, as they try to balance economic growth with the environment.

Question 3: Given the growth of cities in terms of both population and economy, and the reduction

in employment by large multinational companies, isn't it likely that multiple economies will evolve in the world, that there will be a fracturing of economic activity, and that economic activity will be organized by communities around different goals and visions of what human activity should achieve?

Mr. Cavalcanti: There are two aspects to this question. Most developing countries face the issue of informal employment and informal activities. Of course, this is not exclusive to developing countries. Italy, for instance, faced this type of problem. Those employed in the informal sector must be organized at a certain stage; they must contribute, they must pay taxes. But this has to be done in a way that will not restrict the initiative of people who want to be productive. Whether they will grow into small to midsize industries or enterprises is another question.

The informal sector, and even formal, small-to medium-scale industries also face a challenge from the coexistence of multinationals that have economies of scale and access to new technologies. Unless developing countries are able to create their own competitive production units, they will continue to be dependent.

Question 4: Often global environmental initiatives, such as the recent climate negotiations, suffer major setbacks. If environmental negotiations do not work out on international levels, how do you, as national government representatives, encourage local initiatives that affect the global environment?

Mr. Cavalcanti: In our own case in Brazil we have opened the way for direct participation in all our boards in the Ministry of Environment to three segments of society: the nongovernmental organizations, the academic and scientific community, and the productive sector—both workers and employers. They do not participate directly in the international negotiations, but they do take an active part in setting up the domestic policies, which is the main reference for any type of international negotiation.

Mr. Töpfer: International environmental negotiations are problematic. I am responsible for the

preparation of the first conference of parties to the Climate Convention in March next year in Berlin. It is not very easy because as yet we have no base for a protocol on carbon dioxide (CO₂), which is a critical element of the global environment.

I must say that I welcome active participation and initiative on the local level. The Climate Alliance of European Cities is fostering ongoing discussions for OECD implementation of the framework in Chapter 28 of Agenda 21, and about the possibility of better climate work in cities. Stimulation must come from the base, from the cities and the communities that will support the work of national government both at home and in the international arena.

Question 5: In many developing countries the allocation of resources is controlled by the national government. Most of the developmental resources are spent on urban areas and not on rural areas. Has anything been done in terms of shifting real resources to rural areas, and not just the in-kind reuse of urban wastes in agriculture?

Mr. Cavalcanti: In Brazil the number of municipalities, be they small towns or metropolises, has grown, not only in the rural areas, but also in the settled areas of the interior. At first, this was received with a certain degree of reservation, because of the additional costs in running these local governments. But the net balance is extremely positive, since this in one way of bringing basic services to these areas. It is a way of increasing local participation for these areas, not only in their own issues and problems, but also in the national questions as well.

Mr. Bathily: Recently, throughout Africa, and particularly in the franc zone, there has been a drastic currency devaluation. In part, this was done to address the urban-rural imbalance, because the overvaluation of the currency tended to favor the urban sectors by making imports easier to obtain, and by minimizing the price of primary commodities in the rural areas.

Since the devaluation we have seen an increase in the price of agricultural products. This benefits the rural areas, and it paves the way for better economic integration as the countryside caters to the urban sector in terms of supplying foodstuffs that used to be imported. This is one

aspect of structural adjustment that seems to be working, although some other dimensions are more questionable.

Mr. Töpfer: Since official development assistance is only about \$60 billion a year, as compared with \$150 billion in the private sector, the Commission for Sustainable Development realizes that private investment is essential for sustainability, especially in developing countries. The Bretton Woods system has an important role here.

However, in order to attract private investment, there must first be public investment in

infrastructure. It is not easy to bring private investment to rural areas, because the preconditions for the use of infrastructure are not available there.

This may necessitate a change in technologies and rural production. It is vital that countries invest in their rural sectors in order to secure cooperation and further investment by international markets. Countries should substitute for imports by using the products of the rural areas in their cities, and they should also promote export of their rural products to increase the value of the rural sector.

MAYORS FORUM: THE URBAN ENVIRONMENT AS A NEW FRONTIER FOR ACTION

Introduction

Sven Sandström

We at the World Bank are seeking a more effective balance between the Green and Brown Agendas in our environmental work.

For several years the Green Agenda has received a tremendous amount of attention, and the flow of resources into this area is increasing considerably. And many “green” terms are becoming part of our common lexicon: biodiversity, deforestation, global warming, and carbon dioxide emissions, to name a few. We also now have various instruments that have been developed to deal with these issues, as well as a variety of protocols—including the Montreal Protocol, the Global Environment Facility, and numerous other conventions.

But compare knowledge of the Green Agenda with the much more limited attention given to environmental issues in urban areas—the Brown Agenda. What is most striking about this dearth of scrutiny is the alarming statistical evidence about its outcomes. Just take one estimate, for example: the 6 to 8 million children who die each year because the air they breathe or the water they drink is contaminated.

The World Bank, other agencies, and various cities are continuing to implement water and sanitation projects in many countries and cities, but we cannot make a dent in the problem because we cannot keep up with population growth. This deficiency is simply unacceptable. And it begs

two questions: Why have we not been able to do more? And why has what we have been able to do not been more effective?

We and the cities know what must be done in the technical realm, but we are faltering on the institutional, policy, economic, and participatory fronts. And that is why this conference, and the participation of practitioners from major cities, is so important—because it is a fundamental step in a very basic learning process. We would of course like to accelerate this process, enhancing our awareness, exchanging our experience, implementing more demonstration projects, and replicating successes in urban areas.

This is an intricate part of an intense process of learning and consciousness raising. And key to this process is building partnerships—among agencies, between local and central governments, and with private sector and community-based organizations. We must work toward a much more multisectoral approach. And perhaps the most critical participants in this process are the poor themselves, who know what they need and who must often address their needs on their own. We must involve them, learn from them, and support them more effectively than we have in the past. In short, as the Bank recognizes, we must pursue a more bottom-up, participatory learning approach and move away from the conventional, top-down, control-oriented approach.

Finding the Frontier: Posing the Unanswered Questions

Michael A. Cohen

Many thought-provoking questions have been raised by different speakers at this conference. Some of the questions have been definitional; others have arisen from the complexities of experience on the ground and the difficulties of determining how sustainable our individual actions have been. Many speakers have addressed the meeting with compelling moral urgency, arguing that unless we address urban environmental issues more effectively, the millions of poor urban residents will remain mired in poverty, thus severely, perhaps irreparably, compromising the prospects for national development.

Four major issues—"unanswered questions"—about the urban environment challenge must be addressed.

Defining the Local Context

The wealth of experience presented at this meeting has amply demonstrated that one size does not fit all—that the local dimensions of problems are central to their significance and importance, as well as to their possible solutions. As William Morrish reminded us, every religion and language distinguishes between the "Earth" and the "land." If the Earth is our natural world, then the land—our "civilizing terrain"—is the locus of our culture, our values, and our aspirations. Where and how we have settled has determined how we have decided to solve our problems, which institutional forms and instruments we have chosen to use, and how we evaluate the results. If in global terms we see the world increasingly as a composite of cities and towns, then local resi-

dents see their communities as the world, surrounded by other communities, highways, factories, and maybe even parks. Thus, our first unanswered question:

How do we define that local context?

This session on urban environmental governance will raise the issue of jurisdiction, with Minister Eggleton evoking the rethinking going on in Toronto, where it is apparent that, even with effective metropolitan government, urban environmental issues are not congruent with jurisdictional boundaries. Watersheds and air pollution go beyond the municipal limits. How then should the local context be defined? This is not a simple question, because its answer will determine the nature and extent of public and private actions to address urban environmental issues. The question of context is not only political and administrative, or even scientific; it is embedded in commonly understood cultural perceptions of the "landscape" and "settlements" in which people live.

The Balance between Complexity and Simplicity

The definition of the local context has a fundamental impact on the second unanswered question at this session:

What is the appropriate balance between complexity and simplicity in understanding problems and proposing solutions?

As the multiple dimensions of urban environmental management are identified, some people here may be reminded of the debates about integrated rural development projects, whose implementation proved to be too complicated. Even if cities are given greater capacity, is having more objectives better than concentrating on a few? Is it possible in the real world to plan actions comprehensively, or is it more operational and realistic to seek selectivity in objectives and simplicity in design? One of my colleagues has suggested that if water supply and sewerage authorities did their job, the most significant problems facing the urban environment would be resolved. How do mayors view this problem?

The degree of complexity in the actions to be taken must be weighed against the nature of the problem to be addressed. There are a few effective simple and reductionist solutions in the world that we have described at this conference. Thus, we must not only seek to find balances that appear sensible in specific situations, but we must also commit ourselves to learn from those choices systematically. For example, have metropolitan governments been effective at addressing specific types of environmental issues, such as solid waste, but less effective at, say, managing the pollution of watersheds? Is it more effective to organize recycling at the community level, with centralized collection and disposal? Are there more examples where one solution can resolve two problems, as in the case of Curitiba in Brazil, where slum dwellers were rewarded with bus tokens for bringing their garbage to central points, or where all residents were rewarded with bags of vegetables for bringing recyclables to grocery stores?

Finding an effective balance between complexity and simplicity is the central policy and institutional challenge to be addressed. To make the balance politically sustainable, however, it must be identified through local political processes, not through technocratic, top-down decisions. The judgment about what constitutes an appropriate balance must thus be based on social and political considerations, not merely technical ones.

The Meaning of Thresholds

The third unanswered question pertains to thresholds. An important contribution of the

environmental movement has been a better understanding of the importance of thresholds in assessing environmental quality. This line of inquiry should be extended to cities.

How should we distinguish thresholds in the impact of problems, in the costs of their solutions, and in the complexity of actions required to implement the solutions?

Do we find, for example, that the health effects of air pollution—say, the loss of four IQ points among schoolchildren—are serious enough that some of the economic costs of moving from leaded to unleaded fuels in large cities will have to be absorbed by the transportation system as a whole? Are there fundamental differences in the problems of cities with 30, 130, and 230 neighborhoods? What is the impact of scale on specific natural resources? How bad is bad when we speak of water quality? What constitutes significant improvement? Is it possible to move from universal standards that may be unattainable in poor cities to more selective but cost-effective solutions? What tradeoffs can be made at different thresholds? How do we translate these thresholds into economic, financial, social, or political values?

This question is particularly important as we consider the size of cities. People seem to have been voting with their feet by not migrating to Calcutta since the 1970s or by staying away from Mexico City or São Paulo as the combination of the personal costs of living, difficulties with transportation, and a dirty environment makes living in these cities an unattractive option. Do thresholds exist at which the combined negative externalities or urban concentration or the costs of urban living significantly change individual or household behavior? This question is not simply a research one. It is a critical variable in decisions about how this daunting list of environmental problems can be addressed.

Time Frames

The fourth unanswered question pertains to the time frames for improvement. One feature of the problems discussed at this conference has been their relatively gradual emergence as

significant issues—they have not occurred overnight, with the major exception of toxic waste. Given the chemistry and physiology of the natural world, and certainly the complexities of human and organizational behavior, it is also unlikely that these problems will be eliminated overnight.

How then should we regard the time frames for improvement?

What should politicians promise, and how long will it take for them to fulfill those promises? One politician asked me, “What can I do to make a difference?” As I reviewed with her what I considered to be the priority problems, it became evident that all the solutions would have, at best, medium-term impacts, well beyond the limits of her mandate, and certainly beyond the next elections. This reality led us into a discussion of the necessity of completing some less universal actions immediately, while initiating larger-scale interventions that would benefit her children or her grandchildren. Our conclusions were not only politically unsatisfying; they also seemed inadequate to the physical and moral urgency of the problems we were addressing. If we do not know how long it will take to make improve-

ments, how will we manage public expectations and ensure accountability?

The More Difficult Challenges

Together, these four questions mark the frontier for operational action and for applied research. It makes little sense to propose idealistic and completely unrealistic solutions without accounting for these four dimensions.

These dimensions also suggest a framework for considering normative solutions—what constitutes good or satisfactory performance in environmental management.

In turn, this leads to the broader and most important aspect of the frontier—how we can integrate urban environmental concerns into the broad spectrum of urban economic and social activities, so that we no longer view the challenge of urban environmental management as simply limiting damage, but rather as promoting sustainable development. How can we move from making urban environmental quality the dependent variable to making it the independent variable, assumed as essential, and then applied to other choices affecting the environment—and, as a result, provide sustainable urban lifestyles and economies?

Response

Francesco Rutelli

The unanswered questions Michael Cohen posed as challenges confronting the urban environment provide a sound, substantive framework for discussion.

Start Local

The first question pertains to the local context, and I would emphasize that the local level is the best starting point for managing our problems. For example, the European Union began evolving in the 1950s as a community of rural sectors, focusing primarily on agriculture. Today, 80 percent of the European population lives in towns—and these towns, these cities, are where the individual and collective problems should be managed.

The second question—the relationship between complex actions and simple interventions—centers on the political theme. Politicians are elected for terms that are extremely brief in relation to the tasks they must pursue. Take, for example, Aurelio Pichet, once the leader of Club di Roma, which campaigned for limits on population growth. At the end of his life, Mr. Pichet wrote that local and central government problems could be managed more effectively if elections were staggered, in recognition that political leaders have little time to address questions whose answers affect later generations—that they must, rather, give immediate answers to the people living today. But his view was too optimistic, and certainly too provocative, because it ignored the larger democratic question and prevailing political realities. Instead, a balance must be found for

resolving problems with many little solutions. And we have to create strategic initiatives.

The third question pertains to thresholds. Answers to this issue are unique to each country. At this session, we have different mayors and representatives, with very different problems and logistics and mechanisms at their disposal. What is necessary is to synthesize their experience about the quality of life, because improving quality in any one community depends on a complex system of solutions.

A New Identity for Rome

The last question brings me to the meat of my discussion: the possibility of integrating environmental protection with the new politics. And here I would like to discuss my “town,” Rome. All of you obviously know its extraordinary heritage of history, art, and architecture. But Rome is also a modern city, where 3 million people live, and where we are trying to transform the urban structure and organization of this ancient, extraordinary town.

Rome now has a migratory movement, largely from developing countries, that contributes about 7 percent of the population. But Rome covers a large territory—15 times larger than Barcelona. This represents huge opportunities, but also vast dangers, because for the past 50 years we have not had sensible town planning and management.

Today, 700,000 citizens of Rome live outside the town limits. More than 100,000 of them do not have basic services, because expansion to this

large territory has been extremely disorderly. Our challenge now is to create a new city—to do what many European countries have been doing for decades: pursue town planning in which about one-third of basic services can be dedicated to green areas, such as parks, agricultural areas, and forests. We now have a rich opportunity to transform our city, if we just try to manage the territory correctly.

The main urban issue facing Rome is its traffic. We have to create a balance between public and private transportation. Today, 60 percent of our people use private transportation—about 1,850,000 cars in all. We have made efforts to address this problem in the past. But we have to come up with more effective solutions, and we have to do so immediately—we have already spent 12 years on constructing an underground line that is merely 30 kilometers in length, an insignificant amount for such a large territory.

We have in fact embarked on an ambitious program. In the next three years we plan to create a 250-kilometer mass transportation system with aboveground surface railways. We have already opened the first 60 kilometers of urban and metropolitan railways. And we are also

attempting to reduce pollution from vehicle emissions by implementing a systematic control program that is projected to reduce emissions by between 10 and 20 percent each year. We are also implementing programs to minimize waste, by targeting a 10 percent recovery and recycling rate in the next three years. In the “green” area, we have already opened up 250 hectares of parks and gardens in Rome’s periphery, and we are planning to open up another 1,000 hectares in the next three years. We are planning to give half of these spaces to the private sector—to cooperatives and associations—so that they can manage them directly.

These are some examples of what Rome is doing. The city recognizes that urban sustainability requires that there be linkages between the problems of the 200,000 Roman citizens who do not have essential services and the immediate goals of strategic planning. We are seeking a new identity for the city—one that combines a retrospective with a contemporary and future identity, linked to technological innovation, rational territorial management, and sensible occupation of settlements—and ultimately to urban sustainability.

Response

Jaime Ravinet de la Fuente

Michael Cohen has asked how we can solve the urban environmental challenges that most of our cities face, and especially how we can make development sustainable. Finding the solutions is difficult because of the broad landscape of challenges inherent in city management. Cities do not face only environmental problems; they also face concurrent social problems, economic problems, and cultural biases that all tie into one overriding challenge: how to improve the quality of the lives of citizens.

The only way to approach this challenge is from a multidisciplinary dimension, preparing multidisciplinary solutions. Living conditions are not the domain of a single discipline; they cannot be improved through mandatory city planning that tries to set rules for everything. The multiple aspects of human life, and their inevitable interaction, dictate against the separation of responsibilities that currently defines how our policymaking structures work.

Cities Are Not Self-Sufficient . . .

A starting point for addressing the challenge of sustainable development is to realize that cities are not self-sufficient. They are part of a region or province, and they are in turn part of a country. And that fact alone implies a structure of different authorities, each legitimized under the system of national, regional, provincial, state, and local governments. But the locus of current decisionmaking is at odds with the origins of problems at the local level—because in the end, decisions centralized at the upper level are far

removed physically and intellectually from their source.

The only way to resolve the problems emanating from the lower levels is to build associations and coordination from the bottom to the top, implying a modernization of government. The central government must begin to act as arbitrator, decentralizing policy decisions and their implementation to the regional and local governments; in turn, the municipalities also have a challenge: how to decentralize themselves.

But decentralization requires two resources—money and human capital. First, municipalities need financial resources. And that is a problem common to many countries—power devolves to the lower levels of government, but budgetary allocations do not accompany the shift in authority. In turn, complaints emerge about the inefficiency of decentralized government. Take Chile, for example, where we are making a serious effort to decentralize power, but where the entire budget for municipalities is equivalent to 9.3 percent of the public budget—or less than 2.3 percent of GNP. Compare the United States or countries in Europe, where the municipalities or local powers manage 20 to 30 percent of the public budget. Or Germany, where the figure is more than 40 percent. So municipalities really need to get the proper funds—a budget for handling the power that is devolving to them.

The other need is proper human resources. Enhancing the efficiency of decentralized municipalities depends on the availability of trained professionals and competent managers in the cities.

