NORDIC FRESHWATER INITIATIVE for the
UN CONFERENCE ON ENVIRONMENT AND DEVELOPMENT (RIO), 1992
and the INTERNATIONAL CONFERENCE ON WATER AND
THE ENVIRONMENT (DUBLIN), 1992

COPENHAGEN REPORT

Implementation Mechanisms for Integrated Water Resources Development and Management

Danida
Ministry of Foreign Affairs

Report from
Copenhagen Informal Consultation
November 11-14, 1991

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1. INTRODUCTION

Freshwater is a finite and vulnerable resource, which is vital for the sustenance of life, for all development activity, health and environmental maintenance . Rapid population growth, coupled with the pace of economic development, is putting increasing strain on available water and land resources. Depletion and degradation of available resources are causing the costs of new water supplies to escalate and threatening the sustainability of water development programmes.

The past sectoral and top-down approach to water and land management has proved ineffective and insufficient in ensuring the sustainability of water resources. Specialists are agreed that a coordination and integration of sectoral approaches is vital to tackle the escalating problems.

These issues were discussed at the **Copenhagen Informal Consultation (CIC) on Integrated Water Resources Development and Management** held on 11-14 November 1991. The CIC was prepared and hosted by the Nordic countries, i.e. Denmark, Finland, Norway and Sweden.

The 45 CIC participants (Appendix C) from 15 developing and 12 developed countries adopted the **Copenhagen Statement** (Appendix A). The present **Copenhagen Report** is an 'extended version' of the Copenhagen Statement prepared by the CIC-Secretariat on the basis of the comprehensive discussions at CIC of the "Working Paper on Implementation Mechanisms for Integrated Water Resources Development and Management" and of the agreed text of the Copenhagen Statement.

The Copenhagen Report has been prepared as a background document for the Working Groups on "Integrated Water Resources Development and Management" and "Mechanisms for Implementation and Coordination at Global, National, Regional and Local Levels" at the International Conference on Water and the Environment (ICWE), Dublin, January 26-31, 1992.

The report attempts to address some **implementation mechanisms** for integrated water resources development and management in rural areas of developing countries, by proposing **specific actions** to be taken at various administrative levels in the institutional hierarchy for water resources management. It is not intended to be comprehensive and exhaustive, but to provide a framework and background for discussions of such specific actions.

The report is structured as follows:

* A brief background and focus of the Copenhagen Informal Consultation is given in **Chapter 2.**

* Definitions and key principles are summarized in **Chapter 3.**

- **Chapter 4** proposes objectives and principles of decentralized water resources management as the basis for identifying implementation mechanisms and specific actions.

- **Chapter 5** presents specific examples of actions for integrated water resources management at various socio-political and hydro-geographical levels.

- The concept of water as an economic good, and its implications for water resources management, are dealt with in **Chapter 6**. While this concept is very important, it is also complex, controversial and difficult to operationalize. This chapter should be seen simply as one contribution to the process of doing so.

2. BACKGROUND AND FOCUS OF THE COPENHAGEN INFORMAL CONSULTATION (CIC)

2.1 Background

At the UN Conference on Environment and Development (UNCED), in Rio de Janeiro, Brazil, "Agenda 21" is the World's agenda for environmentally sustainable development in the next century. Within this agenda, the freshwater chapter states "Effectively integrated management of water resources is important to all socio-economic sectors relying on water". In preparation for Rio, the fresh water issue will be discussed at the International Conference on Water and the Environment (ICWE) in Dublin in January 1992.

The background for a special Nordic Initiative on the freshwater resources issue in relation to the Dublin and UNCED conferences may be summarized as follows:

- The Nordic countries (Denmark, Finland, Norway, Sweden) have been concerned about the discouraging follow-up of the Mar del Plata Action Plan (1977) with respect to water resources development and management, and they feel a strong commitment to contribute to achieving operational results from the Dublin-Rio process on this issue.

- From a Nordic viewpoint this process needed to be strengthened in two respects:

  (1) Increased focus on developing operational recommendations (**implementation mechanisms**) to emerge from Dublin and Rio

  (2) Increased government participation in the process, not least from the developing countries.

- In cooperation with interested partners in the developing countries the Nordic countries have played an active role in the Dublin-Rio preparatory process, through case studies, seminars and active participation in the UNCED Preparatory Committee discussions on freshwater.

- As support for the final preparation for the Dublin conference, the Nordic countries have prepared and hosted the **Copenhagen Informal Consultation (CIC)**, November 11-14, 1991. The primary objective of the CIC was to contribute to the identification of operational guidelines and implementation mechanisms for integrated water resources development and management. The CIC was a meeting of **government designated experts** with a clear focus on implementation mechanisms. Representatives from the UNCED and ICWE secretariats, and from UN-DTCD and the World Bank, also attended the CIC. The outputs from the CIC were the enclosed Copenhagen Statement and the present Copenhagen Report.

2.2 Focus

The Copenhagen Report is clearly focused. It seeks to address a few key issues in some depth, rather than attempting to cover all aspects of freshwater resources development and management in general. It is hoped that a few key messages and operational guidelines will have an impact on the directions of development in the future. It is hoped further that other such 'messages' and guidelines will result from similar initiatives by others.

The key issues of the report are those which the CIC participants - **on the basis of their experience and expertise in development programmes** - consider important in facing the challenges of future freshwater resources development and management.

The Nordic countries have traditionally cooperated with developing countries in rural water development, mostly in developing water supply (and sanitation) for human settlements. In recognizing the need for integrated and cross-sectoral development, and drawing from the CIC participants' experience and expertise in development programmes, the focus of the report is on **identifying operational guidelines for integrated water resources development and management in the rural areas and small towns of the developing countries.**

Other freshwater issues, which are equally important from an overall development perspective, may be addressed more competently by other fora. Examples of such issues are: improved water resources strategies in relation to irrigated agriculture; industrial development; and development of large urban and metropolitan areas.

The CIC focus may be elaborated a little further as follows:

- In the lead-up to Dublin and Rio, substantial documentation has been produced on **WHY** integrated water resources development and management is important, and **WHAT** needs to be done - in general terms. The CIC aimed at addressing **HOW** to practice integrated water resources development and management in specific and operational terms.

- The Copenhagen Report is focused at the **country level** in the developing countries. It is realized that international (transboundary) water issues are of critical importance for many countries, but this is already being dealt with more competently in other fora. It is hoped that the report can assist countries in their efforts to develop National Action Plans for water resources development.

- The Copenhagen Report is focused on **rural areas and small towns**. The important water resources problems of the fast growing big cities of the developing world are being dealt with by the World Bank/HABITAT and as a separate issue in Dublin.

- The Copenhagen Report focuses on **holistic and cross-sectoral development** and management of resources, rather than addressing specific problems related to water resources assessment, water supply and sanitation, irrigation, industrial development,

wetland conservation etc. These issues are being dealt with separately in Dublin with substantial technical support from the relevant UN agencies. (In the Dublin-Rio preparations UN-DTCD is providing considerable support for 'integrated water resources management'; UN-DTCD has also been an active partner in the Nordic Initiative/CIC)

- It is emphasized that the term "integrated water resources development and management" in this context **includes relevant land (soils and vegetation) management aspects**, i.e. land and water development and management must be integrated to reflect the linkages between soils, vegetation and the quantity and quality of water resources.

As evident from the above the Copenhagen Report seeks to provide one **specific contribution** to the Dublin-Rio process. In the wide spectrum of issues and problems of water, development and environment it is hoped that **a few key messages on how to implement integrated water resources development and management** will improve the outcome of the process.