. . . But They Need to Become So

But beyond the need for financial and human resources is another element that has repeatedly been emphasized in this conference—community participation. Besides devolving power from the central government, we must devolve power from the regional and local levels to the people, allowing them to participate in decisions, evaluation plans, and critiques of the performance of municipalities.

This discussion of efficiency brings me to my last point. Many speakers at this conference have cited projections that by the year 2010 the world will have more than 26 cities with a population of more than 10 million. And this trend is expected to continue even after 2010. That certainly poses several important questions. How

efficient can the cities be with such a large population? Can they make cost-effective investments? Will they be able to enhance the quality of life? If we look at the large cities today, the answers would lean toward the negative.

For that reason, the only way to decentralize cities effectively is to require that they become more self-sufficient, pay their own operational expenses, and cover the required investment—which means, in turn, that citizens must help pay the real cost of living in those cities. In most of our countries the larger cities are being subsidized by the rest of the nation, a situation that perpetuates the continued growth of the urban population. Allowing the broader regions to keep some of their monetary resources will, in turn, enhance the development of the nation as a whole.

Response

Rachel Chatterjee

I have a confession to make. I feel like an imposter in this “Mayors Forum,” since I am not a mayor. The term of the elected body of the Hyderabad Municipal Corporation ended in 1990, and since then no elections have been held. I have been posted to look after the affairs of the city and to exercise the powers of the mayor and the general body. It is in this “confessional” context that I address the questions posed by Michael Cohen.

A Spatial Scale Is One Answer to the Questions

The first question is about defining the local context for policy and action. My answer is simple: the metropolitan area. In Hyderabad we have a sprawl of nine municipalities around the city’s corporate area that simply cannot be separated from the heart of the city. The environmental problems of the city and the metropolitan area converge, and they are intertwined. But in the context of this question, a further classification is advisable.

The conventional approach to addressing urban environmental management issues would be to focus on sectors—air, water, sanitation, solid waste, and so forth. Such a focus is perhaps unavoidable, because the data are classified according to this breakdown, as is the structure of government agencies.

However, an alternative approach is to classify the environmental impacts of urbanization on a spatial scale, that is, at the household, community, city, metropolitan area, state, and national levels (ESCAP 1993). This spatial scale of

impacts will clearly define the characteristic problems at each scale and consequently, the context for policy and action. For example, at the household and community levels, the problems to be addressed would be clean water, shelter, sanitation, solid waste management, and clean indoor air. At the city and metropolitan levels, congestion, ambient air pollution, solid and hazardous wastes, and municipal and industrial effluents would be the major concern. Beyond that, at the state and national levels, we would address such problems as water pollution in rivers, lakes, and groundwater, ecological areas that have been lost, acid rain, ozone layer depletion, global warming, and so forth.

Thus, addressing problems at the spatial scale would also bring clarity to levels of responsibility for action and decisionmaking for policy. The next question—the appropriate balance between complex comprehensive actions and more simple interventions—can also be addressed on a spatial scale, clearly demarcating the areas that require simple interventions and those that require complex, comprehensive actions.

For example, health impacts are greater and more immediate at the household and community levels. Urban health, then, would require a relatively simple intervention at the local level, with perhaps some financial intervention by the national government to support urban environmental health. Similarly, another very simple problem on the spatial scale would be garbage at the community level. One of the first problems I faced in Hyderabad after assuming responsibility related to garbage. The problem was twofold:

that the garbage was not being collected regularly from the open community bins that are placed around the city, and that the placement of the bins was inappropriate—the “not in my backyard” syndrome. Bins were constantly being shifted and used like missiles: when you do not like someone, you get the bins shifted to your enemy’s house!

My solution was to keep the dilemma at the community level itself—to implement a scheme in which we made the community responsible for keeping its neighborhood clean and for placing these garbage bins appropriately. In one colony (after much persuasion), we formed a residents association that was to inform us at which central location it wished to have the bins placed. And so we placed the bins at that location.

Then we explained to them that, with a hundred houses in the colony, no one would be able to control the huge number of people coming out of their houses each morning to throw their garbage wherever they pleased. We told the residents association that it would have to appoint a person to collect the garbage from each house and then dump it at the central bin. Our corporation would contribute 5 rupees per house each month, matched by an equal contribution from the association, to pay the collector.

This scheme started with one colony. We now have 170 colonies involved in the scheme, and many more coming forward to participate because the community has found that it works—no more open garbage bins, and cleaner colonies, all from a simple intervention at the local level. Of course, some problems go beyond the local level—congestion, for example. Its complex and pervasive impacts would require more complicated and comprehensive intervention—perhaps modifying road networks for smoother traffic flow, increasing the diversity of transportation mode options, increasing the costs of owning and driving a motor vehicle, or improving long-term urban planning for better traffic flow. These policy decisions and actions would cut across a large cross-section of departments at the national, state, and city government levels, but they would also depend on local political processes and social preferences.

The third question—the thresholds at which problems change so fundamentally that new solutions are required—is a difficult one, since it

implies setting environmental standards. These standards cannot be applied absolutely or uniformly throughout the world. And modern standards from industrial countries are not necessarily appropriate for developing countries.

The problems themselves differ from one country to another. Health risks in my country are related to malnutrition, bowel disease, and indoor air pollution from cooking fuels. Health risks in industrial countries are associated with automobile and industrial air pollution, pesticide poisoning, groundwater pollution, radioactivity, and urban stress. Thus, problems and their threshold will have to be location-specific. In India thresholds relating to population density and carrying capacity in urban areas require immediate attention.

The question of the appropriate time frames for planning and evaluating action in the urban environment is contingent upon the political commitment by governments. In many countries urban development is still not an important item on the political agenda. Appropriate time frames would have to be fixed by each nation. The solutions could take decades, or they could be more immediate, depending on the political commitment of nation states. Thus, if this conference puts urban environment management on the agenda of nations as a priority item, that in itself would be a measure of success.

Thus, the final question: Can we go beyond damage limitation in urban environmental management toward a true integration of urban environmental considerations into policy and actions?

The answer starts with the immediate—damage limitation—but in the immediate we can also find the longer-term planning exercise. Take, for example, sanitation. Even with a damage limitation policy, we would integrate low-cost technologies for latrines and the conveyance of sewage. For water supply, we would necessarily seek to protect drinking water sources and distribution systems. But we would also integrate action on water conservation with the exploitation of groundwater. For solid waste management, we would integrate concerns about hazardous wastes. For land-use planning, we would integrate a reduction in density, as well as plans for ensuring multipurpose use of city space and easing traffic congestion.

All of these measures would integrate damage limitation with efforts to promote sustainable development. In short, daily management and long-term planning for urban environmental management are interlinked and really cannot be separated.

Moving beyond the Questions: Urban Equity and Community Involvement

It is worth repeating what has been said here many times in the past few days—that problems and challenges are primarily and ultimately human.

India's urban population is one of the largest in the world, at 230 million, and it is projected to grow to 659 million by 2025. At the beginning of the century India had only one city with a population of more than one million. Today India has 23 cities of that magnitude, and Hyderabad is one of them, with a population of 4.34 million. Hyderabad also has the distinction of being the fastest-growing city in the country, having mushroomed by approximately 70 percent during 1981–91.

This, then, poses the primary and ultimate challenge: not to allow events to overtake us, but to plan for and manage this rapid, massive growth whereby we have a sustainable city of tomorrow.

In the new "Frontier for Action," urban equity must be a primary concern, particularly in developing countries. Approximately one-third of Hyderabad's population lives in slums, and poverty remains a persistent feature of urban life. It is the household environment that poses the greatest risk to health, and it is in this environment that the most immediate action is required to provide basic needs—clean water, shelter, sanitation, health, and education. In this context, we have had some measure of success in the U.K. Overseas Development Administration (ODA)-assisted Hyderabad Slum Improvement Project, covering 664 slums and 0.16 million families. I have met some friends here who have worked on the project. The basic philosophy that has guided the project is that providing the poor with basic needs will free their energies to become productive citizens.

And indeed, we have seen this impact in our slum improvement project—that is, when we release the poor from the struggle for basic needs,

they are willing to look more closely at environmental concerns. They have acknowledged that garbage is a problem, and so they have implemented the house-to-house collection scheme discussed earlier. Many have assumed responsibility for improving their habitats, adding rooms upstairs or renovating existing rooms. And many residents have begun to plant trees and to keep them watered, even during the summer, when water is scarce. There is now a general willingness to listen and do something about providing a green cover, cleaner air, and a better environment.

All of this is to say that urban equity—ensuring that the basic needs of all citizens are met—is one of the most crucial elements of any urban management strategy in developing countries.

The second point is that everything that city governments do, everything that mayors do, must maximize the involvement of the communities in city development. We have had some positive experiences with community involvement in Hyderabad—for example, with the garbage collection schemes, in which 170 colonies and 270 slums are now participating, covering a population of 0.4 million. We have found that involvement with this one issue has motivated the community to assume responsibility for many other concerns. We started with garbage collection, and now the communities are asking for infrastructure improvements in roads, sidewalks, and so forth. And when, due to a shortage of funds, we asked the residents associations to help us collect taxes, their response was so positive that property tax collections have risen from 150 million rupees to 400 million rupees in just three years. The major determinant of this huge increase was the involvement of citizens—community participation.

Similarly, we have had another positive experience following a study conducted by a university in Hyderabad. Study responses indicated that the average mean temperature had risen in the city by four degrees over the past two decades, because of the loss of green space. Tree planting had been going on in the city as a purely local-body effort, in which about 30,000 trees were being planted each year. But we then decided that it had to become much larger—to be a broadly based citizen movement—and so we called on our residents associations, the slum committees, organized groups, private nursing-home associations,

federations of industry and commerce, and non-governmental organizations to help in this effort. The movement has mushroomed: in the past two years, we have planted 600,000 trees. And their survival rate is around 90 percent.

Thus, there is evidence that involving the community in the design and development process dramatically enhances the sustainability of projects. The sustainability of any development program depends on creating conditions that maximize the community's involvement and participation and increase the scope of decisionmaking.

We have heard such wonderful stories of hope, optimism, and success in the past few days that we have ample reason to believe that we can

build a sustainable world—but if, and only if, communities are sustainable. Secretary Cisneros spoke of spatial separation in certain American cities, of the necessity of forging links among communities, of the futility of organizing strategies without engaging the people at whom they are targeted. I could not agree more. If we build from the community up, then we build a sustainable city, a sustainable nation, and a sustainable world.

Reference

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Response

Robert Vigouroux

My response to the first question about defining the local context is that we should limit ourselves strictly to the urban scene. Of course, the outskirts may be considered as well, but the urban context should be defined as an abnormal concentration of city dwellers in a space that is much too limited for them.

As mentioned earlier, the Green movement and the environmental pressure groups have, quite correctly, enhanced our consciousness about protecting nature. But given that 50 percent of the population of the world lives in urban areas, we should not overstress nature to the exclusion of humans in the urban environment. Think for a moment about a city in which air pollution has been reduced to zero, the water is clean and safe to drink, wastewater is treated before it is disposed of, and household waste is collected and treated properly. Many would consider that city a perfect environment. But if in that perfect environment socioeconomic conditions are still inequitable, we would still have tremendous problems.

For example, if part of the population continues to live in poverty—despite having access to adequate housing and drinking water—we would still have segregated classes, and the urban environment would not be what it should be. So we should proceed from the basic level—social inequities.

My response to the second question about balance is that we should envision a horizontal symmetry regarding such competing problems as pollution and the use of private cars, housing and green space, and others, rather than to

strive toward a perfect environmental world—but one with an absence of what people need and want. And, of course, we cannot standardize the world anyway, because the richness of the world is in the difference of habits, behaviors, culture, and people.

The answer to the question about thresholds should start with the first and foremost element—financing—because without money we cannot move beyond our ideas and principles. Clearly, in the cities of developing countries, requirements and needs are increasingly urgent, and thus increasingly expensive. One of the issues that must be addressed is the concentration of money in isolated areas, which perpetuates imbalances. We must find a way to share the wealth. But we must not assume that achieving funding balances means that the same environmental standards or even stricter standards should be imposed on developing countries. That would be extremely selfish.

To close my comments, I would like to refer to my city, Marseille. Marseille is a small city—but quite cosmopolitan, with a stable population growth. So I am amazed by the tremendous growth of the megacities of the world, in which the environment has become almost impossible to manage. What seems to be the foremost necessity right now are policies that help us control the hyperconcentration of people in these megacities. We will not stop these cities from growing, and we will not stop people from coming to live in them. But these people will be living without pleasure, without joy, and this would be the worst thing that could happen to the environment.

I want to conclude by thanking the World Bank for having organized this roundtable of mayors, because we, not the technocrats, are the ones who have to address the problems on a daily

basis. And in that light, this forum has much to show cities about how to share know-how and expertise and develop an understanding about how we can build sustainable cities.

Floor Discussion

Question 1: When a city is part of a sensitive ecosystem, how do you, as mayors and city managers, strike the balance? For instance, when the impact of a project like the Lagoon Barrier in Venice is not clear, do you take the chance and proceed, or be cautious and wait?

Mr. Rutelli: The Lagoon of Venice is a very fragile environmental system. The scientific evidence says that the lagoon will die if we don't find an efficient way to manage the tides. However, despite decades of studies, we don't have evidence of damage from the current infrastructure for managing the tides.

Such cases present a dilemma to mayors. They must balance between the need to protect the environment on which the city is based—a long-term, but vital goal—with the more immediate needs of city residents. When I was in Venice recently, a transport boat captain explained that the local administration had imposed a severe speed limit on boats in the lagoon in the interest of protecting the ecosystem. However, the speed limit is also hurting the transport business. Naturally, the boats try to get around the regulations: they speed when they can, or go around to another part of the lagoon. In the end, such severe limitations are self-defeating.

Question 2: An observation about American cities is that there is a significant mismatch between the economic useful life of publicly funded urban infrastructure and the economic useful life of private sector economic activity that benefits from that infrastructure. The risk is that

the private investor in infrastructure would have too short a time horizon to be able to commit funds. On the other hand, continued public investment depends on continued economic activity, which cannot be predicted. Do you, as mayors, recognize this as a problem?

Mr. Ravinet: I am clearly a supporter of private investment in the cities. The way we should handle those who criticize private investment is by giving a public concession with reasonable terms to pay back the investment and to turn a profit. A lot of investment in urban infrastructure, such as highways or subways, should be made by the private sector and paid for by the users. The only clear way to promote public transport is to have vehicle owners pay for the use of streets and for parking, and let the market limit the use of cars instead of hard-to-enforce regulatory measures.

Mr. Cohen: We certainly agree on this imbalance between public and private time frames in terms of benefits from investment in infrastructure. The Bank is in concerted discussion with many cities about precisely this kind of strategic framework.

Question 3: Mayor Ravinet stated that cities should pay for themselves, which implies that they are being subsidized now. However, given that cities are considered to be the engines of the economy, and that governments at all levels other than local profit from urban economic activities, it is necessary to ensure that the engines of growth are not overtaxed. What do you think is

the correct balance for cities and other levels of government to share the costs of running cities?

Mr. Cohen: We need to have a policy framework that takes into consideration that we cannot undercut the productivity of cities in the national interest; we must keep these various points in balance.

Clearly there are costs that must be internalized within cities, particularly at the household level, and I would agree with Mayor Ravinet that we need to encourage that the full cost of services like water supply, sanitation, and electricity be picked up by the cities to the extent possible. But at the same time, we must support the productivity of cities through infrastructure and other kinds of policies.

Mr. Ravinet: When I say that cities should pay for themselves, I do not ignore the fact that they are also the engines of development. However, there is a point of urban growth beyond which investment in the city's infrastructure ceases to be cost-efficient, and creates diseconomies of scale. When millions of man-hours per day are wasted in clogged transportation, it is time to consider reorganizing the city on a more human scale where work, leisure, study, family life, sports, and other activities can be engaged in more easily.

Cities are rapidly coming to the point where investment in highways, sewerage, and water supply is not cost-efficient. And this subject of limits to urban growth is one that should be part of the discussion of solutions for sustainable urban development.

Ms. Chatterjee: I would like to discuss the situation in India relating to this question of balance between national, regional, and local governments.

In Hyderabad fiscal devolutions between the government and the local body are not clear. We had what was known as *octroi*—a tax on goods coming into the city. It was a buoyant tax, which increased every year. About 15 years ago the tax was taken over by the provincial government, and the compensation (1.5 million rupees) was paid to the city corporation.

Today, in 1994, the compensation being paid is still the same, despite the increase in tax revenues. If balance is to be maintained, the first action is to

assure that there is a clear policy, with clear rights and responsibilities. There has been some progress in India. In 1992 the 74th Constitutional Amendment Act was passed, which limits the length of time the fiscal rights of a municipality can be superseded to no longer than six months, at which time elections must be held. In addition, state finance commissions have been set up to advise on the devolution of revenue and the municipalities' access to sources of finance.

Clear lines of policy and responsibility are essential in the relationship between a local body and the state government, otherwise there is no way the local body can fund the infrastructure required to make the cities engines of growth.

Mr. Rutelli: On the surface, these questions require different answers according to the differences in our towns' problems, populations, and perspectives. However, sustainability is a universal concept. Though we live in such different towns, we have learned that we have much in common: we have common goals that we approach from different points of view. This is not to say that the differences are not important. We are elected by our people, and they will elect each of us on the appropriateness of our programs for their particular town. But though we need to know the particular circumstances of our town, we also need to learn how other towns manage their set of resources.

I would address a remark to Mayor Vigouroux. If there is a growing interest in the environment in our cities, it is not because people are looking for a perfect town, but because people indeed recognize that they live in imperfect towns. But people have also come to understand that a perfect environment is not the ideal to be striven for; protecting the environment is not an obstacle to development, but rather a precondition for development.

Audience observation: In classic planning theory, we distinguish between rational planning, incremental planning, and mixed scanning. Rational planning is the usual ideal; incrementalism is the way actions are usually taken; but mixed scanning is what we should promote.

Mixed scanning is based on the idea that the planning organism is in charge of a process, not so much in charge of preparing a plan for 5 or 10

years, but in charge of getting a process under way that is responsive to day-to-day needs within the context of looking forward to both the short and longer terms. It is a model in which one does not think about a time frame as immediate, short, medium, and long—but rather, incorporates feedback during an ongoing process and allows adjustments along the way. The city is growing and changing on a day-to-day basis.