3. DEFINITIONS AND KEY PRINCIPLES

3.1 Definitions

WHY integrated water resources development and management? The objective may be stated simply as

* to ensure optimal use of water resources for economic and social development, while protecting and improving the environment to the maximum possible extent

The problem assessment leading to this objective is contained in the various UN strategy documents, the documents prepared for the CNR (UN Committee on Natural Resources) and UNCED Preparatory Committee meetings (PrepCom II and III), and most recently in the draft Agenda 21 document adopted by PrepCom III (See Reference List of Relevant Documents, Appendix D).

WHAT is integrated water resources development and management? In order to ensure that all readers of the present report share a common understanding of the terminology used, the following definitions are proposed:

By 'water resources' we mean water in the broad sense as available for use and susceptible to human interventions. 'Water' can be surface or groundwater, and is characterized by both quantity and quality.

By 'development and management' we mean all phases of water resources planning, development, use and protection, i.e. assessment, planning, implementation, operation & maintenance and monitoring & control. It includes both 'combined resource and supply management' and 'demand management'

By 'integrated' we mean development and management of water resources as regards both their use and protection, and considering all sectors and institutions which use and affect water resources (cross-sectoral integration). As already indicated 'water' may be interpreted to mean 'land and water' to the extent that land management measures affect the supply and quality of water resources.

3.2 Key Principles

The participants in the CIC considered that the following two key principles should be prime components of future strategies for sustainable development and management of water resources for rural communities:

1. Water and land resources should be managed at the lowest appropriate levels

Centralized and sectoral (top down) approaches to water resources development and management have often proved insufficient to address local water management problems. While recognizing the need for a central mechanism capable of protecting national economic and social interests, the role of governments needs to change, to enable users, local institutions and the formal and informal private sector to play a more direct part. The levels at which effective management decisions can be taken and problems can be solved will vary widely from country to country and from situation to situation. The fundamental principle remains however that, in any given situation, **water resources should be managed at the lowest appropriate levels**, taking into account the need for integration with land use management.

The most appropriate level of water resources management may range from the household level to the level of international river basin committees, depending on the issue at hand. The important point is that decisions or actions concerning water resources management should be taken as close to the root of the problem as possible, i.e. at the lowest appropriate level, and that higher levels primarily should provide an enabling environment for decentralized and integrated management.

2. Water should be considered as an economic good, with a value reflecting its most valuable potential use.

Access to enough water of adequate quality for basic subsistence is a fundamental human need. However, efficient allocation of water resources can only come from a full recognition of the costs and benefits associated with various alternative uses taking into account future needs. In other words, **water is an economic good**. Failure to recognize this key principle has contributed substantially to wasteful and environmentally damaging uses of water. Whether or not different categories of users are charged the full economic cost of providing their water supplies, that cost must be apparent and accounted for in resource management strategies.

Operationalization of this concept includes diverting attention from supply to **demand management** principles when dealing with land and water resources. In addition to the economic efficiency dimension, water must in several contexts be considered as a social good - in order to ensure the satisfaction of **basic needs** for increasingly large poor segments of the populations of the developing world. The ways of charging for water must be carefully designed to reflect local conditions and requirements, which may vary substantially from place to place. An attempt is made later to address this complicated and often quite controversial issue.

4. PRINCIPLES OF DECENTRALIZED WATER RESOURCES DEVELOPMENT AND MANAGEMENT

4.1 Objectives and Governing Principles

Implementation of land and water resources development and management at the lowest appropriate level has these basic objectives:

- to ensure sustainable development and management of water resources
- to achieve a high degree of awareness and concern among water users, while increasing their involvement and responsibility for satisfying their needs
- to develop and promote a shared vision of water resources management, through a broad consultative approach involving governments, NGOs and the public
- to recognize local interests, make local information available and ensure its optimum use
- to mobilize local financial, physical and human resources
- through decentralization, to enable central government agencies to concentrate on essential national functions
- to recognize the important role of the private sector in cost effective water resources management.

The objectives imply a change from a centralized, master planning (supply) type of management system to a decentralized, flexible, demand-driven way of doing things.

This means, for example, that policy implementation through centralized command and control methods are replaced by policies which set the rules of the game and specify the roles of the various actors, including that of the private sector. Thus, water rights systems would be simplified, so that water rights are normally automatically vested in the immediate users, and only taken over for allocation by higher authorities through explicit decisions on the need to do so. Presently in many countries it is the other way around.

Institutional development must be flexible. By being demand-driven, it will differ at different times and different places - even within the same country. The nature of institutional response will depend on natural conditions (such as the overall availability of water resources), but also on social conditions and institutional capacity.

Improved management should result both from relieving authorities of non-essential functions, and from relieving people of the misconception that high level authorities can resolve all problems for people at lower levels.

The governing principles of implementation can be elaborated under two headings:

* Demand-driven development and management of water resources.

* Demand-driven development of institutional responsibility and capacity for integrated water resource management.

4.2 Demand-driven Development and Management of Water Resources

To prepare the ground for their active involvement, people must have choices and a sense of ownership and responsibility. All categories of water users should be given an opportunity to:

* participate in setting priorities for use of economic and human resources for development of different water-use sectors, based on proper information about the practicality, costs and environmental impact of different options

* choose technology and service levels, with due consideration to their willingness to pay for the service chosen, and the sustainability of the resource

* have a choice between different implementing agencies, including both the public and private sector competing on an equal basis.

These choices will only be real when management decisions on water development and allocation are governed by an awareness of the full cost of providing the water, including both the direct investments in installations, the operation and maintenance costs and the opportunity and environmental costs of the water resource in question.

In reality, there are likely to be political decisions to transfer income (i.e. subsidies) to marginal groups to meet basic needs. This will imply that water for basic needs is provided at low or no costs to the consumers. However, subsidies should preferably be allocated in such a way that they do not interfere with the opportunities for the users to choose.

A demand-driven approach thus requires that people express their preferences, and are willing to spend effort and resources in recognition of their support and responsibility for those choices. It also recognizes that there may be groups which are so marginalized in terms of social and financial resources that they need support from the state and/or donors in formulating and presenting their demands (i.e. empowerment).

4.3 Demand-driven Development of institutional Responsibility and Capacity for Integrated Water Resources Management

Changes to existing institutional arrangements and legislative frameworks should not be made for their own sake, but in response to an expressed need. To avoid waste of effort, while ensuring improvements in management efficiency where necessary:

* Institutional capacity for water management should be developed when there is a clear demand. Institutional response will therefore vary from time to time and place to place. A need for a river (or lake) basin authority to regulate water use in one part of a country does not necessarily imply that all river basins in that country need the same type of institution. Existing administrative structures will often be quite capable of handling local water resources management. In other situations, the need may arise for new institutions based, for instance, on catchment areas. Integration too should be demand driven. Organizations are most efficient when they have specific, well-defined and measurable objectives and authority.

* Water use regulations, including local bylaws should generally only be introduced when there is an expressed demand for regulation from affected people, organizations or institutions. This demand may be stimulated through awareness raising, dissemination of information, or creation of better opportunities for expression of demands. Without it there is little likelihood that regulation imposed for external reasons will be effectively enforced.

* Management and regulation of water and land use should generally be performed at the social and physical level appropriate to a need. Only when a new demand arises or a conflict needs resolving should management be transferred to a higher hierarchical level. Even then, there should not necessarily be a transfer of command and control. The higher management level should create the enabling environment for problem solving to be returned to the lower level.