Question 4: In the context of the moral urgency that Michael Cohen mentioned in addressing problems of urban environment and poverty, and in light of Mayor Ravinet's comment that 20 percent of the world consumes 80 percent of its resources, are we prepared to relinquish our private cars, air conditioning, large houses, and all the good things that we aspire to in our societies, when the majority of the world's population, particularly the poor, are living under intolerable conditions?

Mr. Rutelli: The private example is very important, especially for public figures. We have a public responsibility to set an example, because this is what we are asked to do by the electorate. There is now a trend in Western countries that private behavior is becoming a basis for determining fitness for public office. This will be important to the environmental movement.

Question 5: Given that different communities are likely to have different definitions of quality

of life, how can we get communities to lower their expectations when their definition of quality of life may result in unsustainable approaches?

Mr. Ravinet: This question has many answers. The best way that I have found is through education. Education of the community involves working with it to set goals and to monitor situations. This is the way to help the community to address the proper problems and look for solutions, not only from the top to the bottom, but also from the bottom to the top—which is the ideal way to work with a community.

Summing up the discussion, Sven Sandström emphasized three points. First is the importance of day-to-day urban management, and the attention mayors and city managers give to dealing with the crises that emerge constantly in urban areas. These also present useful innovations in problem-solving. Second, there is a need to address the longer-term issues as well—among them, access to and mobilization of financial resources; and citizens' payment of the real costs of living in a city. In this sense, day-to-day management and longer-term change issues cannot be separated. Third, private sector investment, while usually focused on the short term, can be encouraged if the private sector senses that there is long-term stability in an urban area and that there are known rules of the game that will prevail over time.

PANEL DISCUSSION OF STAKEHOLDERS: URBAN ENVIRONMENTAL GOVERNANCE

Introduction

Arthur Eggleton

As a former mayor of Toronto who has moved to the national scene in Canada, I recognize from my own experience the different perspectives that can arise when decisions are made about the division of responsibility for different aspects of the environmental agenda. It is actually quite interesting to have one foot in each camp.

Environmental Issues Create Opportunities for Cooperation

My experience has been that views are becoming less polarized and less adversarial as citizens are becoming increasingly aware of the possibility and necessity for sustainable development. Indeed, many of the fiscal problems confronting governments—in Canada and many other parts of the world—seem to have brought us much closer together and forced us to work with greater cooperation and harmony. And these partnerships are also being developed in the environmental arena.

In Canada we have developed a national roundtable for the environment and the economy, which we are trying to push through as an act of Parliament. Our government has even created a task force to review our taxes, subsidy systems, and grants in an effort to identify barriers to sound environmental practice. This willingness to address environmental governance issues also extends to our provincial and municipal orders—we have many levels of govern-

ment in Canada—from which the momentum for environmental awareness and behavioral modification originated. Of course, as in many other countries, we face jurisdictional and definitional challenges, but the structural and conceptual issues are being addressed as a cooperative effort—a process that has been gathering momentum.

Canada, even with its vast size, is also witnessing a growing concentration of its population in urban centers. In 1991 more than 75 percent of Canadians lived in urban areas. In fact, most of them lived within about a hundred miles of the border with the United States. This concentration, in fact, creates a real opportunity because the city becomes a perfect venue for dealing with quality-of-life issues on a meaningful basis, whether the issue is crime, health, or the natural environment. It also provides an important economic focal point, one that can be linked to other public policy issues, such as the sustainability of the environment.

Infrastructure Works Program: Partnership to Improve the Urban Environment

I would be remiss not to refer to a major initiative being undertaken currently in Canada—the infrastructure works program—which is under my direction. This two-year, \$6 billion program is seeking to upgrade Canada's physical infrastructure while also developing short- and long-term

employment. The program is being targeted primarily at municipal infrastructure, but funding is coming from all three levels—\$2 billion from the federal level, \$2 billion from the combined provincial levels, and \$2 billion from the combined municipal levels of government.

What is unique about the program is that virtually all project proposals have come from the local level and have focused primarily on environmental-enhancement projects—water treatment, sewerage installations and upgrades, and industrial retrofitting. Moreover, after the local levels have initiated the projects—with provincial and federal money added to theirs—they have also assumed responsibility for implementing and completing them, not necessarily with their own workforces, but more often by contracting out work to the private sector. And so a key part of the program is private sector participation. Thus, the program represents the priorities of the local levels as they see them—priorities that they believe are necessary for improving the quality of life, attracting additional private sector investment, and improving their competitiveness as cities in the economy of both our country and the world. And that is an important aspect of the program.

What is also unique about the program is the unprecedented speed at which it has been implemented, demonstrating the commitment of all three levels of government. We have allocated funds for two-thirds of the program already, and it has been under way for only eight months. Ultimately, the program will create 100,000 jobs

directly, but it will create far more indirectly, as additional investment is attracted into these local communities. But perhaps more important, the program is being undertaken as a cooperative partnership by all levels of government, the communities themselves, and business and advocates. The fact that the program has moved ahead quickly and efficiently is testament to the type of cooperative working relationships that can be a model for addressing other environmental issues—where common objectives can be identified, various stakeholders can be encouraged to work together in harmony, and the private sector can seize on opportunities for sound environmental management.

Future Directions in Environmental Governance

In recognition of the importance of environmental management, Canada is currently considering instituting an “environmental auditor general” at the federal level. We believe that the environment deserves the type of functional evaluation and follow-up that we accord to other areas. Oversight and accountability are crucial to the structure of any governance program.

Where common objectives in the public interest can be identified, the various stakeholders can be encouraged to join together for mutual benefit. Today’s speakers will offer you a number of examples and suggestions on how we can build on stakeholder involvement and improve environmental governance.

Overview

K. C. Sivaramakrishnan

Analyzing requirements for the sustainability of programs and projects that the World Bank helps finance, the report on *Governance: The World Bank's Experience* (World Bank 1994) concluded that "good governance is epitomized by a transparent process; a bureaucracy imbued with professional ethos; an executive arm of government accountable for its actions; a strong civil society participating in public affairs; and all behaving under the rule of law." To some, this may seem an ambitious catalogue of ideals rather than an analytical framework. Some scholars also argue that the relationship between government and civil society is the essential element of governance, and a normative or prescriptive approach toward the quality of government or political leadership inhibits an objective analysis of governance. In this perspective, "governance, as distinct from government, refers to the relationship between civil society and the state, between rulers and the ruled, the state and society, the government and the governed" (McCarney and others 1994). Accepting this definition to begin with, we must consider whether urban environmental issues constitute a special dimension of governance.

Differences between Urban Environmental Management and Urban Management

Many would argue that having such basic services as water supply, sanitation, or solid waste collection and disposal provided efficiently is the essence of good urban environment. Given the fact that nearly one in four residents in the cities of the world do not have access to safe drinking

water and well over half lack access to sanitation, city managements have their priority tasks identified for them already. Yet it is when scarcity and deficiency predominate that environmental outcomes become even more critical to securing basic environmental services. Madras, India, a city of 5 million, has had three serious water famines in the past 20 years, prompting calls for evacuating the city. Still, the overextraction of groundwater in its southern reaches has persisted, causing aquifers to become salinated. The city has also been flooded periodically, but water harvesting has yet to be practiced systematically. Even the existing reservoirs and numerous ponds have been allowed to silt up.

India's capital city, Delhi, which is located on the banks of the river Jamuna, can draw water from the river only from whatever flow is left after upstream uses, and it must depend on water sources that are 100 to 300 miles away, and at great cost. Of the 2,300 million liters of water that Delhi uses every day, more than half is discharged without treatment into the Jamuna (Borja 1991). Downstream at Agra, Shahjehan's dream, the Taj Mahal, is reflected not in the fullness of that river, but in the murkiness of a stagnant pool of sewage.

Nonetheless, compared with other cities in the country, the Madras and Delhi water supply and sewerage services do a better job of providing water, despite the questionable environmental outcomes. Transferring pollution downstream, as in Delhi, or overusing a natural resource such as groundwater, as in Madras, is just one example of urban environmental management that goes

beyond what is commonly understood as municipal management and the provision of urban services.

Impact of Urbanization

While the pace and scale of urban growth are major determinants of environmental stress, the globalization of trade and economic liberalization have added a new dimension to environmental management. As more and more countries embrace market economies, the differences in their fiscal and trade policies are becoming more narrow. The “competitiveness of cities” has become an even more critical issue than the “competitiveness of nations.” Cities will survive and prosper, today and tomorrow, primarily on the basis of their economic relevance and strength. Choices about expanding industrial locations, trade activity, or investment options are being and will be made among Bangkok, Guangzhou, Jakarta, and Manila, rather than among Thailand, China, Indonesia, and the Philippines. In turn, economic growth may well increase pollution, place a greater strain on natural resources, create more congestion, and render larger sections of the urban poor more vulnerable to environmental problems.

In China’s cities, for example, sulfur dioxide discharges have been rising at 3 percent annually, restricted activity days due to air pollution are estimated to be 3 billion annually, and about 150,000 cases of pollution-induced respiratory diseases are being reported annually. Such diseases affect nearly half a million people in Bangkok and Delhi. Excessive exposure to lead reportedly causes more than 200,000 cases of hypertension and 400 deaths annually in Bangkok. Nearly half of China’s groundwater resources are polluted to various degrees. And only slightly more than 3 percent of China’s total urban sewage is treated—the rest is discharged into the country’s rivers. Several stretches of India’s 14 major rivers are polluted with domestic and industrial waste. When urban and environmental ministers from more than 50 countries in Asia and the Pacific gathered in Bangkok in November 1993 to discuss urbanization in Asia, they reached a sobering conclusion—that urban growth as a key aspect of economic development in this region has

brought with it a sharp and significant deterioration in the environment in the form of increased health risks, greater inequality in access to services, and regression in the ability of the poor to secure any measure of insulation or protection from pollution (ESCAP 1994).

Establishing Priorities

When environmental problems are numerous and cross-sectoral and resources for redressing them are limited, priorities clearly must be established. Prioritization requires both analysis and an institutional process. Assessing the effects of environmental problems in terms of health and safety, productivity, and equity is one way to rank problems and priorities. Ecological effects such as the extent of land subsidence or saline intrusion from overdrawn groundwater, waste loads affecting water bodies, increased flood risks, and so forth are also critical considerations. Valuation of the economic impacts of environmental problems is another useful process.

Where environmental problems cut across media, redressing problems successfully in one sector can help deal with related issues in other sectors (Bartone and others 1994). To illustrate, investments to address deficiencies in basic environmental services in urban areas are often urged on the basis of apparent rather than real needs. Water supply projects usually seek to increase quantity or extend the distribution networks without addressing the significant system losses (up to 40 percent in many cities). Yet reducing leakages and conserving water may not only help improve water supply, but also reduce wastewater discharge. Increasing road space without addressing the proliferation of private automobiles (doubling and tripling in Bangkok, Delhi, and Shanghai in the past five years) or the distortions in public transport pricing and use is another example. Proper solid waste management that enables garbage to be collected rather than dumped in drains, a practice that frequently aggravates urban flooding, is still another example. The cross-sectoral connections are thus an important dimension of urban environmental problems, and an adequate understanding of such connections facilitates prioritization.

Scale and the Stakeholders

Since prioritization is both a process and a product, the process itself should help identify and involve the numerous stakeholders, such as government agencies, local authorities, professional and interest groups, business and industry, non-governmental and community organizations, and other representatives of the people. However, establishing and sustaining this inclusive process is not easy. The participatory nature of the process itself often creates additional conflicts of views and interests and may often jeopardize or compromise a product that is based on consensus. Another complication is that the interests of individuals or institutions will vary according to the scale of the impact of environmental problems. To illustrate, water is a basic daily need at the household level; a storage, treatment, and distribution responsibility for the city; a natural resource allocation issue at the regional level; and so on. The advocacy of the needs and the politics involved at these different levels need not be congruent; indeed, they are often at odds.

The Ganga Case

Take, for instance, the large and ambitious Ganga Action Plan launched in India in 1985. The basic premise was that the Ganga (Ganges) River, long revered by the Indian people as a symbol of purity, but polluted over the years by domestic and industrial wastes, should be restored to its pristine status. In its course of 2,525 kilometers, the Ganga flows through three states—Uttar Pradesh, Bihar, and West Bengal, where a third of the country's population lives. It also irrigates and drains 25 percent of the land. Some of the greatest pilgrim centers in the world—Allahabad, Benares, Haridwar—and a hundred other towns have risen on its banks. For trading ports and industrial centers such as Calcutta and Kanpur, the river has been a lifeline. Over the years its waters have been diverted at several points for irrigation; during monsoons it floods vast areas; and in summer it is reduced to a trickle in some stretches (Mohan 1992).

The plan to rid the river of its pollution evoked varied responses from several interest groups. The three state governments and the city managements saw the Action Plan as an opportunity

to build long-pending sewage treatment plants in their urban areas along the river. Industry, accustomed to treating the river as a drain in its backyard, proposed that the heavy costs of cleaning up its wastes be borne by the Plan. Scientists stressed that agricultural runoff with an increasing load of fertilizer chemicals and insecticides would be the more serious part of the pollution. Some conservationists argued that the preservation of aquatic life in the river should be the primary concern of the Action Plan. To others, arresting soil erosion and promoting watershed management upstream were the essential tasks. Any suggestion to reduce the diversion of water for irrigation and permit minimum flows in some stretches of the river to maintain its regime was anathema to the farmers and irrigation engineers. To the numerous communities and the people who traveled to the banks of the river from all parts of the country, the Action Plan was a penance, long due from an acquisitive, wasteful society.

The institutional management for guiding and managing the Action Plan thus had to accommodate a variety of national, state, and local agencies and the scientific and academic community. The prime minister's personal interest and chairmanship helped establish a high-level authority in which the three state chief ministers and such key national ministers as finance, environment, irrigation, and planning were members. Under the authority's overall guidance, special groups were set up to screen and sanction schemes, monitor the program, assess river quality, engender public participation, and so forth. Since life on the Ganga is determined largely by a calendar of religious events marked by massive gatherings of pilgrims at specific places, the initial phase of stopping domestic and industrial waste discharges was pursued in a time-bound manner and largely accomplished. As of now, most of the schemes for intercepting and diverting the wastewater have reportedly been completed. Fourteen sewage treatment plants have been established or renovated. Some have useful resource recovery arrangements, such as methane gas, pisciculture, and so forth. Of 68 large industries discharging wastewater into the river, 51 have installed treatment facilities. Dissolved oxygen and biochemical oxygen demand (BOD) levels have shown modest improvements in some stretches of the river (Mohan 1992).

Along with this modest success has come some criticism. Community organizations in some of the riverine cities such as Benares felt that the Action Plan was largely a government-sponsored public works program with little scope for popular participation. Since the Action Plan's initial focus was on preventing the discharge of domestic waste into the river, some considered it a national handout to a group of municipalities that had failed to take care of their wastewater problems in the first place. A more positive criticism was that the Action Plan was confined to Ganga, while other rivers in the country were equally or more polluted.

In these eight years India has seen major political changes; governments have changed in the center, and the states have changed two to three times. That the Action Plan has withstood these administrative changes is evidence of its broad public and political support. Building upon the experience in technology and in such financing components as capital works and maintenance, a National River Action Plan has been launched recently, and work has commenced on another major river, the Jamuna. Although cast in a project format, the Ganga Action Plan thus indicates the considerable potential in approaching rivers as ecological systems, and how governance arrangements for sustaining that system can extend beyond municipal and sectoral concerns.

Rallying Points for Stakeholder Support

Perhaps rivers and seas and similar natural endowments are an attractive ecological platform for identifying and mobilizing the support of stakeholders. The MEDCITIES and Baltic Union are recent efforts to create intermunicipal networks, organized around shared natural resources, such as the Mediterranean and Baltic seas. River Basin Commissions, such as those for the Delaware estuary or the Rhine, are other examples. It may not be easy to identify such natural endowments within megacities and multimunicipal urban regions, but some efforts have been made. The municipalities in Rio de Janeiro have managed to come together to tackle the pollution of the Guanabara Bay. São Paulo has devised a watershed management arrangement for the Guarapiranga. Bangkok is trying to develop a more positive approach to the Chao Praya River. Metropolitan

Manila has been doing some soul-searching over what it has done to the Laguna de Bay. A recently completed Royal Commission Report urges the conservation of the waterfront as an organizing principle for rearranging governance in Greater Toronto as a bioregion (Royal Commission on the Future of the Toronto Waterfront 1992).

Other megacities with fewer resource endowments have to rally around different points of concern; whether it is "running short of breath" in Delhi or Mexico City or "running out of water" in Beijing or Madras, the severity of the crises may be the stimulus for rethinking governance. The Federal District of Mexico City is collaborating with other municipalities in the metropolitan zone, as well as with the provincial and national authorities, to implement a comprehensive multicomponent program to combat vehicular pollution, after several years of debate. If a crisis is required to prompt megacities to come together, the world is unlikely to run short of them. The latest UN population projections confirm that by 2010 there will be 26 cities of more than 10 million people; of these, 21 will be in Asia (excluding Japan). In the next size class of 5 to 10 million, 26 of a projected 33 cities will be in this same region (United Nations 1992).

Whether it is the growing deficiency of environmental services or the exacerbation of air and water pollution, environmental degradation for several of these large cities is threatening their sustainability and continued growth. This urgent question has been added to the long and tortuous debate on optimum city size and agglomeration economies. Scholars who have decried the image of a "big, bad city" as a myth now acknowledge that megacities in developing countries have been less successful at avoiding the negative externalities of pollution and congestion than have industrial countries (Richardson 1989). Technological applications, pricing policies, market-based incentives, improved regulatory management, and growing public awareness—all are cited as determinants of the comparative success of industrial countries.

Models of Environmental Governance

While rigorous paradigms of urban environmental management are not readily available, particularly for multimunicipal, metropolitan

situations, some approaches and institutional changes are worth noting.