4.4 The Enabling Environment and the Role of Government

The principal implications of demand-driven water resources development and management and development of institutional responsibility are that a high degree of flexibility is needed in time and space, and that the role of the state changes from one of command, control and execution to creation of the enabling environment.

In creating the enabling environment for management at the lowest appropriate level, the roles of the government include:

- Mobilizing resources for and formulating National Action Plans for water resources development and management. Such plans should include a definition of the roles of central and local government, the formal and informal private sector, and communities.

- Creating the infrastructure for the optimal national development and management of water resources, including the delegation of authority for implementation to the appropriate levels.

- Legislation, standard setting and other activities necessary to protect the environment and ensure equity and fairness in availability and access to water resources. Empowerment of local government to introduce and enforce appropriate bylaws. Review and amendment of existing legislation inhibiting decentralized management can be just as important as introduction of new legislation.

- Monitoring and assessment of the use, development and management of water and land resources, and dissemination of information to all interested parties.

- Promoting awareness of the needs for water and land resources management at all levels of society.

- Creating opportunities for expression of demands for water and land resources development and management.

- Building capacity to undertake water and land resources management when the need for it is agreed upon.

Of course decentralization of water management will not suddenly solve all problems, and there must be mechanisms through which central authorities can maintain an overview of the national land and water resources development and management scene and be able to interfere in cases of emergency.

International agencies and donors have an important role to play, individually and in cooperation, to support developing countries in creating the enabling environment for integrated development and management of water resources at the lowest appropriate level. This should include mechanisms to channel donor support to local levels in developing countries. Local institutions and NGOs from developed countries may be similarly involved, under government coordination.

5. MANAGEMENT AT THE LOWEST APPROPRIATE LEVEL

5.1 Conceptual Framework

Like any other natural resource or sector, water is managed at several institutional levels in the socio-political system from the lowest (household) to the highest (national/international) level. Within a country, the socio-political hierarchy may be described as composed of three principal levels: local, intermediate and national.

Water itself, however, does not respect administrative boundaries. Water is contained within natural hydrological boundaries, varying from the lowest subcatchment (or sub-aquifer in case of groundwater) to the largest international river basin.

The four principal levels of the socio-political and hydrological hierarchies are listed in Fig. 5.1. As explained in the introductory chapter, this report will not address transboundary water issues.

SOCIO-POLITICAL	HYDROLOGICAL
Local (Household - Village) (Community)	Subcatchment (or aquifer)
Intermediate ..... District / Region/Province	Catchment (or regional aquifer)
National (State/Federal)	River Basin
International	International River Basin

Fig. 5.1 The four principal levels of the socio-political and the hydrological hierarchies relevant for integrated water resources development and management.

Water resources management problems are obviously characterized by a wide diversity, due to large variations in actual socio-political and hydrological conditions. In most cases, the local level will consist of a variety of institutions at different sub-levels such as household, village, town/neighbourhood and ward/block. The intermediate level comprising districts and regions/provinces, will in some countries be subdivided into two levels, depending on country size and political structures. However, for illustration of principal management responsibilities and instruments at the various levels the proposed four-tier structure may be considered as an appropriate conceptual framework.

The hydrological hierarchy is illustrated in Fig. 5.2. As the socio-political and the hydrological hierarchies are non-uniform, integrated water resources development and management is dependent on both the hierarchies. This generates the need to establish interfaCes where water management can take place, i.e. points where there is both a reasonably good co-incidence of the two hierarchies, and where important management problems exist.

In some countries, management at the lowest appropriate level can be handled adequately within the existing socio-political structure. This is clearly preferable from the point of view of use of scarce manpower and financial resources. In other cases, discrepancies between the hierarchies and the magnitude of management problems may warrant establishment of special water management structures at one or more levels in one or more parts of the country.

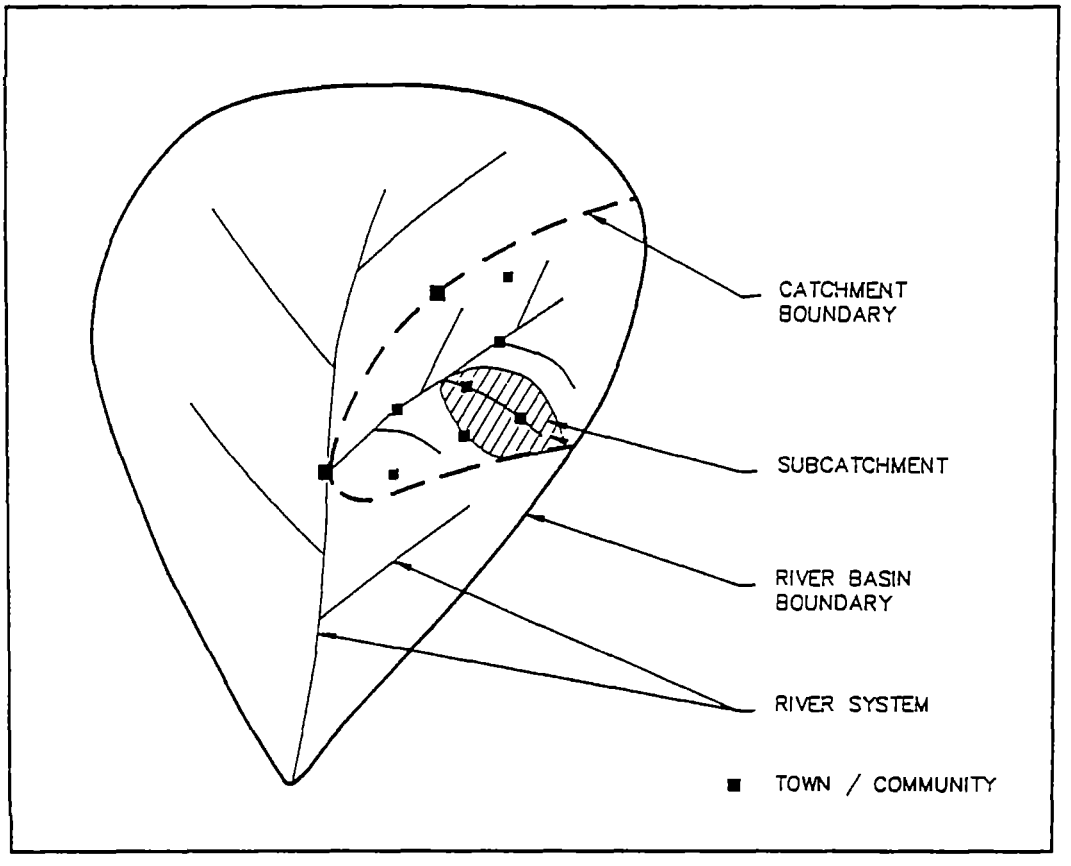


Fig. 5.2 The Hydrological Hierarchy

In addition to these structures, interest groups at local (user groups), intermediate, national and international levels (water associations) play a role in pursuing sectoral water interests, and in water resource management.

The socio-political hierarchy and the possible water management structure and their interactions are illustrated conceptually in Fig. 5.3, in which the role of user and interest groups is also indicated.

It must be emphasized that when a special water management structure is established it does not necessarily comprise autonomous administrative bodies (authorities). The water management structure is shown in Fig 5.3 as separate from the socio-political one to illustrate that certain water management functions may have to be performed with specific consideration of hydrological conditions. In many cases these functions may be taken care of through advisory bodies (committees).

In the discussion so far, the management hierarchy involves mostly institutions in the public domain. However, it is increasingly evident that private companies, NGOs, cooperatives, corporations etc. have an important role to play in water resources management. Whenever private entities can manage water cheaper and better - within the overall framework and guidelines defined in the public domain - this option should be considered.

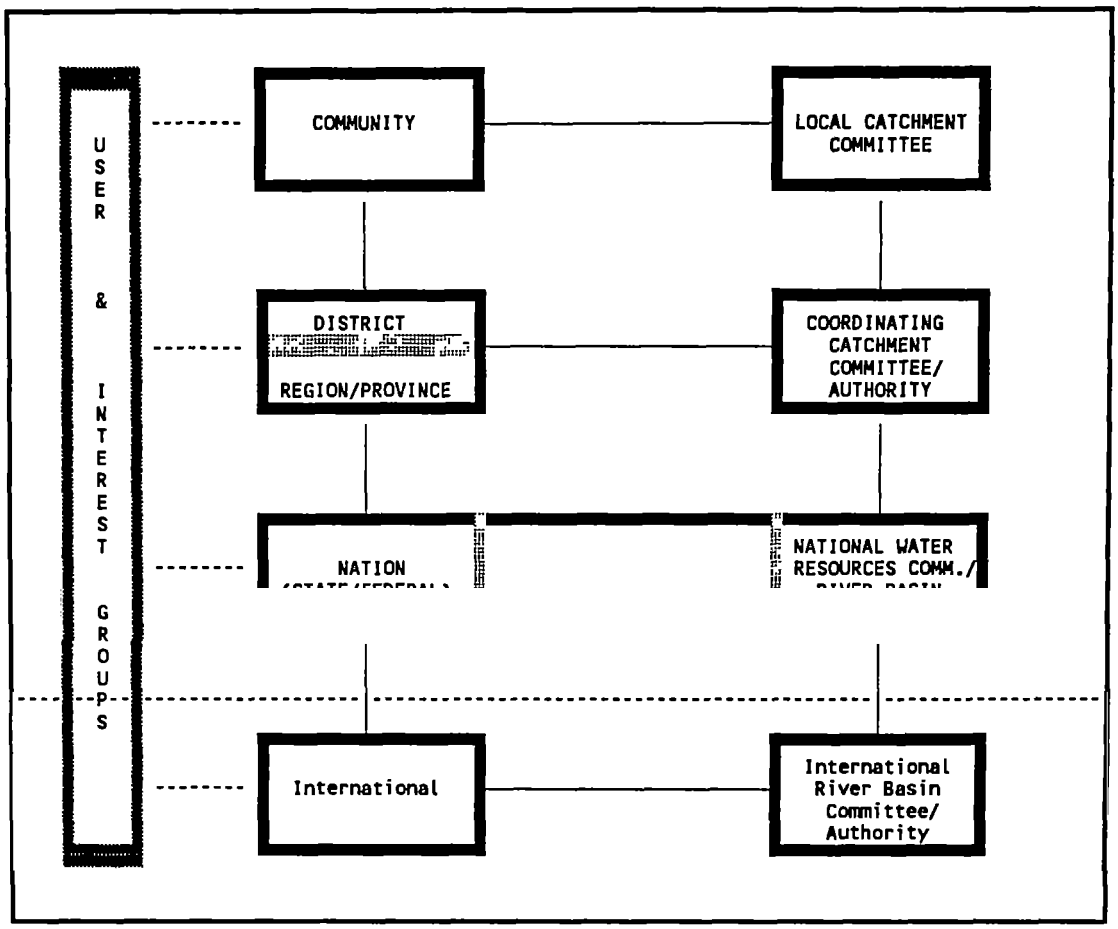


Fig. 5.3 Interactions between the socio-political and the water management hierarchial structures.

5.2 Management Instruments, Decisions and Actions at the various Levels

Given the various administrative hierarchies, whether existing or potential, the following implementation mechanisms for integrated water resources development and management should be identified:

- The lowest appropriate levels for management decisions, including roles of public and private sector institutions.
- Management actions and instruments at all levels to implement these decisions.
- Required inputs at all levels (higher levels providing the enabling environment for lower levels).
- Mechanisms at each level to promote cross-sectoral integration.

In the following description of management functions at various administrative levels only the three lowest, principal levels are considered. (As mentioned above the CIC did not discuss transboundary water issues).

These management functions are further elaborated in the following subsections, which also cover some aspects of the role of user and interest groups. The descriptions should be seen as examples of application of the general principles (Chapter 4), recognizing that applications to different countries (and at different times) will result in different specific forms of management functions and structures at the various levels.

5.2.1 User and Interest Groups

Most water uses, such as domestic water supply, industry, agriculture, livestock, navigation, aquaculture and recreation, involve different sectors of society. Such water users have their own objectives reflecting specific sectoral interests.

Water users are often organised at all levels:

* At the local level, ~~user groups~~ are often established in connection with e.g. water supply and sanitation, irrigation, forestry, etc. at village level or below.

* At the regional, national and international levels users are often organised in ~~associations~~ having the local user groups as member organisations (water works association, farmers association, associations for tourism and recreational use of natural resource, etc.). The associations take care of sector interests in various ways, including interactions with the socio-political structure.

In the following only the functions of user groups operating at local level are described.

User Groups at Local Level

A user group is a group of individuals/households established with a single purpose, village water supply and sanitation, irrigation within a certain area, social forestry, etc. The function of the user group is to create a feeling of ownership and responsibility, and to take care of the needs of the group. In as far as such user groups have a joint interest in developing, operating, maintaining and protecting the source, and have no major conflicts with others over the use of the source, they will often be the lowest appropriate level for water resource management.

Management decisions:

* Utilization (development and management) of small or seasonal water sources.
* Demand/need of the group as input to planning process at higher levels.
* Principles of water allocation within user group.
* Principles of user charges within the group.

Management actions and instruments:

* Collection of fees.
* Collection of monitoring data.
* Organisation of user input to development, operation and maintenance.
* Planning proposals/requests.
* Motivation of user group members.
* Regulations.
* Sanctions.

Inputs:

* Information and technical assistance.
* Training.
* By-laws.
* Water charge structure.
* Regulations.
* Awareness campaigns.

Mechanisms for cross-sectoral integration:

* Participation in local watershed committee and/or in community management.

Fig. 5.4 Examples of management functions for user groups at local level.

In the Ismani case study, Tanzania (Appendix B) user groups at community level are developing and managing seasonal water holes and canal irrigation fed by springs and rivers, and tap and cattle trough users have important functions in operation and maintenance of the water supply system. Only the cattle trough users, however, have formal authorization, although irrigation and water hole groups in practice perform a number of the functions shown in Fig. 5.4. They would do so more efficiently and could be provided with needed inputs and involved in cross-sectoral integration if they were legally recognized. Along rivers, the community levels (villages, wards and divisions) would have to be involved in allocating water rights to irrigation groups to protect the interests of downstream groups.

5.2.2 The Socio-Political Management Structure

The socio-political management structure within a country comprises the following three principal levels:

* Local level, representing the levels from households through villages/towns/neighbourhoods to wards/blocks. The local level will in this conceptual framework be denoted community. (May consist of several levels.)

* Intermediate level, representing districts and regions/provinces. (This level may in many countries be subdivided into two levels).

* National government level. (In countries with federal and state governments this level too is subdivided).