The Metropolitan Scene

Those who lament the multiplicity of agencies and fragmentation of jurisdictions in Calcutta or Manila, Lagos or Rio, should note that “hyper-pluralism” is the prominent feature of the North American metropolis (Wirt 1971). Adhering to the Madisonian principle of dividing power as security against tyranny, metropolitan politics in North America carefully pit “power against power, authority against authority, and interest against interest.” More than three-quarters of the people in the United States live in more than 300 metropolitan areas, and the typical metropolitan area contains about a hundred government units. Establishing public interest at the metropolitan level is thus an arduous search and struggle through this power play. Yet in providing and coordinating basic urban services such as water supply, sanitation, or transport, “most American urban areas have realized effective metropolitan governance without having to enact formalized metropolitan government” (Ross and others 1991). Daily life in New York, one of the great “unnatural” wonders of the world, divided into countless cities, suburbs, and special districts, is sustained by an interrelationship among these governments “perhaps more complicated than any other that mankind has yet to contrive or allowed to happen” (Wood 1971).

Through a variety of instruments, ranging from informal cooperation to voluntary councils of governments, to special-purpose regional bodies, to multipurpose districts, to reformed urban counties, North American cities have tried to secure the provision and coordination of urban services. Some areas, such as metropolitan Dade county in Florida, Greater Portland, Minneapolis-St. Paul, and Toronto, have created more sophisticated two-tier and three-tier organizations, consolidating metropolitan and local-level responsibilities.

However, environmental management is a significant addition to the tasks of metropolitan governance. In some cases, metropolitan formations already established have taken on these additional tasks. The Washington Council of Governments, for instance, is working with the

metropolitan Washington Air Quality Committee on a regional plan to meet the requirements of the 1990 Clean Air Act. It had previously developed a water quality management program that reduced key pollutants in the Potomac River by 90 percent.

At the other end of the country, Los Angeles—sometimes described as “four hundred suburbs in search of a city”—set up the special South Coast Air Quality Management District in 1977, combining the four county-based air quality districts that existed earlier. During the initial years of its existence, the district was criticized for inactivity and loose enforcement. In 1987, in the wake of the Federal Clean Air Act, the California legislature strengthened the district’s leadership and gave it additional powers. Beginning in 1989, prompted by the U.S. Environmental Protection Agency (EPA) and the Southern California Association of Governments, the South Coast Air Quality Management District developed a comprehensive plan to reduce pollution. Although Los Angeles still has the most polluted skies in the nation, its air quality has improved in recent years, with smog levels in 1991, 1992, and 1993 remaining at the lowest levels on record (Levits and Kelly 1993). Communication with and responsiveness to the community through advisory committees and frequent public workshops, innovative approaches such as RECLAIM (the Regional Clean Air Incentive Market, involving 400 large industrial polluters), and considerable prodding by the EPA are some of the reasons for the South Coast Air Quality Management District’s modest success.

Civil Society Dimension

Civil society and its relationship to the state is a crucial dimension of governance. However, urban societies are complex, comprising many elements and groups, and are rarely homogeneous or congruent at the city level. The perception of urban environment issues, the willingness to mobilize, and the ability to intervene are usually limited to neighborhood and community levels. They do not necessarily converge at the city, metropolitan, or regional level. The option to engage in or disengage from any particular range of issues is both the strength and the limitation of communities. Whether the “community” is one

of business or professional groups, nongovernmental organizations or a local-level organization, its role in governance is shaped through a combination of adversarial and collaborative relationships with government.

The concept of "civic environmentalism" provides a valuable understanding of the process and challenges involved in communities' relationships (John 1994). As a supplement and at times an alternative to command and control mechanisms, civic environmentalism builds upon both top-down and bottom-up initiatives, whether from the government or from interest groups. National environmental action plans, environmental impact assessments, single-issue advocacy by interest groups, and comprehensive planning approaches—all have their value at different stages of building up the civic role. Even litigation that amounts to holy wars are useful in nudging the stakeholders to collaborate. Whether in restoring the Everglades in Florida, or in restricting reclamation from the sea and urban expansion in the Bombay backbay, such public interest litigation has helped clarify the responsibilities of public authorities and prompted them to discharge these responsibilities more effectively.

But litigation is an expensive and often extreme form of popular intervention. Quite often it is necessitated by the denial of information on public projects or matters of environmental significance. Transparency and the right to information are thus critical requirements for building the relationship between civil society and the government. Unfortunately, as yet neither is common in city governments. But even city governments can learn. Perceptions of urban environment issues, the clarity of understanding, and responsiveness and transparency in decisionmaking can all be enhanced significantly by an exchange of information between communities and cities. Such networks as MEDCITIES, the Baltic Union, Megacities, Healthy Cities, and the Metropolitan Environmental Improvement Program that are seeking out and sharing community and city initiatives that address urban environmental problems are a recent phenomenon. Their merit and strength stretch beyond the respective jurisdictions and governments of the participating cities. Beyond sharing experience and coordinating responses to common problems, these networks also facilitate comparisons of performance,

thereby providing an element of political competition and incentives to perform.

Global Need

Globally, much is still to be done. The widespread attention that the Green Agenda of biodiversity, greenhouse gases, and rain forests has received is ample evidence of what global sharing of information can achieve. The problems of the urban environment are no less global. Indeed, the similarity of such problems among the cities of industrial and developing countries is greater than is commonly understood. Urban air pollution is one such common area. The perils of pollution from vehicles have long been a concern from Los Angeles to Manila to Mexico. Yet strategic planning is not that similar. While cities in industrial countries try to enhance emission standards and performance, the technology of the two-stroke engine, discarded in the West decades ago, is picked up and applied with enthusiasm by several new vehicle manufacturers in China or India. Reconditioned diesel or gasoline engines power the paratransit systems in several cities of the developing world, also providing a convenient export from some industrial countries. Whether it is a market, pricing, or public policy failure that perpetuates the "dirty auto industry," a global assessment will help develop a more effective strategic plan for solutions. Whatever the uniqueness or city-specific character of urban environmental issues, such global reach must be one of the objectives and outcomes of environmental governance.

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National Government Perspective

Martti Lujanen

As Mr. Sivaramakrishnan has stated, governance refers to the relationship between state and society. One aspect of this relationship is the locus of decisionmaking. Where environment is concerned, it is important to ensure that decisions are made at the appropriate level—which implies a full understanding of the distribution of responsibilities among and between public authorities and the private sector.

Another aspect of the state-society relationship, and one that bears closer scrutiny, is the type of instrument used by the government to direct the people toward achieving national goals and priorities.

Western European governments, both central and local, use nine main types of instruments to influence urban development:

1. Regulations, norms, standards, and permits
2. Financial instruments, including both incentives (such as grants) and disincentives (such as taxes, fees, and charges)
3. Agreements with the private sector (a new area in Europe)
4. Physical planning
5. Research, both supportive and executory
6. Development monitoring, including the creation of environmental indicators
7. Education and training
8. Guidance
9. Awareness campaigns through commercial advertisements.

How are these different instruments used in practice? To illustrate, I provide examples primarily from the most environmentally

advanced part of Europe, including Germany, the Netherlands, the Nordic countries, and the United Kingdom.

Regulatory Instruments

The first group of instruments consists of traditional government tools that are still widely used. Examples abound, but a few will suffice. One set includes the heat installation norms for buildings to reduce energy consumption. This instrument was more prominent in the 1970s but is still used today. Some states in Germany have considerably increased the level of these norms.

Another example is restrictions on car fuel emissions—mandates to install catalytic converters in new cars, to have periodic inspection and maintenance for vehicles without catalytic converters, and to ban leaded gasoline. This area is one in which Japan and the United States, especially California, have been the most progressive in the world.

Permits are another example of these regulatory instruments. For instance, the Finnish Water Act requires that special permits be obtained for activities that pollute waterways. This “polluter pays” principle stipulates that the polluter take steps to prevent or at least reduce any inconvenience to waterway activities, and that it compensate the state for any damage. The principle is largely a new regulatory mechanism throughout Europe, despite being on the drawing board for nearly 20 years.

Financial Instruments

European governments use a variety of financial support systems for urban environmental governance. But the more traditional ones are investments for infrastructure. For instance, in my country of Finland, major investments have been made in wastewater treatment facilities; today, about 85 percent of all municipal waste undergoes biological and chemical testing and treatment. But cost recovery is also an important element of this activity; in fact, the charges collected for drinking water supply are increasingly being used to cover the costs of treating the wastewater.

On the whole, the incentive side of financial instruments has changed gradually but dramatically in the past 20 years, due primarily to the application of the polluter-pays principle. The fundamental financing rationale behind the principle is that polluters bear the full cost of the necessary pollution prevention and control measures *without* drawing subsidies from the public sector.

The European Union is in the process of implementing its fifth Environmental Action Program—"Towards Sustainability for the Years 1993–2000." Under this program sustainable paths of development, the integration of environmental and sectoral policies, and a broadly based application of market instruments to get the prices right will play a central role. Moreover, the European Union is now vigorously debating an economic instrument for environmental policy—the Commission's proposal for a carbon energy tax. The European Union seems to be waiting for similar developments in Japan and the United States, perhaps for competitive reasons. But some countries are not waiting—Denmark, Finland, the Netherlands, Norway, and Sweden have introduced their own carbon taxes during this decade. All European countries do in fact impose a relatively high tax on car fuel. Roughly 70 percent of the gasoline price in all West European countries consists of taxes. This is certainly an area where the European and North American traditions differ.

Financial instruments are also used to promote recycling—for example, deposit charges on bottles and cans. These deposits are quite high in Germany, for instance, ranging from about 40

cents to as much as a dollar and 40 cents on drink bottles, paint cans, and different types of packaging. Packaging legislation in Germany is actually extremely advanced. The key is that manufacturers, importers, and sellers are obliged to take back any packages they handle and determine whether they can be recycled or reused outside public waste management.

Agreements with the Private Sector

A different type of instrument is used in the Netherlands, where an agreement between the Ministry of the Environment on the one hand and the organization representing the packaging industry on the other was negotiated in 1991. It is called the Packaging Covenant 1991. The purpose of this agreement is to reduce packaging waste.

Physical Planning

Physical planning shapes the nature of our living environment. Transportation policies, in particular, play a crucial role in energy conservation and the quality of the air. As is well known, most European countries have adopted different measures for reducing dependency on cars in cities. Many of these measures seek to address the root cause, not just symptoms—that is, they try to reduce the need for travel by promoting a more balanced use of city space, rather than unnecessary separation of city functions, and by discouraging the construction of shopping centers and malls, which encourage car use.

Research

Research should play a vital role in creating more sustainable societies. Take, for instance, energy-saving measures in Finland. Relatively strict norms apply to the energy efficiency of buildings—for example, triple-glazed windows have been compulsory in new production since the 1970s. But research has tried to improve upon these norms. And it is noteworthy that our research and experimental building projects have proved that, compared with current conventional buildings, energy consumption in new buildings can be cut by half without sacrificing the quality of indoor air—and at a cost that is

only slightly higher. But more research is required before the prototypes are ready for widespread construction.

Another example of applied research is the development of low-flush-capacity toilets, which are already widely used. The newest version requires only three liters per flush. Compost toilets have also been developed. These products have moved from the prototype to the commercial production stage, and are also being exported.

Monitoring

Monitoring is obviously an important component of any environmental policy. Again, taking Finland as an example, we have a monitoring network for chemical analyses of water quality, comprising about 5,000 permanent sampling points; thus, there is one sampling point for every 1,000 inhabitants. Three other monitoring efforts are also worth noting. One includes environmental impact assessments, which the European Community approved as early as 1985, and which will play an increasingly important role in environmental policies in Western countries. Another is the OECD program of environmental performance reviews implemented in 1991—which provide standardized criteria and variables for comparison across countries. Still another is an urban indicators project initiated by the World Bank that is now being implemented by the UNCHS in Nairobi.

Education and Training

School curricula have been revised in many European countries to impart the basics of sustainable development. Different countries are also applying rigorous, purpose-oriented training arrangements in this context. For example, in Finland, an advanced training system has been implemented by the municipalities; just last year,

1,000 training events were sponsored, and 40,000 employees and local politicians took part in them. This means that roughly 100,000 training days take place across the country each year.

Guidance and Awareness-Raising

European nations have tried several initiatives to give guidance to the public, and to raise the public's awareness of environmental actions and priorities. Denmark actively promotes energy efficiency through the use of commercial advertisements, for instance, on television. In the United Kingdom the local government management board has issued two publications to promote environmental sustainability: "A Guide for Local Authorities in the United Kingdom" (on Agenda 21) and "Local Agenda 21: A Step-by-Step Guide."

A Concerted Effort

These are some of the instruments that the European Union is using to govern its urban environmental agenda. Many have been replicated by other countries, and many offer promising tools for developing countries. But good urban environmental governance is really a balance between two elements—decisions made at the local level, with a clear distinction of responsibilities among government, the private sector, and communities, and the unfettered use of policy instruments, with minimal manipulation and bureaucratic interference.

None of these instruments by itself will produce tangible results. An awareness campaign is not enough to influence consumption patterns, but should be supported by financial incentives and disincentives. One of the important roles of national government is to make sure that use of these instruments is coordinated and cohesive, to assure that environmentally sustainable development is achieved.

Local Government Perspective

Jaime Ravinet de la Fuente

A commonly accepted and obvious principle is that cities are the current and future environment for most of the world's people. Cities are where we live, where we grow, where we perform, where we work, where we have our families. Thus, a partnership between the environment and the cities is a must. We have to be able to put the cities in sync with human development—cities are *for* human development. But how are we going to put the cities on a human scale, and how will we address the continued growth of cities throughout the world?

The fundamental approach to address these questions is to alleviate poverty in our cities. Today, there is no surer way to damage the environment than to perpetuate poverty. If we alleviate poverty, then we will reduce segregation in our cities, and we will start working at the human level.

Competition among Cities

Today many cities are in competition with each other. Especially in the developing world, cities become the centers for business and trade. And even in a developing region such as South America, competition among the cities is currently surpassing competition with countries. Competition among cities means that the cities themselves must be able to attract investment, in turn implying that we must be able to coordinate the growth of public authority and the private sector.

That brings me to another subject—governance. We have heard that the Madisonian principle of dividing power is secure proof against tyranny. I would agree with that, but in

some ways the concept of a city's being ruled by technicians, by the central government, may be based on another principle, from Machiavelli: *divide to rule*.

We may complain that the municipalities are not efficient enough to solve all the problems, especially those pertaining to the environment, because they are too large or because they cross jurisdictions with other municipalities. But the other way—to centralize city management—could result in a highly centralized form of government that will not necessarily resolve the problems of the cities and the environment.

I wanted to mention a “counter trend” in Chile. Although competition between cities is rising, cities are also cooperating and helping each other face common problems. For the past 20 years in Chile, we have had a “Solidarity Fund,” in which cities pool their resources and distribute them according to need. City resources come from land taxes, business permits, and vehicle licenses. Some cities are able to raise more resources than others. So we have set a system in which municipalities transfer 50 percent of their revenues to the Solidarity Fund. The funds are then distributed among all 334 municipalities in the country according to a national poverty index. This does not, however, offset national government programs to reduce poverty, but merely corrects imbalances in resources among cities.

Alliances for Cities

Based on my own experience, the best way to address the problems in the cities is to forge an

alliance among the central government, local governments, the private sector, the business sector, and the social sectors in our civil society. Perhaps the most vivid example of this alliance can be found in Barcelona. Every time we speak about city development and strategic planning, we should study the experience of Barcelona. It has been able to coordinate the efforts of all actors—the national government, the regional governments, the different municipalities, the private sector, and the social sector.

The only way to deal with the environment of the city, which is *our* environment, is not to accept that the problems can be resolved only by a very efficient government ruled by technicians. The participation of the people, of the social actors, is key in setting targets, developing strategic plans, and coordinating efforts. A city must not be ruled by the architects, economists, or other experts—because sometimes the schemes you create in the laboratory or formulate in an academic institution are not ones the people can or will embrace.

Our experience in Santiago has taught us to undertake environmental projects after thorough planning that involves all the actors. This means meeting with the different authorities from the public sector and the different tiers of government, and actively incorporating the private sector and the people. In this way the people will accept the environmental targets and cooperate with the projects.

The way to help a city achieve its human potential is to engender the participation of the people—their spirit—in local government, regional government, and federal government. Of course we need government support for technical approaches; but the people must assert their own influence through social organizations and through the private sector if our cities are to address environmental and competitive challenges more effectively. Decentralization, coordination, and the sharing of responsibility—these are the only way to solve the problems of the cities.

Business Perspective

J. Hugh Faulkner

The issue of governance and the structure of governance is something I have lived with in various incarnations in the past. I am not going to comment on that. The range from centralized to decentralized systems is well known. The issues are fairly clear among the various options.

What really matters to those of us in business, whatever the governance structure, is the type of policies that the governance structure is implementing. A range of issues have been discussed, but one issue is particularly relevant from our perspective.

Internalizing Environmental Costs

Having examined the issue of sustainable development up to the Rio Summit and since, I have found one unavoidable and central policy issue that is key to the entire concept—internalizing environmental costs. Unless we are prepared to address this fundamental question, the entire notion of sustainability is an illusion. If there are concerns about waste disposal or about water quality throughout the world, the concerns do not arise from the structure of government—rather, they are due largely to the absence of an appropriate charge for water use or waste disposal.

So whatever the governance structure, whatever the setting, the key to effecting change within municipalities and the urban infrastructure is whether environmental costs can be internalized. The polluter-pays concept applies with as much rigor in Malaysia as in France, with as much rigor in the Philippines as in Germany. This

concept is not one that can be applied selectively between industrial and developing countries.

The argument that internalizing environmental costs creates a competitive disadvantage is nonsense. The two countries in the world that have progressed furthest toward internalizing environmental costs—Germany and Japan—are the most competitive economies in the world.

Stop Talking and Start Charging

The pervasive environmental degradation in the municipal areas of the developing world demands action. I would suggest that, as we continue to debate issues of governance structure, we must in the meantime take action to resolve the environmental problems. Anyone who has spent time recently in Bombay, Jakarta, or Manila knows that these cities are a simple combination of people and industrialization. And the environmental impact is a simple equation: environmental impact equals population times the standard of living.

We know what is happening on the population front, and so one should just factor the population growth rate into the equation and then start looking at the earnest desire mentioned by the mayor of Santiago—to alleviate poverty, which means increasing the standard of living. But improving the standard of living and increasing the number of people means a more severe environmental impact—that is, unless we do it differently.

Business responds to incentives and disincentives and the laws within which it operates. If we

want to stop polluting, then charge for using environmental resources. Let us stop taking so much time talking about it. Just charge. It is a resource. It should be paid for. Water is no different than iron ore. It is a resource. Air is a resource. So charge for it. Do not overcharge, but charge!