Community (councils/committees)

A community is typically a village, a town/neighbourhood or a ward/block. Within a community several user groups representing different sector interests will exist. As the resources in many cases cannot be managed separately, a community is the lowest level at which an integrated view of water resources development and management is possible. Communities have councils/committees or similar institutions managing community affairs - which in many systems today do not, however, include water and land resources. Often sub-catchments and other resources are located within community boundaries and can best be managed within one or another level of the community structure, as shown in Fig. 5.5.

Management decisions:

* Utilization (development and management) of small water sources, e.g.
  - Communal water ponds - whether surface water or taps (domestic water supply)
  - Streams, springs and wells (irrigation)
  - Small earth dams (Livestock)
  - Small fish ponds.
* Water allocation, water rights, effluent permits
* Integrated management of forest, land and water
* Catchment protection
* Operation and maintenance, support services. whether from public sector or private enterprises.

Management actions and instruments:

* Revenue collection (forest and water).
* Organisation of community based operation and maintenance.
* Collection and basic analysis of monitoring data.
* Awareness building/motivation
* Price mechanisms
* Regulations
* Rationing
* Sanctions

Inputs:

* Technical extension and training support from District.
* Regulations/by-laws.
* Capital.
* Information/feedback from Local Catchment Committee.
* Decisions on water rights and effluent permits decided upon by Local Catchment Committee or intermediate level.
* Technical extension and training support from regional level.
* National action plan.
* Information.

Mechanisms for cross-sectoral integration:

* Participation in local Watershed Committee
* Village council with possible appeal to higher level (e.g. District council)

Fig. 5.5 Examples of management functions at community level in the socio-political structure.

The case study of the Kenyan Western Water Supply Program, the Comoé, Burkina Faso study and the Ismani study (Appendix B) all provide ample evidence of the need and potential for community management, including planning, implementation, operation and maintenance of improved water supplies, through water committees at village or scheme levels.

Both the Kenya and Tanzania studies and the Tamil Nadu, India study (Appendix B) also propose community involvement in other fields of management of water resources: In Kenya and Tanzania the management of water supply schemes could include management and protection of their catchment areas; conflicts within and between user groups in Ismani may be solved through recourse to village or ward authorities; and the India case study suggests decentralization of monitoring and regulation of extraction of ground water to community level organizations.

Intermediate Level (Administration and Council/Committees)

The intermediate levels, district/province/region etc., would typically take care of management functions, such as those shown in Fig. 5.6, which cannot be performed at community levels.

Adequate integrated water resources management at the intermediate level requires strengthening of the technical/administrative capabilities within the local/intermediate government structure. The required capabilities should be seen in the light of cross-sectoral integration, i.e. officials at all levels must be motivated and able to interact with officials in other sectors. A constraint in this respect is the traditional career structure, which tends to stimulate loyalty to the central line ministry rather than to the local political-administrative setup.

Management decisions:

* Allocation of medium/large water perennial sources, e.g.:
  - Surface water reservoirs.
  - Important aquifers.
* Establishment of priorities and criteria for water allocation/water rights.
* Coordinated approval of development projects originating from communities, users, or Catchment Committees.
* Establishment of local water quality standards and permissible effluent limits.

Management actions and instruments:

* Monitoring and assessment of water resources (quantity and quality).
* Solution of conflicts generated at lower levels (between different communities).
* Provision of technical extension and training support to Catchment Committees and Communities.
* Macro-planning respecting lower level plans, defining potential growth areas and ensuring overall sustainability of use of natural resources.
* Presentation of planning scenarios involving "Mega projects".
* Establishment of a planning framework for regional level authorities still leaving room for lower level decisions.
* Enforcement, sanctions.
* Bylaws

Inputs:

* Capital.
* National action plan.
* Resource assessments and environmental impact assessments from higher and lower levels.
* Decisions on water rights and effluent permits from Catchment Committees.
* Planning proposals/requests from lower level.
* Technical extension and training support from national level.

Mechanisms for cross-sectoral integration:

* Interministerial committee/development committees
* Participation in Coordinating Catchment Committee.

Fig. 5.6 Examples of management functions at intermediate level in the socio-political structure.

The Comoé, Burkina Faso, case study is a clear example of an unfulfilled need for management at the provincial level. While the water needs of rural communities are generally met through handpumps managed by the communities, there are major users at the provincial level competing for several water sources, including the Comoé River Basin covering most of the province. Provincial level management, including representation of user interests, e.g. sugar factory, urban water supply, smallholder irrigation projects etc., would have as its major functions:

to allocate water from the major resources, including especially reservoirs;
to coordinate development and protection of the sources;
to monitor and assess the resources, both in regard to quantity and quality (contamination from factories);
and possibly to introduce a water fee as one regulatory mechanism.

Supplementary to the proposed community management of water sources, the Kenya study similarly emphasises that: "This requires, however, extensive awareness building among the community and development of fair and acceptable rules, compensation mechanisms and management/decision making procedures according to the appropriate community management practices. Mechanisms to solve possible conflicts between several communities (up- and downstream effects) should be developed as well as the effects of water use or land use usually don't stop at the administrative boundaries. This requires functioning linkages between the community level and regional level water resources management".

National Level (national, federal or state government)

The highest (national) level in both the administrative and the water/land management structure is the national (federal or state) government. Management at the national level will be executed by the land/water ministry. In addition, a national coordinating body, e.g. a National Water Resources Committee, for water resources management may support the ministry.

Management decisions:

* National water policy and strategy
* Integrated water resources planning in the framework of the national planning process.
* Policies for allocation of medium/large water sources.
* Water quality standards.

Management actions and instruments:

* Intergovernmental agreements.
* Solution of conflicts between sectoral interests.
* Solution of conflicts between regional interests.
* Integration of monitoring data and analysis compiled at lower level.
* National legislation.
* Donor coordination.
* Research and development programmes.
* Allocation of funds
* Awareness building at all levels
* Education and training
* Information
* Institutional capacity building

Inputs:

* Needs/requests on water resources plans from regional level, both districts/provinces and catchment committees.
* Monitoring data and analysis hereof carried out at Coordinating Catchment Committees.
* Processed water resources and water quality data and analyses from Coordinating Catchment Committees.

Mechanisms for cross-sectoral integration:

* Integration of sector interests e.g. through National Water Resources Committee with cross-sectoral representation.

Fig. 5.7 Examples of Management Functions at National Level.

For national level management of the Save River Basin, Zimbabwe, the case study notes:

"In a River Basin the size such as Save there is need for an organisation to take on the overall operational responsibilities of water facilities and to monitor water quality and quantity. The organisation should operate on a catchment basis which implies that the responsibility will not be limited by administrative structure such as Provinces and Districts."

"Since a Regional Water Authority (RWA) is already in existence in the River Basin the following responsibilities are proposed delegated to the RWA:

i. Operation and maintenance of dams owned by the government in the Basin.

ii. Continue operation of irrigation schemes in Commercial Farming Areas and give technical advice and support to schemes constructed in Communal Land Areas.

iii. Release of water from dams based on approved regulation rules.

iv. Monitoring of water quality and water quantity parameters. The latter should focus on data needed for planning of release of water from reservoirs in the Basin. Monitoring of siltation should also be included."

This proposed RWA would thus create the framework for more decentralized management, e.g. of watershed conservation, land use planning and irrigation schemes, by Natural Resource Management Committees proposed to be set up under the Rural/District Councils. It would also participate in the proposed international cooperation on water management through a joint Water Commission between Zimbabwe and Mozambique for the shared River Basin.

5.2.3 The Special Water Management Structure

In many countries, with appropriate adaptation, the existing socio-political structure can be enabled to deal with integrated water resources development and management, without major capacity building measures.

Considering the scarcity of financial and qualified manpower resources, strengthening of the existing institutions should be given priority. New institutions may be required at the catchment/river/lake basin level, but these should be created in harmony and close coordination with the existing socio-political structure.

The water management structure may, like the general socio-political structure, comprise the following three principal levels:

- Local level, where management functions are taken care of by an organisation which may e.g. be called the Local Catchment Committee.

- ~~Intermediate~~ level, where functions are placed in an organisation, e.g. denoted the Coordinating Catchment Committee/Authority.

- ~~National~~ level, where the functions may be taken care of by a National Water Resources Committee.

The Local Catchment Committee is defined by the local (sub)catchment, which has various sizes compared to the community areas and most often crosses the local administrative boundaries.

The two main functions of the Local Catchment Committee would be to ensure that water resources development and management is carried out by considering the entire hydrological unit (integrated over a number of community areas), and to ensure the integration of cross-sectoral interests (water for different purposes).

The Coordinating Catchment Committee/Authority similarly would be established where several districts or more than one region or province share important interests in one catchment or river basin.

A River Basin Authority at national level might be called for when a vital hydrological unit includes the entire area of several regions/provinces, thus comprising a major part of the country/state.

The water management committees may be vested with any range of the functions listed for the three principal levels in Figs. 5.5 to 5.7 above, according to local conditions and the needs they were designed to fulfil.

The institutional arrangement for these committees under the water management structure can be envisaged in two different ways:

(a) Advisory Committee
Work through existing organisations in accordance with normal administrative structures. Typically, one of the existing agencies involved in water management could be given responsibility for heading such an advisory committee, which would include representation of sector interests.

(b) Executive Authority
Establishment of an autonomous organisation, to which formal authority on water and land management issues is delegated from the administrative system. Examples of such organisations are the River Authorities in UK and France, Tennessee Valley Authority in USA and the Damodar Valley Corporation in India.

Which institutional arrangement to choose will also vary from one country to another, but it should be emphasized that establishment of a special water management structure does not necessarily require major changes in the overall administrative structure.

In the Ismani case, for example, it is suggested under the present economic crisis not to create new administrative bodies, and thus to leave water management at catchment level to the involved Village, Ward and Divisional Committees, with recourse to the District. Such committee should be enabled to handle integrated (cross-sectoral) management of water resources. The Group Scheme Committee for the water supply, the area of which is almost identical with the catchment area, may, however, be given an advisory role, also concerning problems not strictly under its jurisdiction. Later, it may be deemed appropriate to vest much more authority in a Local Catchment Committee for Mbunga River Catchment.

At the other extreme the Save River Basin study proposes that the existing Regional Water Authority (which is actually a River Basin Authority) should now be given wider management authority over the Save River Basin.

5.3 Examples of Water Resources Management at Lowest Appropriate Level

The lowest appropriate level may differ considerably from one place to another, and from one time to another. Figs. 5.8 and 5.9 illustrate the management functions at lowest appropriate levels under two very different circumstances.

Fig. 5.8 hypothesises a country with a single dominating water source, e.g. a major river system on which the country depends for its extensive irrigation works, but which also causes seasonal flooding. The only additional water source is groundwater (wells and boreholes), taking water from regional or localised aquifers.

With agriculture completely dependent on irrigation, there is competition for water, which is distributed through a nationwide canal system. The lowest appropriate level for allocation of available water, and for construction, operation and maintenance of the national canal system is therefore at the national level. Flood control works and flood warning, which is interdependent for the whole country, similarly must be a national responsibility.

Local level authorities, allocate water to local users, within priorities given by intermediate level authorities, in accordance with the groundwater available and the surface water allocated by national authorities.

Fig. 5.9 shows a typical situation in a country with relatively abundant water resources, originating from a number of sources with limited interdependence. Normally water resources management would under such circumstances be vested in the local level socio-political authorities. It also indicates, that a special management structure may be established, say, in one part of the country, where parts of two or three provinces and perhaps a medium size town depend on the water from one source (river or regional aquifer). The figure shows that in this situation an intermediate level catchment authority with representatives from local and intermediate socio-political authorities as well as user groups, may be the best management instrument to reconcile the socio-political and hydrological hierarchies.

	Socio-political structure		
	Local level	Intermediate level	National level
Decisions	Management/dev. of irrigation canals and pumps Management/dev. of wells Water allocation Cost recovery	Priorities for allocation of groundwater Priorities for allocation of surface water to local areas	Policy and plans for management/dev. of WR Priorities for allocation of surface water to provinces National flood control plan
Actions and instruments	Organization and coordination of user groups Implement dev. projects Organize operation and maintenance Regulations and pricing, sanctions and revenue, collection for water allocations Settle disputes Local development plans and requests for water allocations	Techn. extension and training Water resources monitoring Regulations and sanctions for allocation of surface water to local areas Regulations and pricing for ground water extraction Allocation of effluent permits for provincial development plans	Construction, o. and m. of water distribution and drainage works Construction, o. and m. of flood control works Water resources monitoring Water resources monitoring and environmental impact assessment Flood warning system Legislation and regulation of intermediate and local management of surface water and flood control Price mechanisms for cost recovery and opportunity costs Mechanisms to solve conflicts
Inputs	Water allocations Water extraction regulations and rates Techn. extension and training Information	National policies, plans, regulations and projects Local water requests	WR data on day to day basis Planning proposals/ requests esp. in relation to agricultural dev. plans Appeals for conflict solutions
Cross sectoral integration	Coordinating user group committee	Provincial Development Committee	National Water Authority/ National Water Resources Committee (repr. from Ministries, Provinces and user groups

*Fig. 5.8 **Example of water management functions in a country with a single dominating water source.***

	Socio-political structure			Intermediate level catchment authority
	Local level	Intermediate level	National level	
Decisions	Management/dev. of WR Integrated management of forest/land/water Water allocation and water rights Effluent permits	Criteria for water allocation, water rights and effluent permits Provincial development plans WQ standards	National water development policy and plans Recommended WQ standards	Criteria for water allocation, water rights and effluent permits Allocation of water rights and effluent permits to major users Principles of catchment protection and integrated management of forest/land/water WQ standards
Actions and instruments	Integration of user group interests Implement development projects Organize o. and m. Regulations and pricing, sanctions and revenue collection Settle disputes WR monitoring	By-laws Solution of conflicts Technical extension and training WR monitoring Large development projects	Legislation delegating management and dev. of WR to lower levels Allocation of funds WR monitoring	Sectoral integration and conflict solution By-laws and regulations Price mechanisms Water Resources Assessment and Environmental Impact Assessment Catchment development plans
Inputs	Technical extension and training By-laws Development funds Information	National plans Water Resources Assessment and Environmental Impact Assessment Planning proposals and requests	Provincial plans	National plans Legislation authorizing catchment authority WR data
Cross sectoral integration	Village Council Community dev. Committee	Provincial Water Committee	National WR Committee	Governing Committee (Repr. local and intermediate levels and user groups)

*Fig. 5.9 **Example of water management functions in a country with relatively abundant water resources originating from several independent sources.***

6. WATER AS AN ECONOMIC GOOD

Access to enough water of adequate quality for basic subsistence is a fundamental human need. A prerequisite for sustainable management of water as a scarce and vulnerable resource is that its full economic cost should be identified and acknowledged. With limited funds available for water and other human development needs and competition between different sectors, priorities must be set.