One of the decisions we have made in the Business Council is to move this agenda forward through projects to demonstrate that sustainability—and efficiency—is a real concept on the ground. We have created a unit called Sustainable Project Management, which I head, and we are targeting urban infrastructure issues associated with water, waste, and energy.

A Business-Municipality Partnership

Our basic proposition is that keeping these types of infrastructure as simply “municipal services” will perpetuate the chronic problems that plague them today—the absence of financial

resources, technology, and management. If we want to change those elements, then one way to engage the private sector is to turn these problems into businesses.

These businesses should not simply be private businesses. They can be public sector partnerships of mixed-capital companies that have a contract with a municipality to deliver a certain quantity of water of a certain quality. The other things we can do through the Sustainable Project Management Unit—because it is not for-profit and is not investing in the business itself—is that we can help our business partner, the municipality, identify technologies and we can negotiate with the regional development banks to finance the proposals.

We believe that sustainable development makes good business sense, and we urge that it be incorporated into infrastructure services and that these businesses be allowed to grow and develop.

Community Perspective

Elisea Gozun

Population growth and rapid urban development have degraded urban environments worldwide. Not even the wealthier and more technologically advanced nations have been spared. The situation is much worse in the urban centers of developing countries, where the infrastructure, technologies, and institutions necessary for urban environmental protection are grossly inadequate. Governments, poor as they are, are finding it increasingly difficult to cope with this rapid urban environmental degradation. This reality points to the importance of mobilizing the communities to complement their governments' limited resources to address critical environmental problems.

Role of Communities in Environmental Management

It would be quite easy to assume simply that the general citizenry should be active in environmental protection. After all, as the "end user" of the environment, each member of the community has the largest personal stake in his or her environment.

Unfortunately, many communities in developing countries are not even aware of how environmental degradation is negatively affecting their lives. The scavenger families on Smokey Mountain, at the infamous dump site in Manila, are not fully aware that their children are being exposed unnecessarily to the health hazards of living on this mountain of garbage. Faced with more pressing day-to-day problems arising from their poverty, most simply look to government to

solve what they perceive to be their environmental problems—whether it is the absence of potable water or sanitation facilities or ineffective garbage collection. But governments *have* traditionally assumed that role—using the top-down approach to planning, decisionmaking, and actual project implementation and relying solely on their own resources.

Worldwide experience now shows that the solution to urban environmental degradation cannot come from government alone, nor from the citizenry alone. Any effective and sustainable solution must be the result of active cooperation between the private and the public sectors of any society, whether rich or poor.

An awakened citizenry, active in protecting the environment in their own communities, would certainly make it easier for governments to manage the "larger" environment of an entire city or even an entire country properly. In addition, an active group of communities can also help ensure that governments, whether national or local, do their part in delivering basic services, including environment-related services, to the people.

Metropolitan Manila Experience

Recent developments in Metropolitan Manila have given new hope for addressing the environmental degradation of the premier urban center in the Philippines. Influenced largely by the growing environmental consciousness throughout the world, the Philippine government (both the national government and local government

units) is now giving the environment sector a higher priority in its programs. The fact that environmental problems are reaching critical levels have prompted some communities actually to begin to exercise their right to govern their own environments directly.

The Philippine government, through the Department of Environment and Natural Resources, is now implementing the Metropolitan Environmental Improvement Program (MEIP), with financial and technical support from UNDP and the World Bank. The objective of MEIP is to help Asian cities tackle their rapidly growing environmental problems. Particularly applicable in Manila's case—given the deep and complex social and cultural roots of its environmental problems—is MEIP's emphasis on addressing these problems cross-sectorially, and basing solutions, action, and leadership at the community level. MEIP-Manila's emphasis on the foregoing principles are thus quite evident in the portfolio of projects that it has chosen to support.

The successes we have witnessed in community governance, though still limited, have emboldened us to share the lessons we have learned with other communities, not just in Metro Manila but with other cities involved in the UNDP–World Bank Metropolitan Environmental Improvement Program.

Factors for Success

Our experience with communities that have assumed direct governance of their own "microenvironment" shows that the following factors are critical to success.

Understanding the Problem

Awareness is always the starting point of community environmental governance. It usually begins with an awareness of the specific environmental problem that affects them directly, and a realization that something must be done to address it. However, the communities themselves must identify their problems and be convinced that they can do something to solve them. They should plan the actions to be taken and organize themselves to carry out these solutions.

Let me give one example. A resident of Villamor Air Force Base, a community of some

60,000 residents (families of enlisted men and noncommissioned officers of the Philippine Air Force), was alarmed by the growing garbage problem in her community. She participated in a zero waste management seminar sponsored by the Recycling Movement of the Philippines, was inspired to take action, and engaged the participation of community leaders. Together, they mobilized their community and, with support from churches and schools, they now have a successful cleanliness and beautification project.

Awareness can come from within the community or from external sources. It can be based on environmental issues or on any other problem that concerns the entire community. An example of a good entry point is awareness-raising among the youths who constitute the greater majority of the Metro Manila population. MEIP has capitalized on this by supporting eco-youth camps for high-school student leaders in order to develop a new generation whose respect for the environment is genuinely internalized. Youths are an important advocacy group because their influence reaches both the household and the community at large.

No matter where it originates, awareness of the environmental problem and of the capacity of the community to do something about it will always be the first step. But that *awareness must be nurtured through an organized campaign* that involves all members of the community. While universal cooperation cannot be expected immediately, no one must feel left out. House-to-house campaigns, community meetings, inter- and intracommunity "contests," bulletin boards in community stores, and other vehicles for heightening awareness have proved effective in getting the support of members of these communities.

Communities Need Champions from Within

In all of the communities that have successfully assumed governance of their own environments, a strong leader emerged *from within the community itself*—to generate and then sustain interest in community projects. A few nongovernmental organizations (NGOs) have attempted to organize communities to resolve their own problems; and although some have been successful at initiating action, none has been able to create a self-sustaining project. Committed "champions"

from within, who will push and guide the community, have been a major determinant of project success and sustainability. It is important, however, that leaders mobilize as many community members as possible in all phases of the projects—from identification to planning to implementation. The leader must not be content with simply doing things by him or herself.

These “champions” may not be the elected officials of a given community. In some MEIP project areas the perceived leaders are not necessarily those that have been elected. Nonetheless, in choosing a champion the community’s perception about leadership must prevail, and project implementors must handle conflicts over leadership delicately.

Ownership in the Project

It is not enough that members of communities realize that they are stakeholders in their environments. It is equally important that, individually, they feel that they are also stakeholders in whatever project the community undertakes. They must have a sense of ownership in the project itself. They must believe that the plan is their plan, and that execution of that plan will be for their benefit. The Paco Environmental Enhancement Project—a waste minimization project involving vendors and hawkers in a public market and its surrounding communities, including the squatters living along the Paco Creek—has demonstrated that active participation in the process of identifying problems and planning projects contributes significantly to this sense of ownership in the project, which in turn ensures its sustainability.

In the Paco experience people from diverse backgrounds—big business (Unilever), NGOs, the national government (Department of Environment and Natural Resources), the local government unit (the City of Manila and three *barangay* councils, which are the lowest political unit in the country), a multilaterally funded program (MEIP), market vendors, and street hawkers—collectively and individually feel that they “own” the Paco Environmental Enhancement Project. The process pursued by the groups to get to where they are today is illuminating.

After a workshop in which they all agreed to cooperate, representatives of each sector were selected to form an ad hoc committee to coordi-

nate the initial phases of project planning and implementation. With technical and financial assistance from MEIP, surveys on waste generation and disposal, as well as on perceptions of the problem, were conducted first by MEIP with the people and then by the people themselves. A core group of leaders, also chosen by the people, underwent training. On the basis of the survey results, information campaigns were conducted. These campaigns were led by trained members of the community and included focus group discussions among the vendors, hawkers, and residents in the vicinity. The vendors cooperative incorporated environmental management education into its regular seminars for its general membership.

Having laid the educational foundation, the community then devised solutions for their environmental problems. They discussed not only general concepts but even such details as the collection route of garbage trucks, the number of containers required to segregate the compostable, recyclable, and residual waste and where each of these containers would be positioned, and the method for moving the waste materials within the market and within the community so that collection could cover the entire area in as short a time as possible. They completed these planning sessions with the assignment of specific responsibilities for each stage of the plan.

Armed with their plan, they then proceeded to hold dialogues with officials of the Department of Environment and Natural Resources, the Metro Manila Authority (MMA), and the City of Manila. The city government readily assigned garbage trucks to pick up the community’s residual waste at the designated places and times, and even made a commitment to provide a site for the community’s composting operations. The community is now well organized and has functioning committees for enforcement, education, collection, and engineering. Their core group of leaders have been deputized as an environmental brigade by the city’s mayor.

Because they believe that the project is their own and will benefit all of them, everyone has been diligent about carrying out their respective responsibilities on the project. With the expected profits from the sale of recyclables and compost, the community is now planning other activities for improving the conditions of the public

market and its surroundings. But the most important sign of the project's success is that, today, the people of the area are proud to be members of their community.

No Community Is an Island

Despite the success of the communities at raising their awareness, finding their champions, and having a sense of ownership in their project, they still need support from outside the community so that they can achieve long-term success. The communities need access to the technologies of environmental management—the whys, the hows, and the wherefores—that are available from NGOs, government agencies (Department of Environment and Natural Resources), and multilaterally funded programs (MEIP). Many also need technical, financial, and logistical assistance. Such is the contribution of the Recycling Movement of the Philippines to Villamor Airmen's Community, of Unilever and MEIP to the Paco public market community, of the International Resources Recovery and Recycling Network to the Pasig Green Park Subdivision, and of the Metro Manila Authority and the Rotary Club of Makati to Barangay Pitogo.

Communities must also establish mutually supportive linkages with their local government units. After segregating the recyclable and reusable materials from their household wastes, there will still be some waste left for disposal. In almost all cases communities will not have the resources necessary to dispose of the waste properly, and local governments must come in to take care of this responsibility. In Barangay Pitogo (a low-income community of 16,000 residents in Makati), the Metro Manila Authority and the *barangay* officials worked out a specific garbage collection schedule for each zone within the community. Residents put out their garbage only on the appointed days and times of garbage collection. Otherwise, no garbage can be found dumped on the streets. Some zones within the *barangay* now segregate their waste, sell the recyclables, and compost their biodegradables. The prescheduled deposit of garbage from the house to the designated pickup points may not sound impressive to those who live in industrialized countries, but in a poor country such as the Philippines it is an achievement.

In Makati the municipal government gave funds to the *barangay* to hire local policemen (called *tanodbayans*) to assist in enforcement activities, and sent its engineering staff to help declog the drainage canals. In Manila and Quezon City the city governments are providing dump trucks to collect residual waste. The collection routes and times were agreed upon by the communities, the city officials, and the hauling contractors.

In all these cases the communities also mobilize their own resources in order to sustain projects without relying solely on project or local government unit support. For example, in the Paco Environmental Enhancement Project, the vendors and street hawkers spend time and effort on cleaning up the Paco Estuary. They even hired their own street sweeper. Another example is the Public Sanitation Facility (PSF) component of the World Bank-assisted Metro Manila Infrastructure, Utilities, and Engineering Program. Public sanitation facilities (toilets, baths, potable water standpipes, and laundry areas) were constructed over seven years in congested and depressed areas in Metro Manila that lacked access to such facilities. PSFs that were subsequently managed by user associations were more successfully maintained than those managed by entities other than the users themselves. Some user associations have been able to finance improvements to the facilities and provide additional services to the community, such as paving footpaths and setting up cooperative stores. Again, the sense of ownership was critical to success.

Nothing Beats Success

Projects, especially the first one, must be doable. Successful implementation of the first project will almost always lead to more projects with at least equal success. The initial project must not be overly ambitious, thus threatening its chance of success; and as much as possible, benefits to the community from the project should be easily discernible. The community must be prepared socially to undertake the project. External linkages, from project start-up through implementation and final output, must be in place even before the project is launched.

The Pasig Green Park Subdivision community undertook first to solve a simple drainage problem that the residents perceived was their

main problem. Clogged drainage canals were causing flooding during heavy rains. International Resources Recovery and Recycling Network, an NGO, helped in the fund-raising campaign and provided technical expertise to declog the drainage system, thus minimizing flooding. This initial success motivated the community to implement more fundamental solutions to their environmental problems, such as solid waste management. The same NGO provided the community with waste management technology. The community established linkages with junkyard dealers to purchase the recyclables and with the local government of Pasig to pick up the residual waste for disposal. A private company provided receptacles for segregated waste. The success of Pasig Green Park has been shared with other homeowner associations, as well as with the local government. As a result, six other homeowner associations in the area have started organizing themselves along similar lines. They have, in fact, formed a Confederation of Homeowner Associations for environmental improvement and other projects.

Conversely, failure of the first project will probably not even allow a second attempt at community governance. We have not been without our failures and problems. Some projects have fallen flat on their faces, with households segregating their waste only to find out that they do not have a feasible market for their recyclables. Some of the PSFs failed because their user associations were not sufficiently trained in financial management.

The street hawkers of one street in Paco almost withdrew their participation in their project when some policemen, acting without clearance from the mayor, demolished their stalls, despite an agreement between the hawkers and the mayor of Manila that they would be allowed to stay in that area. Garbage collection became erratic with the onset of the rainy season, which flooded the transfer station of the city. Quick

response from the community leaders, as well as the city government and other support groups, prevented the collapse of the project. The lessons we have learned from our failures have helped improve our batting average in community governance.

Future of Community Governance

Some communities in the Philippines have proved they have the capacity to develop both the technical skills and the organizational maturity to assume direct governance of their own environments. The Metropolitan Manila experience, although limited, has demonstrated that communities, NGOs, private corporations, local government units, and national government agencies can work together and achieve mutually beneficial results in the environmental sector. But at the moment, the number of communities that have assumed governance for their own microenvironments is admittedly still too few to have a noticeable impact on the total urban environment.

However, we are confident that community governance is the way of the future. As more communities assume their rightful roles as stakeholders in the environment (and not just beneficiaries of the state) by getting involved directly in improving their microenvironments, the overall urban environment will definitely be enhanced—and at a lower cost to governments. What must be done is to replicate the good experiences, while ensuring that none of the factors for success is omitted in the desire to attain more rapid replication. Governments must recognize this and consciously promote and support such efforts.

In the final analysis, cooperation among the community, private business, NGOs, and local government units produced beneficial results because each understood and accepted its role in the entire process of urban environmental governance. In the successful communities, the sum of the parts was indeed greater than the whole.

Floor Discussion

Question 1: How can local governments and communities be empowered to create a real dialogue and working relationship with the federal government?

Mr. Eggleton: The federal government must actively talk with people at the local level and understand local interests, needs, and concerns.

Mr. Lujanen defined governance as being relevant to the lowest appropriate level. Government is, in fact, the locus for local needs to be met. Ms. Gozun, as well, offers the important observation that we should incorporate community action from the grassroots into government programs. National-level government programs should help provide a framework, but with a flexibility to be able to meet those needs at the local level. Obviously, there needs to be a lot more dialogue to do this.

The infrastructure program I described earlier is a bottom-up program, as opposed to a top-down program. We should have more of these programs in which local needs and priorities are being met and federal funding is being provided, rather than a grant telling cities, top-down, what they need.

In Canada we are undergoing some radical changes in many of the programs and services that we provide at the federal level. For example, the social security programs are going to include extensive consultation at the local level to make sure we are meeting the needs and the priorities of people throughout the country. I think that this is the way national governments should operate in the future.

Question 2: What is the role of labor in urban governance? Tens of thousands of laborers are on the front line doing the work every day—sanitation workers and so on, who have knowledge, information, and expertise, know the back alleys of shantytowns intimately, and have knowledge that could be tapped into. Many of these workers are community members themselves.

Mr. Eggleton: The central point is that labor is part of the community. This is an inclusive phrase, not an exclusive one.

Mr. Ravinet: I would like to point out that we, as municipal leaders, consider the community as a whole. To be able to govern our cities, we need the participation of the private sector, the community, and what I call the social actors: the universities, the NGOs, and, certainly, the labor organizations. They are the users of the city, of public transport, of downtown areas, of public spaces, and we have to consider them in policymaking.

Mr. Faulkner: I want to mention that in Madras we are looking at a water recycling plant to deal with the water shortage. As you know, 40 percent of the fresh water in Madras is used by industry, even though no industrial process needs fresh water.

When we started to look into recycling, our approach was to have a water meeting with a broad range of people, who were there more as citizens of Madras than as representatives of particular interest groups. We found that this approach generated a much more open debate. Single-issue constituencies weren't defending

their turf. There was a common perception of the problem—the lack of water—and everyone worked together to find a common solution.

Ms. Gozun: In our work we considered the workers as part of the community, and I would like to cite one specific example. The government wanted to set up public sanitation facilities in highly congested areas that had neither sanitation facilities nor, in fact, potable water. But in the process of consultation, it came out that the people really wanted individual connections. Of course, this would cost much more.

But the people just asked to be given access to a source of water. The communities then mobilized themselves, organized workers, and designed their own piping system. With limited intervention from government—just access to the water source—the community members now have individual connections.

Question 3: To follow Mr. Sivaramakrishnan's point about priorities, the main priority is that municipalities need to become "propoor." As things stand, the poor never go to the municipality to solve their problems because they are apprehensive. Also, we cannot become too ambitious and try to deal with the totality of problems. Could we think of one step at a time, and concentrate on finishing that, so that many new avenues will open?

Mr. Sivaramakrishnan: There are three requirements, as I perceive it, in the cities of developing countries. First of all, municipalities should exist as empowered entities. At any given time since 1947, 50 percent of the municipalities in India have been governed by a higher-level authority.

The second point is that municipal institutions also have to relate to the community as the civil society. This is a question of political accountability; it is only when municipal institutions are politically accountable that they can think of being sensitive to issues like poverty. Otherwise, they become merely extensions of regulatory edifices of higher levels of government.

Third, the structure of city governments should not be so restrictive as to produce only regulatory policies. Complexity is inevitable, but choice of steps will emerge only if there is political accountability.

Question 4: Most of the discussion today has tended to treat the private sector as a single, monolithic entity. In reality, there are multiple economies within any large metropolitan area, some of which are not part of the conventional market-based economy. How does the reality of multiple economies, and the prospect of conflict between the nonmarket economies and the market economy, affect the issues of governance? Another aspect of this conflict is illustrated by the prospective investment in the auto industry in China and in India, which may benefit a few, but may disproportionately harm many environmentally.

Mr. Faulkner: I would agree with the first premise. I think the sleeping issue is at what point the excluded part of the economy, the informal sector, will get involved. Some of us believe strongly that this has to happen sooner, rather than later. The informal sector is a superb market—probably the most efficient market in the world—but it is outside the main market. We believe that property rights are key to informal sector change.

On the second point, quite frankly, you cannot stop putting cars in China or India; but if the rules governing their use are rigorous, as in Singapore, the environmental impact will be much less negative.

Question 5: While agreeing with Mr. Faulkner on the polluter-pays principle, we might ask, what about those people who cannot pay?

Mr. Faulkner: One of the strange paradoxes of this world is that very often the poor, even the poorest of the poor, are more willing to pay than the wealthy if they think they really have an even chance at a predictable supply of decent water. You will get more noise from those who can afford to pay.

Mr. Sivaramakrishnan: This polluter-pays principle is important. When Hugh Faulkner says that if you can deliver a service that is predictable, measurable, and has identifiable benefits, the willingness-to-pay is not going to be a problem—this is a point on which we all can agree.

However, concerning the polluter-pays principle, a distinction should be made between the business sector within a country and the

multinational business sector. There is a certain international responsibility here in sharing information, in providing guidance on cost-effective, environmentally appropriate technology. For example, the auto industry has a responsibility to make known their own experience with the technology of the two-stroke engine—namely, that if developing countries adopt the two-stroke engine now, it may take them 12 to 15 years to set right the environmental damage. Business can play this particular role, just as it has in Green Agenda issues.

Mr. Ravinet: I fully agree, and this brings me to another subject that should be discussed on this panel. I agree with the polluter-pays principle, but this is quite difficult for southern countries to apply while competing with other countries for investment.

There is a double standard in the behavior of many multinational companies. When operating in the North, they obey all the rules; but when these companies are in the South, they take advantage of cheap labor and, because of the pressures of international competition, of the inadequacies in environmental regulation. This is something that the international community must address if we really want to improve our environment.

Mr. Faulkner: These multinationals are actually governed by their shareholders, who are mainly Northerners. These shareholders presumably are environmentally aware and should ask some intelligent questions about what is going on in Chile, for example. As Mayor Ravinet says, the authorities in Chile are not going to pressure the multinationals on environmental issues. This pressure is going to come from their shareholder base at home.

I happen to run a subsidiary of a multinational, Alcan, in India. Our standards are higher than those of any of our domestic competitors, not because we are concerned about the authorities in Delhi but rather because we are worried about how we are going to deal with our shareholders in Montreal at the annual meetings. Frankly, most multinationals today, because of the pressure of raising capital, are fairly successful at maintaining uniform standards around the world, although there are exceptions.

Another interesting facet of multinationals is their role in transferring environmentally appropriate technology. China had a meeting this summer on implementing Agenda 21. General Motors was there and offered all of their car pollution prevention technology for free. Increasingly, corporations are beginning to recognize that unless they behave this way they are not likely to do very well in these new markets.

Question 6: What incentives are there for a city to improve its conditions and way of doing business? Is there a means of rewarding cities that do improve—for example, on poverty alleviation or the environment—and not rewarding those that don't? Incidentally, how does the World Bank analyze its own successes and failures on these issues?

Mr. Ravinet: The real question, to my mind, is how to measure progress, and who will do it. Project evaluation and project performance are some good measures. But the main judge should be the people. Decentralization requires a lot of confidence and trust in the people.

Mr. Serageldin: The World Bank has an independent operations evaluation unit that reviews every single project that the Bank has financed. We have done over 3,500 reviews so far; in addition, there is an annual external review. A 10 percent economic rate of return is only one of several criteria we use. We try to target the projects very tightly, address specific issues such as capacity building and institutional development, and, in the past four or five years, increasingly emphasize local participation as the essence of sustainability.

Question 7: How can city or regional governments be convinced to eliminate subsidies and internalize environmental costs, as suggested by Mr. Faulkner, when this may lead to a loss of comparative advantage? And a related question, how can the body politic be convinced to pay environmental costs when they may not perceive the scarcity of the resource, or the damage to the environment?

Mr. Faulkner: One way to approach the problem is to create public-private mixed capital companies. However, this will only work if those

involved in the company and the stakeholders who attend the meetings agree on the environmental aspects and the need for enforcing the internalization of environmental costs. This approach could break down at any one point: the community does not agree that there is a problem, for example, or the mayor is not prepared to let the city come in as an equity participant in the company. In essence, willingness-to-pay is the recognition the community gives to the subject. It's best to proceed step by step.

Question 8: The Environmental Protection Agency's office in Philadelphia is taking its first steps toward trying to reconcile what we have been doing for 20 years with the concepts of sustainable development. As a federal agency, we would like feedback from the panelists and from the people attending today as to what federal governments can do besides simply offering handouts.

Mr. Ravinet: The environment needs to be handled in association with the different layers of the public sector and the civil society.

Our experience in Santiago, Chile, has taught us that the only way to undertake environmental projects is through dialogue between various public authorities at all levels—national, regional, and municipal—and by incorporating the private sector and the people. An educated

public is the only safeguard for the environment; the people must understand the target and the measures being taken. Therefore, stakeholders must be brought together to undertake environmental protection.

Question 9: The real issue for those of us who think we are experts is to recognize and accept the truth that most poor people, in most cities in the Third World, provide their own housing and all their own services. The question is how do we bring about a genuine, pragmatic partnership between governments and aid agencies, on the one hand, and the urban poor, on the other.

Ms. Gozun: In the Philippines there is now an effort to reach down to the lowest political unit—the *barangays*—to get community participation at that level. A concrete example is a project that we are currently putting together with the World Bank for the establishment of additional public sanitation facilities in Metro Manila. The local governments have identified areas where they think they are needed.

We are also going with the local government to the communities themselves, to verify with the people exactly what their needs are and their willingness to pay for services. The idea is for the communities to take part in designing the facilities that they want, as well as in running the facilities later on.

THE FUTURE: INTERNATIONAL COMMUNITY COMMITMENT TO THE URBAN ENVIRONMENT

On to Istanbul

Wally N'Dow

It is a great privilege for me to address you today at the concluding session of your conference. I have listened with much attention and interest to the speakers and discussants who have preceded me, and I want to congratulate Ismail Serageldin and his colleagues at the World Bank for bringing all of us together. What you have had to say has opened our eyes to the true nature and extent of the urban problems that are now among the most urgent of any confronting the international community. Speaking for the United Nations Conference on Human Settlements—Habitat II, to be held in Istanbul, Turkey, in June 1996—I can tell you that you have made an invaluable contribution to our preparatory process. I thank you for it.

A Shared Mission

You have examined in depth the very problems facing the urban environment—the problems that may not catch the headlines, but that make up the very fabric of daily urban life. You have shared with us how governments and municipalities throughout the world have responded to these complex challenges, which often bring concerns about economic development and living standards into direct conflict. You have been honest about what has been accomplished in several situations, and about the gargantuan tasks that still lie ahead. And, in doing so, you have set a clear agenda for specific actions that must be addressed worldwide.

My experience in the past few weeks—one that several of us here today shared in Cairo—provided a similar sense of hopefulness. Because despite the often tension-producing working sessions—those that managed to monopolize the attention of the news media—what the front pages did not report was the overall sense of mission shared by the delegates. The feeling that our global problems can no longer be just talked about—and fretted about—was all-pervasive; the need for specific action and response was the primary focus.

Such is the case, too, with the urban crisis, so intimately connected with population, physical environment, and social conditions—the issues that challenge and dominate the United Nations agenda as it nears its 50th anniversary. We need not estimate, project, or speculate about what will happen to our cities in the next 10, or 20, or 50 years. We know exactly what will happen if we do not change our behavior and act responsibly, both individually and collectively.

Seeing Clearly

A mother, trying to keep her large family together in a teeming squatter settlement, without running water or sanitation facilities—who is trying to cope with the diseases of her children's bodies and with the despair and hopelessness in her children's minds—does not need to be told that "something has to be done." She

is her own reality check. She does not need our statistics to perceive her own human—more often inhuman—condition. She does not need to be told that a crisis is upon us.

Unfortunately, however, in this confusing and often unruly world of ours, most of us do need to be told. Indeed, as Bosnia and Haiti and Rwanda demonstrate—sadly, the list is long—we tend not to see the crisis until we have no other choice. The urban situation we examine here today poses precisely this danger. With few of the characteristics that we commonly associate with an urgent international crisis, it is all too easy to adjust our vision to block the crisis out. And doing so is nothing less than an invitation to disaster, especially at a time when it is essential that we redefine the entire concept of international security and how it applies to each and every one of us.

Historically, security has always been seen in terms of protecting national boundaries and borders. But all that is changing now. The end of the Cold War has brought with it a new reality that the only true and lasting security is the one that concerns itself with protecting the people, their welfare, and, no less, their opportunity to lead healthy, productive lives in an environment that encourages them to attain their full potential as human beings. Your conference has been devoted to a major aspect of that effort, and all of us—no matter where we come from—have a stake in the outcome.

On the Road to Istanbul

Thus, in coming here today to speak with you in my capacity as Secretary-General of Habitat II, I am taking a big step forward on the road to Istanbul. That road actually started two years ago in Rio at the United Nations Conference on Environment and Development; from there, it went to Cairo and the just recently completed International Conference on Population and Development. The next stop is Copenhagen and the World Summit on Social Development next March; then on to Beijing and the World Conference on Women in September, and finally to Istanbul with Habitat II.

This unprecedented continuum of conferences spans some of the most serious and pressing challenges of human security that will confront the world community in the new

century. Cumulatively, the conferences that have already been held and those that are still to come have begun to deliver a more holistic and humane message about our global problems and the cooperative solutions they require.

It is appropriate, then, that Habitat II will be the final conference of this remarkable series, because it is in the cities and towns of the new urban world now exploding all around us that the majority of the world's population will live and work, and where most of the population will be generated and natural resources consumed, with both environmental and other impacts that will be felt way beyond any city limit. But more than that, it is in the cities and towns of the new urban world that political and social conditions are most likely to boil over into conflict, and where, ultimately, the roots of real global security—true human security—lie.

Polarization of Rich and Poor Threatens the Community of Nations

Everything you have been saying underscores the main danger we face—that we are running out of time. You know the projections: soon after the twenty-first century moves beyond its first quarter, the cities of the developing world will be the overcrowded, congested home of nearly 4 billion people—most of them the poor, the homeless, the pavement dwellers, the multitudes trapped in inadequate shelter and debilitating slums and shantytowns. They will be, in fact they already are, what they have rightly been called: the inadvertent, accidental pioneers of the new urban world. And I speak not only of the poor and dispossessed in Africa, Asia, and Latin America, but also of their counterparts elsewhere in the world—many of them right here in this city where we meet, and in other cities of the industrialized world.

The inescapable fact, as you have made clear, is that our cities are not working. And this is true in rich countries and poor countries alike. It is equally clear, as has been the case for some time now, that conditions in the rural areas of developing countries continue to deteriorate, and with that deterioration comes the added threat of a new division between rich and poor, both within and among nations. This division may well be the new polarity that characterizes the

dawning era of our global urban civilization. If such polarization does indeed become the dominant characteristic of the new world order—and we should make no mistake about it—it will bring about a future at least as dangerous as the period of East-West rivalry the world has recently left behind.

Habitat II: Bringing Together Lessons of Experience, New Approaches, and Hard Facts on Costs

Against that backdrop, the overall objective of the Habitat II Conference is twofold—to enhance the world's awareness of the problems we have discussed here, and to awaken it to the potentials of human settlements as important input for social progress and economic growth. But this potential can be realized only if we convince the global community that on an urbanized planet we have no choice: our cities, towns, and villages must be healthy, safe, just, and sustainable. It is time to end the platitudes and clichés. It is time to act.

There is no one answer to the dilemma that confronts us. We need, rather, many answers, and we need them locally no less than internationally; we need to find them in every municipality no less than in every capital. But when we do, how do we translate them into doable action? How do we turn one small youth project in one inner city into a model that can be replicated by urban youths in cities throughout the world? How do we install underground sewer pipes in overcrowded slums and shantytowns? How do we curb the potential epidemic from waterborne disease? How do we stop the resurgence of tuberculosis and the explosion of AIDS? How do we cope with rising urban crime? How do we untangle the global traffic jam? How do we house the homeless? And, underlying it all: Who will pay for it?

These are the large questions—and there are many more—that must be addressed in developing countries and industrial countries alike. This is the real call to “get things done,” the call that must sound as a clarion to every national legislature and every municipal council. It must involve every mayor no less than every president and prime minister, and it must reach out into every aspect of civil society—the poor and their organizations, the nongovernmental community, women's groups, and political organizations—

everyone. And the private sector has a particularly important role to play; we urgently need its support if we are to succeed.

The Habitat II Conference 20 months from now will be a culmination of ideas and projects, addressing all our concerns and spotlighting models that can be built upon and replicated. At the same time, Habitat II will mark a beginning—for the proposal of new techniques, new state-of-the-art systems, and new ways of cooperation and management among community groups and municipal governments, with the help of national and international institutions and resources.

We must be able to go to Habitat II armed—that is, in full mobilization—with precise models of cooperative efforts, such as many of those discussed here at this conference. We need to identify, encourage, and support many more examples of innovative problem-solving. We need to be able to translate human needs into precise financial costs to meet those needs—and to ensure transparency and responsibility through program management at the grassroots, municipal, and national levels. And then—and only then—can we reach out to secure the long-range national and international financing necessary to accomplish doable projects.

The underpinnings of the road to Istanbul are being put into place now: the identification of site-specific local, national, and global needs; the examples of workable programs that can be replicated; the initiation of new management and technical systems that can address old problems; and a precise budget of what this will cost, including financing strategies for shelters and urban infrastructures.

This is a budget that must be prepared, not with astronomical figures of billions and trillions—but with specific budgetary proposals for specific needs. For example: the start-up costs for various units of family housing; the costs of constructing a sewage treatment plant (and for training the personnel and staff to implement it); the legal costs associated with tracing property deeds so that people—especially women, who in many areas of the world have not had the right to own property in their own names—can lay claim to what is theirs; the cost of educational programs to train community health and sanitation aides; and the costs of managing and training local personnel to administer accountable programs.

These are but a few of the hundreds of tasks that must be undertaken as we prepare for a Habitat II that will lead to other doable projects—and to an international financial commitment to “get things done.” But along with it, we must also change our own attitudes of despair that this crisis of human settlement is all too overwhelming; that the statistical realities of vast migrations to urban centers are of such magnitude that coping with them is more than we can manage—or afford; that the infrastructures of our cities are beyond repair; or that the cities that gave rise to the world’s great cultures are now leading us to destruction. Yes, the danger is real. But so are the opportunities.

Success Stories

We cannot afford to do nothing. All of us here—and everyone worldwide concerned with the perplexities and challenges of the urban dilemma—know the response does not lie in dwelling on the past, but rather in facing the future with a readiness and willingness to commit resources to action. It lies in the exchange of case studies whose outcomes speak not of defeat, but of hope. It lies in taking on responsibility—at the global, national, and municipal levels—to do what must be done if the new century is not to perpetuate the ills of the old.

In a very tangible sense, the sought-after response lies in the stories of communities that have organized themselves to bring all possible resources to bear to attack and assault the conditions that otherwise would destroy their cities and their spirit. It lies in the willingness to take chances, to try new models of human settlement that rely on shared community responsibilities.

It lies in successful literacy programs for adult women who have never been to school and in technical training for women and their men; in capital investment in production facilities that create “real” jobs; and in school feeding programs for children and in supervised after-school activities; in community cleanup projects; in coalitions of police and neighborhoods to provide protection and security; in designated sanitary landfills;

and in innovative transportation systems that carry people from home to school to jobs. It lies in programs that create a healthful environment that gives people pride in their communities and in themselves. These success stories are to be found everywhere, in poor countries and rich. We have to track them down, make them known—and replicate them. True, they are not as dramatic as the horror stories, but they light the way on the road that now lies before us.

We are increasingly one global city in which the problems that befall one deteriorating urban society are closely intertwined with the problems of another—problems that inevitably affect the strength and viability of a nation. And the way that individual nations perceive themselves, and are perceived by others, affects the stability and peace of our community of nations.

The East-West struggle may be behind us. But it is not only a North-South struggle of haves and have-nots that now faces us. The struggle for a decent living environment goes on everywhere; there are no geographic boundaries in the quest for the basic minimum needs of human society. It is only a question of degree—and of our commitment, willingness, and ability to respond.

Why are we going to Istanbul? The Nigerian author Chinua Achebe suggests an answer in his book, *Things Fall Apart*, first published in 1958. The protagonist, Okonkwo, comes back to his village and gives a huge feast for all of his kinsmen. “I have called you together because it is good for kinsmen to meet,” he tells the assembled group. One of the village elders responds: “When we gather together in the moonlit village ground, it is not because of the moon. Every man can see it in his own compound. We come together because it is good for kinsmen to do so.”

In Istanbul we, too, will come together—from the villages of Nigeria, the streets of Bombay, the barrios of Bogotá, the inner cities of the United States and Europe—from everywhere on the planet. For we are all kinsmen in our quest for global shelter and humanity, and we must all work together “because it is good for kinsmen to do so.”

The Islamic Development Bank

Ousmane Seck

I want to frame my discussion of international commitment to the urban environment first in the context of the Islamic Development Bank, an international financial institution established in 1975. The objectives of the bank are to contribute to the economic development and social progress of member countries and of Muslim communities in nonmember countries, according to the principles of Islamic Shari'ah. The Islamic Development Bank provides interest-free loans for developmental projects and enterprises and finances projects involving leasing, installment sales, equity investments, and foreign trade; technical assistance; and economic research. The bank has funds for special purposes, including trust funds and funds for Muslim communities in nonmember countries.