6.1 Cost of Water - An Introductory Example

The principal economic function of pricing is that it signals the costs to society of using water. In economic terms the costs comprise the following three elements:

(1) Direct cost of extracting and distributing water to users;

(2) The value of opportunities denied to others when water is used up for production, consumption or simply wasted (opportunity cost); and

(3) Environmental cost (or 'externality cost') imposed on others when water quality is degraded, or alternatively, cost imposed on the polluter to prevent his actions to affect water quality.

The significance of these three elements is illustrated through the example in Fig. 6.1.

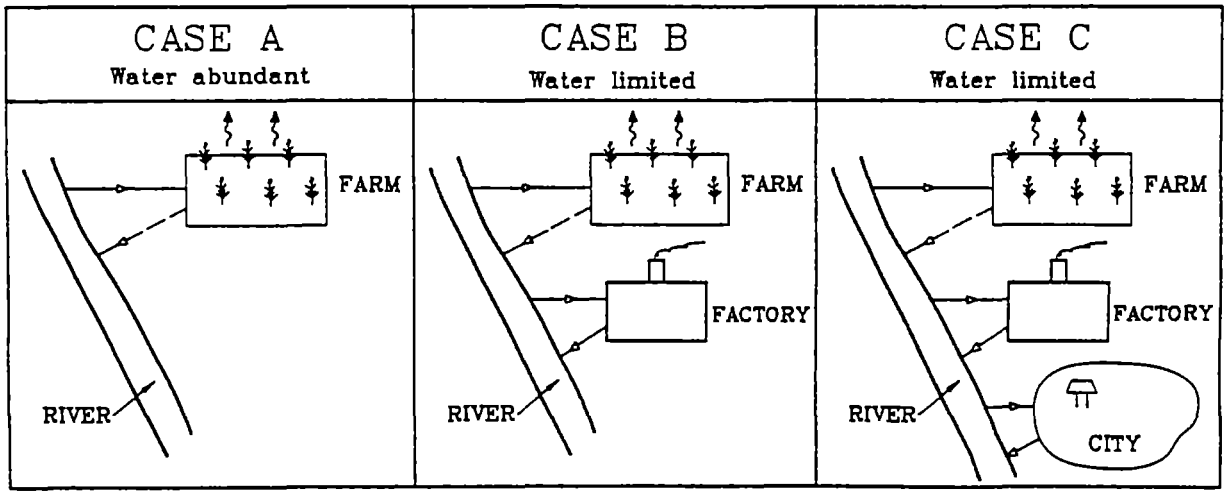


Fig. 6.1 Schematic example of three different cases of water use.

The example in Fig 6.1 includes three cases, A, B and C. In all cases the water source is a river. (Similar examples can be made for groundwater use). In case A the only major water user is a farm using water for irrigation. In Case B there is one additional downstream user: a factory using process water, which is returned as polluted water. In Case C a city is located further downstream and is dependent on the river as a source for its domestic and industrial water supply.

Case A is furthermore characterized by abundance of water in the source (the river), while in cases B and C the water source is not plentiful in relation to the user demands.

The cost of water can then be expressed as follows:

Case A: If the farm has its own water supply scheme (fully financed and managed), the farm will use water until the cost of the last m^3 (the marginal cost) exceeds the added production value it generates through irrigation. If, on the other hand, the water is supplied by an external organisation, the farm will decide its water use on the same principle, but now the water charge replaces the direct costs of his own water supply in the farmer's overall decision on how much irrigation water to use. If the water charge is equal to marginal water supply costs, the farmer's production (and therefore water use) decisions will be identical in the two cases. However, a water charge formula that does not reflect marginal water supply costs, will induce the farmer to use a different quantity of water. A fixed periodic charge, for example, will reflect zero marginal cost and thus induce the farmer to use much more water than in the first case.

Case B: The cost of water for the farm in this case comprises two elements: (a) The marginal direct cost of extraction and distribution, and (b) the opportunity cost, i.e. the value of the water in its best alternative use (in this case the factory) which is foregone when the water is used consumptively for irrigation by the farm.

Case C: The cost of water for the factory comprises three elements: (a) The marginal direct cost of extraction and distribution, (b) the opportunity cost (in this case for urban use), and (c) the environmental cost of cleaning up returned effluents at emission point or at downstream intakes, whichever is the most cost-effective way of providing downstream users with the water quality they demand.

6.2 Assessing the Economic Value of Water

Making water available and usable involves costs in the form of capital and labour. Growing demand for water means that satisfying the needs of one user increasingly preempts the use of that water by another user. There are therefore additional costs - the opportunity and environmental costs - as described above. These costs may be negligible, or they may be quite high, depending on the actual geographical and developmental situation.

Increasingly, communities find that water resources, until quite recently correctly perceived to be abundant and therefore to be made freely available to all, now fall short of demand. Unlimited availability of water for one user group, e.g. upstream farmers, limits the availability of water to downstream industry, commercial activities and households and thus hampers social and economic development. Uncontrolled upstream discharge of industrial or mining effluents into adjacent water courses may limit the supply of adequate quality water for downstream households, farmers and fisheries. In short, water - once adequately managed as a free good for all as the increasingly dominating community rule - has been transformed into a scarce commodity facing competing intermediate and end uses. As such water is no longer a free good. Whatever water is available in the community faces alternative competing uses. If some users receive it free, they are likely to use more of it than if it were rationed or if they were to pay for what they use. As a consequence, less would be available for other user groups whose demands exceed remaining supplies. In short, when there is no longer enough water of adequate quality to freely meet all the demands on it, some mechanism for allocating this scarce resource between those demanding it is required. It is when development has reached such a stage that one talks about water as an economic good.

But what about over extraction ?

Acknowledging competing demands for a limited supply of water of a given quality in a given place at a given time, simply means that whoever has some water available has the choice between using that water or offering it to the highest bidder among alternative users. If he decides to use the water himself for whatever activity he is engaged in (household, agriculture, industry, or using the water as a sink for residuals from production or consumption activities), he abstains from an income he could have earned by selling this water to someone else in the community or downstream. This means that the user decides that the value of the water to him is higher than the income foregone. By not selling the water he abstains from an income opportunity; thus the concept opportunity income or opportunity cost.

Another consequence of such excessive water use in cases where it is provided free of costs to the users, is that it may mislead the planners and water works managers to believe that the demand for water is in fact larger than it is, and as a result to design and construct a larger water supply capacity than justified. Likewise, downstream users may be forced to undertake more costly water supply investments to extract water from a more distant or less accessible source.

In addition, such water management practices entail the gradual creeping up of severe environmental costs in the form of salinization, waterlogging, waterborne diseases, etc. In other words, significant income opportunities are lost as a result of inefficient water management. Likewise, industrial, agricultural, commercial or household effluent emissions into the environment (surface or groundwater) reduce the quality of water for downstream users. The environmental cost of such upstream waste discharges is the additional cleaning up cost to maintain the original water quality demanded by the downstream users, or the incremental costs of diverting attention to a costlier water supply source.

neglects renewable resource aspect of H_2O

6.3 Meeting Basic Needs

Increasingly, communities are becoming aware of the growing scarcity of water and its deteriorating quality, and so recognize water as an economic good. At the same time, they have a commitment to meet basic needs. Some may solve this dilemma by giving priority to basic need satisfaction in water allocation, possibly including rationing of water. Others may adopt water charging systems which secure a minimum provision that all can afford, while additional demands are charged according to a formula which ensures full or partial recovery of all costs.