The Islamic Development Bank plays an important role in promoting cooperation among members of the Organization of the Islamic Conference, individually and jointly—notably in trade, agricultural development, industrial cooperation, scientific and technological cooperation, and financial and monetary matters. The bank closely coordinates its programs with other international, regional, and bilateral development institutions in its cofinancing operations and other related activities.

The Islamic Development Bank's membership currently stands at 47 countries in Asia, the Middle East, Africa, and the Central Asian Republics of the former Soviet Union. The bank is unique in that all of its members are from developing countries that are experiencing rapid growth in their urban centers. Furthermore, these

countries are constrained by the absence of both adequate resources and expertise to manage urban growth. This deficiency critically affects their ability to deliver basic infrastructure and services. They cannot adequately respond to the scale and pace of urbanization.

The bank also recognizes the importance of the environment. This is one of the main thrusts of its newly approved strategic agenda.

I endorse the position established by my predecessors. I realize that the debate that has taken place at this conference has wide-ranging consequences for millions of urban dwellers, particularly the poor. Broadening the environmental debate to include those issues that are most critical to people living in urban centers is appropriate.

We seem to have reached the conclusion that urban environment issues cannot be tackled unless we have a global and multidisciplinary approach. We can tackle these issues only if we coordinate our efforts and differentiate among the needs of the various participants, because human concentration, while an occasion for happiness, is also a matter of serious concern. My colleague, Mr. N'Dow, has brilliantly captured what can happen in these urban concentrations.

Solving Rural and Urban Problems Together

From my personal experience—as minister of planning in my country, Senegal, with responsibility for selecting projects and programs and for distributing funding, and as minister of finance and as former mayor of the second-largest city in Senegal—I have seen the dimensions of these

urban issues. I contend that in order to resolve urban problems, we must first resolve rural problems. I need use only the example of Dakar, the capital of Senegal. The population of Dakar has been growing at a rate of 7 percent annually—3 percent from natural growth and 4 percent from rural migration. Why? Because this portion of the territory of Senegal, which comprises only 2 percent of the entire territory of the country, contains 80 percent of its industry, more than 90 percent of its health and educational facilities, and 85 percent of its employment. All of this concentration has taken place in just 2 percent of Senegal's territory.

It was the magnetic attraction of these opportunities that caused the rural exodus into Dakar. Consequently, it became increasingly difficult for Dakar to cope with the rapid urban environmental degradation accompanying the expansive migration. The government has taken appropriate measures to reverse this trend, and now some decentralization has taken place, although it is not yet enough.

Environmental problems in developing countries are experienced acutely in their rural sectors. More development must be undertaken in rural areas if we want to attain more orderly and sustainable urban development. The solution to urban management problems is not merely to expand capacity by making new investments in urban areas. We can also provide basic services—schools, clinics, water supply systems, and so forth—cost-effectively to the *rural* population. In that way, we can arrest the great migration from rural areas to the urban centers people feel obliged to seek out in their quest for a better life. Urban centers cannot effectively be sustained if the social and economic needs of rural areas are neglected.

Managing Environmental Problems

My second remark is that we need to create expertise to manage urban development in developing countries. Many mayors, perhaps some of the mayors you have met here, are may-

ors of rich cities. And they may indeed have expertise. But in developing countries the cities are left to themselves. The mayors have very little support because city management is not a subject that is taught in the universities or institutes. It is essential, then, that these academic institutions include the subject of urban management in their curricula. The emerging urban centers will stand to benefit from the application of innovative approaches—specifically, new technical solutions, community-based participatory development experiences of best practices, and so on.

My third remark pertains to educating people. I had the opportunity to visit many cities in India last August. I also visited Madame Chatterjee's city—Hyderabad. I saw how the people, when they were well educated, especially the women, took care of their cities. I saw how the communities took care of their education needs, from primary school to university, and of their health needs—and did both without any government involvement. They mobilized their communities to complement the government's limited resources for addressing critical environmental problems.

We must give due emphasis to training and awareness at the community level, targeted particularly at women. Much more public education is essential, and methods for communicating with people must be devised.

My final remark concerns financing. The international institutions should join hands proactively in a more coherent and coordinated manner. These deliberations can give rise to many positive conditions and ideas for revitalizing the development process and building a new partnership to that end. We now need to take joint responsibility to ensure that the agreed-upon commitments are translated into reality. Governments, international organizations, nongovernmental organizations, and local communities—all must cooperate in improving the structure, process, and resources of our urban institutions. We can make a difference and create the conditions that are favorable to a sustainable environment.

The Global Environment Facility

Ian Johnson

The Global Environment Facility (GEF) has been in existence for slightly more than three years, first as a pilot program, and then, since March of 1994, as a permanent facility, restructured with its own governance and replenished with somewhat more than \$3 billion in grant resources for the next three years. These resources are for developing countries and are a supplement to the regular flow of developmental aid assistance.

GEF's mandate covers four areas of global environmental concerns: climate change, biological diversity protection, international waters, and protection of the ozone layer. Furthermore, the GEF has been named as the interim financing mechanism for the global environment conventions on climate change and biodiversity. We are able to finance the costs to developing countries of undertaking the additional efforts required to integrate global environmental concerns into national sustainable development strategies. The cost of these additional efforts are referred to as incremental costs.

As we are in the midst of establishing the new GEF—we are beginning the process of defining our long-term strategic and operational agenda—we found the opportunity to listen to the debate on urban issues of considerable interest, and I thank the organizers for inviting us to the conference.

Indeed, thinking globally and acting locally, although worn rhetoric, contains many grains of truth, and so I wish to explore three ways that the global agenda—global thinking—and national and local action can be brought together.

Linking Global Agendas

The first way these perspectives coincide is found in the conventions themselves. The global environment conventions address the impact of human activity on the planet's health. The climate change convention, for example, is targeted exclusively at the impact of human activities on climate change. And as the world becomes more urban, so, inescapably, does human activity increasingly mean urban activity. Thus, the urban sector is clearly important to GEF as we begin our own thinking of where we are going.

A second link arises because many aspects of the Brown and Green agendas coincide with GEF's own operational agenda. Shifts to more efficient household fuels and improvements in the efficiency of transportation systems can provide global benefits in the form of reduced carbon emissions, for instance, and improvements in local air quality. Thus, we are funding a project in Karachi to help reduce emissions by improving the fuel efficiency of vehicles. In Teheran we have financed a study to identify least-cost options to reduce vehicle emissions. And in Poland we are funding a project that substitutes gas for coal in urban heating systems.

We have also provided financing for developing an environmental management program in the Danube River basin, including its important delta. Much of the pollution and destruction of this river system is from urban sources, and, indeed, many important wetlands and delta regions throughout the world are suffering not only from urban pollution but also from urban sprawl.

Cultural and Environmental Heritage

Global and local agendas are linked in a third way as GEF develops long-term policies and operational strategies, many of which will embrace the urban agenda. I will mention just two.

One area of concern is adaptation to climate change, especially with regard to a potential rise in sea level. Many of the world's megacities have an interest in this topic.

Another area of increasing importance in our long-term thinking is investment shifts into fuel substitution strategies and modal shifts in the transport sector. GEF is preparing an operational strategy on these issues and will undertake long-term analyses of the types of incremental cost financing we might consider for the transportation sector. Quite clearly, the inter- and intramodal transport systems in the urban sector are very important in this regard.

I would also like to mention to other areas that are important to the global environment and its linkages with the urban sector. One pertains to biodiversity, something not normally associated directly with cities. We must try to preserve the link between urban dwellers and our natural habitat. It is quite depressing to think of children growing up in cities and never having the opportunity to experience natural habitats or the wildlife they support. We must think creatively about how we can bring biodiversity to the city, whether through parks and

botanical gardens, or through education and communications schemes, or through special programs. GEF must place greater emphasis on education and communication than it has in the past.

Second, it is my belief that the issue of cultural heritage will emerge not only as an urban concern, but also as a global concern. As cities grow and become increasingly impersonal, and as policies and incentives act against the preservation of cultural sites and historic buildings, the pressure to destroy cultural heritage will always be present. Although it is not directly part of the GEF mandate, the desire to preserve cultural heritage seems to be of great global interest.

Finally, documenting experiences—whether on the performance of new technologies, the efficacy of new regulatory and policy instruments and their impact on the global environment, or the integration of global concerns into urban programs—must be an important element of GEF strategy. We can learn much from practitioners and policymakers, and it is important that we identify ways to encourage the exchange of information and to promote discussion and debate. This conference has been an excellent example of that process. I am delighted to have been asked to join in this dialogue. I have learned much from all of the speakers and discussants here this week, and I look forward to seeing how GEF can encourage the type of debate that the link between the global environment and the urban environment so clearly deserves.

Part Four

Conclusion

Summing Up

Ismail Serageldin

After a very full two-and-a-half days, I have the responsibility of summarizing what we have learned and of suggesting some areas for follow-up to our fruitful discussions.

First, let me thank everyone for their well-prepared and considered contributions to the various discussion sessions.

This conference has demonstrated many important relationships and linkages between the solutions to environmental problems and the tasks of development. Above all, the debate has clearly reaffirmed our strong belief in the *close linkages between the circumstances of poverty and the human face of the environment* in cities and towns of all sizes. Speaker after speaker has eloquently provided evidence that solving urban environmental problems must be an important strategic element in urban poverty reduction. Likewise, unless poverty is reduced, the environmental sustainability of cities is at risk. As Secretary Cisneros suggested, environmental justice and social justice are interdependent. *Equity* must be at the center of our concerns. If the elites do not address inequities out of a sense of justice, as they should, perhaps they will be persuaded by enlightened self-interest and the hope of avoiding civil strife—a point made by the Mayor of Marseille.

Sustainable, Livable Cities

We all recognize the impact cities have as both consumers of resources and producers of economic well-being. Lester Brown and Mahbub ul Haq exchanged views on whether to bury

Malthus, but they, and all of us, agree on certain fundamentals. Thus, the issue is not whether “cities are sustainable” in terms of their impact on food, energy, nutrient cycles, water, land, and air. Rather, the question is, how can we *effectively manage the cities in a sustainable fashion*, especially in the face of the inevitable growth of urban populations. Professor Hirono asked us to define sustainability as the reduction of air and water pollution—a tall order, but one that poses the right challenges to all of us here. As we were reminded by the Mayors Forum, our commitment to equity and poverty reduction means that “limiting damage” cannot be the brief we respond to. We must push the frontier and be proactive in radically changing the way things are done. And this will require firm commitment to proper pricing policy, as Mayor Ravinet and Minister Töpfer reaffirmed: the polluter pays, and the consumer pays, full price.

We have had compelling evidence that there is an interdependent *relationship between the spatial and physical development of cities* and their environmental conditions and quality. There is an urgent need to reassert the importance of spatial and physical analysis in urban policies and strategies. Charles Correa eloquently made the case for the basic human right all people have to decent spatial arrangements. He showed irrefutably that it is not a matter of cost or density. I strongly subscribe to the view that even the most modest of urban environments can be nurturing rather than brutalizing and dehumanizing.

It is probable that the urgently needed emphasis on improving market efficiency

during the 1980s led to a neglect of the spatial and physical form of urban areas. This, in turn, resulted in neglect of the many externalities of urban life, including traffic congestion, infrastructure planning, and the location of various forms of economic and social activity. Peter Hall has suggested that the European cities have begun to improve these aspects of their planning, primarily through transport investment. But there is clearly a need to assess what the preconditions are for increasing densities in cities in developing countries to avoid some of the high costs of urban sprawl that North American cities have experienced. Space has a great impact on energy consumption. In that connection, Mayor Maragall of Barcelona posed some thoughtful questions concerning intra- and interurban transport and the very meaning of the urban periphery or the limits of cities.

Understanding the local spatial and physical contexts of individual cities—not to mention their cultural, political, and socioeconomic characteristics—underlines their *diversity*. “*One size does not fit all*” when it comes to identifying effective urban environmental strategies. The mayors have stressed the need to give great weight to local factors in addressing urban environmental problems. Rome is 15 times the size of Barcelona. Santiago is not Hyderabad.

Urban Environment: A National and Local Concern

We were reminded during the Ministerial Roundtable of the need to link urban environmental initiatives to *national policy frameworks and action plans*. Many problems at the local level reflect national policy and investment decisions, and in some cases, it will take changes in national policy to achieve local improvements, such as more realistic and economic pricing of energy or water.

But when the urban environment is seen as a national issue, it raises two immediate problems: striking a balance between rural and urban areas, on the one hand; and striking a balance among various cities, especially vis-à-vis the capital city, on the other. Such challenges invariably involve realistic assessments of the relative weight of the constituencies concerned: political power is a reality. However, we must constantly reaffirm

our commitment to *equity* if we are to change the status quo and reduce poverty.

In considering the nexus between national and local responsibilities, we have concluded that national policy and action are necessary, but not sufficient conditions for local-level improvements. There is clearly a *local dimension*—a local view—that is essential to local problem-solving. The local dimension includes sensitivity to local context, culture, landscape, and resource endowments, as well as local *ownership* of the priority-setting process. And as Elisea Gozun told us, community champions and building on achievements are keys to success at the local level. This process is necessarily a political and not merely a technocratic one, reflecting the development of civil society and the quality of governance.

This morning’s session demonstrated that environmental governance is in fact more than conventional urban management. It requires a much more dynamic understanding of the balance between short and longer-term needs in the use of natural resources, and it calls for cooperation, not competition, among urban institutional structures, whatever the focus—whether neighborhood, local, municipal, metropolitan, or sub-urban. Developing new models of effective urban environmental governance will be a central challenge in the coming years in all countries, both North and South.

Yet if the devolution of authority and greater fiscal responsibility to local authorities is seen as essential for more effective actions for the urban poor, we must recognize that there is a risk that richer cities will do much better, and that poorer cities will be disadvantaged. Thus, the establishment of a mechanism for “solidarity fund sharing” must accompany the promotion of greater municipal authority and autonomy.

A word about the urgency of this conference’s overriding theme: I believe that the compelling message of the importance of the urban environment will motivate the international community—in its broadest membership, including governments, international institutions, nongovernmental organizations, professionals, and academics—to work more intensively on urban environmental issues, and that these issues must be highlighted in the Habitat II Conference in Istanbul in June 1996. If the 1976 Habitat Conference in Vancouver

took “habitat” to mean human settlements, without environment, and if Rio looked on “habitat” as the natural environment, without people, Habitat II must bring together the two discourses to include both definitions of habitat in a more integrated manner. I was delighted to hear Secretary-General N’Dow address this question so eloquently in our concluding session, as he reminded us that we are all kinsmen, and that the poor and the marginalized are the accidental pioneers of our urban future.

Lessons of Experience

Let me speak for a moment about the rich discussions that were held in the parallel sessions, since few had the benefit of a full overview of all the accounts and deliberations on lessons learned, as I have had through the rapporteurs who were at each session.

Urban Air Pollution

The session on urban air pollution dramatically demonstrated that economic growth can be accompanied by terrible environmental and health consequences unless public policy and private behavior acknowledge the need for careful environmental controls. The Katowice case, with lower life expectancy in the center of the city that at the suburban fringe, illustrates how sensitive people are to various concentrations of pollution. Although most countries do not face the severity of the situation facing Katowice, most cities do experience serious transport-related air pollution. The case of Mexico City demonstrates that while the effects of air pollution may be much more serious than originally understood, their solution also requires a multi-dimensional approach. This includes reducing trips, changing traffic patterns, improving fuels and engine efficiency, and building a broad consensus within the city for these measures. Clearly, countries must come to grips with the problem of motorization. This is an issue we at the Bank are studying, and we hope in the coming year to have some suggestions that can be placed within a broader strategy on air quality, an area our colleagues at the United Nations Environmental Program (UNEP) have been addressing for several years.

Municipal and Industrial Wastes

The session on municipal and industrial wastes examined issues that have not in the past received the attention they deserve. While cities have been concerned about waste collection, they have largely ignored the problems and risks of disposal. Although the Bhopal case is relatively well known, I fear that many cities are increasing their susceptibility to such disasters by not examining sufficiently the risks in industrial location and industrial waste collection and disposal. The U.S. case demonstrates that even when enormous financial resources are available to finance cleanups, the various processes involved in cleaning up waste are subject to many technical and institutional constraints that themselves can pose serious risks. Robert Watson shared an amazing fact with us, that one in four Americans lives within four miles of a Superfund site—this, in a country as vast as the United States. Recall that Bangladesh has about 120 million inhabitants crammed into an area about the size of Arkansas (two and a half million people). When the potential risks implied by such numbers are considered, I believe that the “human face” aspect of the municipal and industrial issue—the social and human costs of these hazards—needs to be continually reemphasized and that we must not simply focus on the financial burden that toxic cleanup may impose.

The session did not, however, deal only with the handling of large industrial and toxic wastes. It also addressed the more common problem of the solid wastes generated by households and communities and the many local solutions that have emerged in response, including the importance of the informal sector. Although the session did not specifically examine recycling strategies, it is nonetheless apparent that an enormous amount of recycling goes on in cities and communities in developing countries. This activity is closely linked to employment and income-generation. It is another of those win-win strategies that need to be nurtured, as modernization proceeds apace.

Water Supply and Water Resources

A third parallel session addressed the link between urban water supply and the management

of water resources within a broader framework of resource use. This is an extremely important subject and one we at the World Bank take very seriously, as Guy Le Moigne stressed in his presentation of the Bank's new water resource policy paper. We are pleased to report that some of the Bank assistance in this area is proving helpful, as the Brazilian case demonstrates. The session highlighted the fact that water resources need to be considered within a broad framework of resource use and rural-urban allocations that takes into account both efficiency and equity issues. Such a framework would incorporate both demand management, including efforts to ensure that urban areas do not overconsume water, and economic pricing. This broader approach came through in the presentation by our colleague Arthur McIntosh from the Asian Development Bank.

Urban Wastewater and Sanitation

A related session focused on urban wastewater and sanitation. Here there is clearly a dual agenda: sanitation and sewerage service must be extended to growing urban populations, particularly the poor; at the same time, efforts must be made to ensure that water resources are not polluted from wastewater. The first part of the agenda was central to the efforts of the Water Decade during the 1980s, with its emphasis on health and immediate improvements using low-cost technology. The second part of the agenda, however, adds the longer-term dimension of sustainability and the protection of resources. We would all agree that the human experience should be looked on as a longer-term adventure, and so the challenges of ensuring sustainability should be given much greater priority. This probably means much more attention needs to be paid to water pricing in almost all cities of the world, both North and South.

The sanitation session also provided an opportunity to learn about important community-level projects such as the Orangi Pilot Project in Karachi, which has produced impressive results that are being emulated in other countries. The Santiago case also illustrated how problems can be avoided with effective action on wastewater disposal.

Health, Poverty, and the Environment

Many of these concerns came to the fore in the session on the nexus of health, poverty, and the environment. The groundbreaking, collaborative research of the London School of Tropical Hygiene and the Stockholm Environment Institute, in partnership with institutions in Accra, Jakarta, and São Paulo, were presented at this session. This work on intraurban health differentials has confirmed many of the underlying hypotheses we have had about the relationships between community- and neighborhood-level infrastructure, environmental conditions, and health. Participants in the session heard the researchers themselves present their truly frontier-expanding research, which was then related to the methodological advances developed by the World Health Organization.

There are two very important implications of this session: first, we must avoid generalizations about environmental conditions in cities and move toward a more informed understanding of the differences within cities so that we may use that information to develop better-targeted policies and assistance. Second, the experience of the three cities demonstrates the importance of addressing inequality within the urban population. This is not simply a matter of attending to absolute poverty—absolute levels of deprivation—but rather, relative poverty. Experience further suggests that even if the social and economic cases for targeting assistance to the poor are accepted, the political difficulties of actually doing so may be considerable.

Land Resources

Speaking of the role of economic interests leads me to the session on land use—we all know that urban landowners have been a powerful obstacle to more efficient and equitable use of land resources. The land session included three interesting cases: first, the case of Jakarta, where public policy has guided, if not actually controlled, settlement patterns; second, the case of Seoul, where strong controls proved less effective than the authorities expected; and third, the case of a community in Minnesota, where it was demonstrated that community preferences were essential

ingredients for developing successful approaches to land use.

Common Challenges in Environmental Management

If I were to identify a couple of common threads among these six parallel sessions, I would suggest the following: first, the urban phenomenon is a complex one by definition. It does not present a target as narrowly delineated as that of a sector, but rather requires problem-solving on a broad front: housing, water, sanitation, street lighting, transport, and public services are all demanded by citizens. Mayors do not have the luxury of selecting one area for improvement over another. Although they may choose to give priority attention to one issue at a particular time, they must guarantee at least a minimum level of attention to the others at all times. Thus, setting priorities at the municipal level raises problems similar to setting national priorities, but without the benefit of the same sovereign authority.

Second, that old truism, that the process is as important as the product, is especially true of urban problems. Effective action requires the involvement of all concerned parties, and real improvements will not be possible without such involvement. How to achieve such cooperation, however, is a challenge that is unique to each situation.

Running through all our discussions, however, is the issue of poverty. The universal agreement that we cannot separate poverty reduction and environmental improvement was most heartening. I must confess, however, to being somewhat disappointed that there was not more forceful recognition of the *gender issues of poverty and environment*.

I fully recognize that gender issues raise cultural questions that can sometimes be difficult. Nonetheless, let me affirm here my belief that any effective poverty reduction requires special attention to the role of women: the management of the microenvironment in urban areas relies, just as it does in rural areas, primarily on the work of women. From that conviction, as well as from my perception of gender inequities as issues of *basic human rights*, flows my profound commitment to addressing head-on the issue of

the status of women. It is a commitment shared by my colleagues at the World Bank, and we will continue to do our utmost in addressing this all-important topic.

The Future: International Commitment

And so, we come full circle to the issue of the human dimension of the urban environment. We reaffirm the hypotheses that underlie the design of the conference program, and we rededicate ourselves to working to promote the themes we have addressed.

But Kamla Chowdhry asked for specific next steps. We have just heard from two distinguished representatives of the international community: Ousmane Seck, Vice President of the Islamic Development Bank, who, among other things, called for us to focus on human resources to better coordinate our actions in the international financing system; and Ian Johnson, Secretary-General of the Global Environment Facility, who opened up new vistas in the deliberation over what is in the "global interest" and included cultural heritage in his definition.

Now, let me speak for the World Bank. First, we will actively broaden the dialogue and cooperation associated with the design, preparation, and appraisal of our pipeline of urban environmental projects for the future and with implementation of the Bank's ongoing portfolio of projects. As Mr. Preston noted in his introductory remarks, the Bank lent some US\$1.4 billion to its member countries for urban environmental improvements during 1994, complementing the US\$1.0 billion for green environmental projects. Our total environmental portfolio is now US\$9 billion, and it is growing rapidly. We have a very full pipeline of assistance planned for the next few years, as many countries are requesting external advice and financing to address these problems.

The assistance program will be set within the process of establishing urban components of the National Environmental Action Plans. At present, few Environmental Action Plans adequately include the urban environment within their frameworks. We will actively work with governments to strengthen this component of the plans.

As part of this process, we propose to work with local and national governments, nongovernmental

organizations, professional groups, and other institutions to explicitly set objectives for improved performance—in other words, to take the specific steps that are likely to spell success. The many good ideas that were suggested during the parallel sessions will be important inputs to that process.

We propose to work with the Global Environment Facility and its partners to strengthen the linkages between the global and urban environmental agendas. I am very encouraged by the growing understanding that urban issues can have significant global impacts.

We also pledge to work closely with the United Nations Centre for Human Settlements (UNCHS) in the preparations for Habitat II. We will host preparatory events for the meeting and will help at the country level, using proceeds from Bank urban operations to support a performance-oriented approach to consultations concerning urban policy. We are honored that Secretary-General N'Dow has participated in this conference, and we hope that these sessions have helped to build momentum toward the 1996 City Summit in Istanbul.

We will also work with other international agencies to review the structure of existing programs (such as the Urban Management Program) to see how we can effectively rationalize the delivery of high-quality assistance in this

area. This follows up on a mandate given to UNCHS by the CSD in May 1994. As a first step, we propose to set up an Urban Environment Working Group among the multilateral and bilateral agencies to see how the various forms of assistance can be made more effective. We will invite nongovernmental organizations and others to participate in this process.

It might be said that the many subjects discussed at this conference reflect the many aspects of the human face of the urban environment. The foremost issue is poverty, a challenge that is no less compelling because it claims lives at the margin. This challenge demands that we commit ourselves to continue the search for better understanding and better results. Human decency requires this of us. The problems at hand, although great, are not insurmountable: the future is being forged in the crucibles of our minds. We at the World Bank hereby reaffirm our commitment, and we look forward to working with you, to improve the quality of life for the urban poor now living in the developing countries and for the generations yet to come. This can be done, must be done, will be done.

Thank you all. I look forward to seeing you again in Washington next year at the Third Annual World Bank Conference on Environmentally Sustainable Development.

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Appendixes

Appendix A

***Program. Second Annual World Bank
Conference on Environmentally
Sustainable Development:
The Human Face
of the Urban Environment***

Sponsored by the World Bank

Held at the National Academy of Sciences, Washington, D.C.

September 19–21, 1994

Inaugural Session

Welcoming Address

Bruce Alberts, President, National Academy of Sciences,
Washington, D.C.

The Human Face of the Urban Environment

Ismail Serageldin, Vice President, Environmentally Sustainable
Development, World Bank

Introductory Remarks

Lewis T. Preston, President, World Bank

Urban Poverty and Urban Environment in the North

Henry Cisneros, Secretary of Housing and Urban Development,
U.S. Government, Washington, D.C.

The Road from Rio

Maurice Strong, Chairman, Ontario Hydro, Canada;
and Secretary-General, United Nations Conference on Environment
and Development (UNCED-Earth Summit, 1992)

Reception and Opening of Exhibit on Sustainable Urban Development

American Institute of Architects

18th St. N.W. and New York Avenue, Washington, D.C.

Session 1. The Importance of the Urban Environment: Roundtable of Ministers

Chair: Klaus Töpfer, Minister of Environment, Federal Republic of Germany;
and Chairman, United Nations Commission on Sustainable Development

Striking a Balance: Urban Environmental Priorities in the National Context

Ismail Serageldin

Presentations

Abdoulaye Bathily, Minister of Environment, Dakar, Senegal

Henrique Brandão Cavalcanti, Minister of Environment, Brasilia, Brazil

Session 2. Are Cities Sustainable?

Chair: Mahbub ul Haq, Special Adviser to the Administrator,
United Nations Development Programme (UNDP), New York, New York

Making Cities Sustainable

Lester Brown, President, Worldwatch Institute, Washington, D.C.

Discussants: Pasqual Maragall, Mayor of Barcelona, Spain

William Alonso, Professor, Harvard University, Cambridge, Massachusetts

Rapporteur: John Redwood, III, Senior Environmental Specialist, World Bank

Can We Reshape the Cities of Tomorrow?

Peter Hall, Professor of Planning, Bartlett School of Architecture
and Planning, University College, London, United Kingdom

Discussants: Jorge Wilhelm, Deputy Secretary General, Habitat II Conference; and
former Secretary of Planning, São Paulo State, Brazil

Ryokichi Hirono, Professor, Faculty of Economics, Seikei University,
Tokyo, Japan

Rapporteur: Janis Bernstein, Environmental Specialist, World Bank

Session 3. Parallel Sessions. Improving the Human Urban Landscape: Lessons of Experience

A. The Risks of Exposure: The Challenge of Urban Air Pollution

Chair: Nafsiah Mboi, Member of Parliament, Republic of Indonesia;
and Indonesian National Institute of Science, Jakarta

Overview

Jacqueline Aloisi de Larderel, Director, Industry and Environment Centre,
United Nations Environment Programme (UNEP), Paris, France

Lessons of Experience

The Mexico City Pollution Control Program: Manuel Guerra,
Director, INAINE; environmental scientist; and radio personality, Mexico

Industrial Air Pollution in Katowice, Poland: Wojciech Beblo, Director,
Environment Department, Regional Administration Office of Katowice

Household Energy: R. K. Pachauri, Director, Tata Energy Research Institute,
New Delhi, India

Rapporteur: John Flora, Principal Transport Specialist, Transportation Division,
World Bank

B. Protecting People from Hazards: Municipal and Industrial Solid Waste

Chair: Livia Benavides, International Consultant in Hazardous Waste; and former Hazardous Waste Specialist, Pan American Center for Sanitary Engineering, Lima, Peru

Overview

Mohan Munasinghe, Chief, Pollution and Environmental Economics Division, World Bank

Lessons of Experience

The Superfund Experience: Robert Watson, Associate Director for Environment, The White House, Washington, D.C.

Bombay and Kanpur: Sheela Patel, Director, Society for Promotion of Area Resource Centres (SPARC), Bombay, India

Municipal Waste Management in Alexandria, Egypt: Olfat el-Sebaie, Professor; and Chairman, Environmental Health Department, High Institute of Public Health, Alexandria University

Rapporteur: Sandra Cointreau-Levine, Waste Management Consultant, Roxbury, Connecticut

C. Sharing and Conserving Common Resources: Water Supply and Water Resources

Chair: Sandra Postel, Professor; and Director, Global Water Policy Project, Cambridge, Massachusetts

Overview

Guy Le Moigne, Senior Agriculture and Natural Resources Adviser, World Bank

Lessons of Experience

São Paulo, Brazil—Guarapiranga River Basin: Ivan Carlos Maglio, Guarapiranga Program Coordinator, Department of Water Resources and Sanitation for the State Government of São Paulo

Water Resource Management in Eight Asian Megacities: Arthur McIntosh, Senior Project Engineer, Water Supply and Urban Development Division, Asian Development Bank, Manila, Philippines

Turkey—Cleanup of Izmir Bay: Nuran Talu, Advisor to the President, Environment Commission of the Turkish Grand National Assembly, Ankara

Mexico—Management of Water Resources, Mexico City, Mexico: Ismael Herrera-Revilla, Professor, National University of Mexico

Rapporteur: Letitia Obeng, Senior Water and Sanitation Specialist, World Bank

D. Urban Wastewater and Sanitation: Responding to Household and Community Demand

Chair: Maritza Izaguirre, Executive Director for Panama and Venezuela,
The Inter-American Development Bank, Washington, D.C.

Overview

Carl R. Bartone, Senior Environmental Specialist, World Bank

Lessons of Experience

Karachi, Pakistan—Orangi Pilot Project: Arif Hasan, Coordinator

Ouagadougou, Burkina Faso—Low-Cost Sanitation and Public Information Program: Eustache Ouayoro, Ouagadougou Urban Sanitation Officer, World Bank, Burkina Faso

Santiago, Chile—Avoiding an Epidemic: Catterina Ferreccio, Director and Epidemiologist, Health Research Development Group (GREDIS)

Beijing, China—Combating Water Pollution: Yang Suzhen, Former Deputy Chief Engineer, Environmental Protection Agency for Beijing, China; and China Coordinator for MEIP, Beijing

Rapporteur: Teresa Serra, Resettlement Specialist, Latin America Technical Department, World Bank

E. Health, Poverty, and Environment: The Nexus

Chair: Trudy Harpham, Professor of Urban Development and Policy,
South Bank University, London, United Kingdom

Overview

Carolyn Stephens, Urban Health Programme, London School of Hygiene and Tropical Medicine, United Kingdom

Discussants: Gordon McGranahan, Senior Research Fellow,
Stockholm Environment Institute, Sweden
Kamla Chowdhry, Chair, Centre for Science and the Environment,
New Delhi, India

Lessons of Experience

Accra, Ghana—Intra-Urban Mortality Differentials: Ben Doe, Principal Town Planning Officer, Accra Planning and Development Programme

São Paulo, Brazil—Intra-Urban Mortality Differentials in an Industrialized City: Marco Akerman, Center for Contemporary Cultural Studies

Jakarta, Indonesia—Environmental Problems Facing Urban Households:

Charles Surjadi, Chairman, Urban Health Study Group, Atma Jaya University

The Significance of the Intra-Urban Differentials in Health and Environmental Conditions: Wilfried Kreisel, Executive Director, Health and Environment, World Health Organization (WHO), Geneva, Switzerland

Rapporteur: Christiaan Grootaert, Senior Economist, World Bank

F. Supporting Municipal Initiatives: Regional Networks

Chair: Peter Kimm, Director for Urban Programs,
U.S. Agency for International Development, Washington, D.C.

Lessons of Experience

UNDP/World Bank Metropolitan Environmental Improvement Programme (MEIP):

David Williams, MEIP Coordinator, World Bank

MEDCITIES: Ayse Kudat, Coordinator, Europe and Middle East Environment Division,
World Bank

Baltic Cities Network: Piotr Krzyzanowski, Coordinator, Baltic Cities Network,
Europe and Middle East Environment Division, World Bank

UNDP/UNCHS (Habitat)/World Bank Urban Management Programme (UMP): Pablo Trivelli,
UMP Latin America and the Caribbean Regional Coordinator, Quito, Ecuador
Jochen Eigen, Coordinator, Sustainable Cities Programme, UNCHS, Nairobi, Kenya

Rapporteur: Josef Leitmann, World Bank Coordinator, Urban Management
Programme

G. Land Resources: Differing Perspectives on the Shape of Future Cities

Chair: David Dowall, Professor, Department of City and Regional Planning,
University of California at Berkeley, United States

Overview

Land Markets, Urban Form and the Environment

Alain Bertaud, Principal Urban Planner, World Bank

Discussant: Saad Eddin Ibrahim, Chairman, Ibn Khaldun Centre
for Development Studies, Cairo, Egypt

Lessons of Experience

Guided Sprawl in Jakarta: Hendropranoto Suselo,
Assistant to the Minister of Public Works, Republic of Indonesia

Controlled Development and Densification—The Case of Seoul:

Kyung-Hwan Kim, Professor, Sogang University, Korea

Landscape as Urban Infrastructure: William Morrish and Catherine Brown,
Co-Directors, Design Center for American Urban Landscape,
University of Minnesota, Minneapolis, United States

Rapporteurs: Catherine Farvacque, Urban Planner, World Bank
Omar Razzaz, Land Management Specialist, World Bank

Session 4. Special Address

Great City, Terrible Place

Charles Correa, Architect and Urban Planner, Bombay, India

Rapporteur: Mary McNeil, Public Affairs Officer; and Editor, *Urban Age*, World Bank

Session 5. Urban Environmental Governance

Chair: Arthur Eggleton, President, Treasury Board of Canada;
Minister of Infrastructure; and former Mayor, Toronto, Canada

Overview

K. C. Sivaramakrishnan, Senior Adviser, Urban Management, World Bank

Panel Discussion of Stakeholders

The National Government Perspective: Martti Lujanen, Director General, Housing and Building Department, Ministry of Environment, Helsinki, Finland; and Preparatory Committee Chairman, United Nations Conference on Human Settlements (Habitat II)

The Local Government Perspective: Jaime Ravinet de la Fuente, Mayor, Santiago, Chile

The Business Perspective: J. Hugh Faulkner, Executive Director, Business Council for Sustainable Development, Geneva, Switzerland

The Community Perspective: Elisea Gozun, National Program Coordinator, Metropolitan Environmental Improvement Programme (MEIP), Manila, Philippines

Rapporteur: Vijay Jagannathan, Senior Water and Sanitation Specialist, World Bank

Session VI. Urban Environment—A New Frontier for Action

Chair: Sven Sandström, Managing Director, World Bank

Finding the Frontier—Posing the Unanswered Questions

Michael Cohen, Senior Adviser, Environmentally Sustainable Development, World Bank

Mayors Forum

Francesco Rutelli, Mayor, Rome; and leader of Green Party, Italy

Jaime Ravinet de la Fuente, Mayor, Santiago, Chile

Rachel Chatterjee, Commissioner, Hyderabad Municipal Corporation, Bombay, India

Robert Vigouroux, Mayor, Marseille, France

Rapporteur: Jerry Silverman, Principal Institutional Specialist, World Bank

Session VII. Conclusion

Special Address: On to Istanbul

Wally N'Dow, Assistant Secretary-General, UNCHS (Habitat); and Secretary-General, United Nations Conference on Human Settlements, Nairobi, Kenya

The International Community's Response

Ousmane Seck, Vice President, Islamic Development Bank, Jeddah, Saudi Arabia

Ian Johnson, Secretary-General, Global Environment Facility, Washington, D.C.

Rapporteur: Fitz Ford, Senior Economist, World Bank

Closing Statement

Ismail Serageldin

Appendix B

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