6.4 Demand Management

6.4.1 Charging Options

Water scarcity as described above requires integrated water management. The community must see that water is allocated for different uses in such a way that it is used in accordance with the stated goals of the community's development priorities. Such goals are likely to include efficient resource allocation, sustainable development, and equitable and fair distribution of rights and local resources, so that the basic needs of all in the community can be met.

Among the many means available to communities to secure a balanced fulfilment of these developmental goals are pricing, subsidization, physical rationing and quantitative entitlements (free or otherwise) of the scarce water. The specific mix or package of such means and the detailed formula for each, e.g. water tariff structures, implicitly reflects the priorities, preferences and managerial abilities of that community as regards water resources management.

There are many widely different charging options available for domestic, industrial, and irrigation water. The chosen charging mechanism depends on the local conditions and the development goals. Experience has shown that improvements can only be sustained if the felt need of the users is so strong that they are willing to pay for the services. Charging for water use is thus essential not only for inducing conservation and protection of water resources, but also for creating a sense of ownership and responsibility for the functioning of these water systems.

6.4.2 Cost Recovery and Willingness to Pay

Cost recovery means the extent to which actual charges collected cover capital and recurrent costs of production, delivery and discharge of water. The concept covers anything from providing water completely free (zero cost recovery), to partial-, full- or more than full cost recovery and can be compatible with many different charging regimes. For instance, a fixed connection cost plus variable charges for water use provide a mechanism which can readily reflect the way that capital and recurrent costs are incurred. The variable charge may reflect the full opportunity and environmental costs of water or a part of them. Even fixed-charge systems can achieve full cost

→ H_2O Resources
input costs
H_2O should
input.

recovery if the charge is set high enough, though such systems are much less flexible in achieving demand management and equitable allocation of resources.

Water charges can take on almost any form or mix of fixed and variable elements. There is no such thing as a correct water charge in any absolute sense. The optimal charge or combination of charges can be determined only on the basis of the stated goals of the community and the directives given by the community to the water authority. The typical trade-offs encountered in determining optimal water charge structures are pure water allocation efficiency which is the most direct way of conveying to the users that water is an economic good (requiring charges that reflect opportunity and environmental costs fully whether cost recovery is achieved or not). This versus basic needs considerations which may require cross-subsidization between different user categories in order to provide poor and vulnerable users with the water needed to sustain life, i.e. for drinking, cooking and washing. Most would agree to include certain site specific additional uses required to sustain a reasonable minimum standard of living and human dignity (e.g. for basic home gardening and backyard animals). The idea of efficiency charges or opportunity cost pricing is to induce people to economize with water by forcing them to think in terms of the opportunity cost of the water they use as opposed to paying a fixed sum and then waste for free as much water as they like.

A user's willingness to pay for improved water supply may vastly exceed actual water charges as well as full cost recovery, or be far below full cost recovery. The answer depends entirely upon the actual situation and the relative attributes of the prevailing and the improved system, as well as the various socio-economic and demographic characteristics of the water users. What is important here is that there is no need for the optimal charge to reflect the willingness to pay, except that the charge cannot exceed the willingness to pay. The optimal charge in a given situation may for efficiency or equity (e.g. basic needs) considerations be stipulated well below the willingness to pay level. Typically, water charges paid to private water vendors in poor squatter areas are way above the charges paid for house connections by the well-to-do residents in the same towns, and would - if applied to public taps or private connections in squatter areas - provide a handsome profit in addition to full cost recovery.

APPENDIX A

The Copenhagen Statement

COPENHAGEN STATEMENT

Freshwater is a finite and vulnerable resource, which is vital for the sustenance of life, for all development activity, health and environmental maintenance . Rapid population growth, coupled with the pace of economic development, is putting increasing strain on available water and land resources. Depletion and degradation of available resources are causing the costs of new water supplies to escalate and threatening sustainability.

The past sectoral and top-down approach to water and land management has proved ineffective and insufficient in ensuring the sustainability of water resources. Specialists are agreed that a coordination and integration of sectoral approaches is vital, to tackle the escalating problems.

Participants in the Copenhagen Informal Consultation on Integrated Water Resources Development and Management prepared and supported by the Nordic Countries and held on 11-14 November 1991 consider that two key principles should be prime components of future strategies for sustainable development and management of water resources for rural communities.

1. **Water and land resources should be managed at the lowest appropriate levels**

2. **Water should be considered as an economic good, with a value reflecting its most valuable potential use.**

The Copenhagen Informal Consultation focused on integrated water resources management in rural communities (including small towns) in developing countries. Affected water users therefore include domestic users, agricultural users, and rural industrial users. These recommendations are not intended to cover water management problems of large urban areas, or transboundary issues. These topics are recognized as vitally important but they are addressed through other fora.

Governments are urged to adopt the two key principles in their national policies and action plans and to couple them with a strong recommendation that land resources management should be fully integrated with water resources development and management. In support of these recommendations, the 45 participants (including water resources specialists from 15 developing countries and 12 developed countries) have provided guidance on practical ways to implement integrated water resources development and management from local to national level in developing countries. Implementation mechanisms are described in the report of the Copenhagen Informal Consultation. The main elements are outlined in this Copenhagen Statement.

BACKGROUND

At the UN Conference on Environment and Development (UNCED), in Rio de Janeiro, Brazil, "Agenda 21" is the World's agenda for environmentally sustainable development in the next century. Within this agenda, the freshwater chapter says "Effectively integrated management of water resources is important to all socio-economic sectors relying on water". In preparation for Rio, the freshwater issue will be discussed at the International Conference on Water and the Environment (ICWE) in Dublin in January 1992.

The Copenhagen Informal Consultation, the recommendations from which will be input to ICWE, represents an important consensus on the approaches needed to implement effective integration of water and land resources management, in a multisectoral approach which extends to all levels of society.

THE KEY PRINCIPLES

1. Centralized and sectoral (top down) approaches to water resources development and management have often proved insufficient to address local water management problems. Recognizing the need for a central mechanism capable of ensuring the national economic and social interests, the role of governments needs to change, to enable users, local institutions and the formal and informal private sector to play a more direct part. The levels at which effective management decisions can be taken and problems can be solved will vary widely from country to country and from situation to situation. The fundamental principle remains however that, in any given situation, water resources should be managed at the lowest appropriate levels, taking into account the need for integration with land use management.

2. Access to enough water of adequate quality for basic subsistence is a fundamental human need. However, efficient allocation of water resources can only come from a full recognition of the costs and benefits associated with various alternative uses taking into account future needs. In other words, water is an economic good. Failure to recognize this key principle has contributed substantially to wasteful and environmentally damaging uses of water. Whether or not different categories of users are charged the full economic cost of providing their water supplies, that cost must be apparent and accounted for in resource management strategies.

MANAGEMENT AT THE LOWEST APPROPRIATE LEVELS

Objectives

Implementation of water and land resources development and management at the lowest appropriate level has these basic objectives:

* to ensure sustainable development and management of water resources
* to achieve a high degree of awareness and concern among water users, while increasing their involvement and responsibility for satisfying their needs
* to develop and promote a shared vision of water resources management, through a broad consultative approach involving governments, NGOs and the public
* to recognize local interests, make local information available and ensure its optimum use
* to mobilize local financial, physical and human resources
* through decentralization, to enable central government agencies to concentrate on essential national functions
* to recognize the important role of the private sector in cost effective water resources management.

Demand-driven water resources development and management

To prepare the ground for their active involvement, people must have choices and a sense of ownership and responsibility. All categories of water users should be given an opportunity to:

* participate in setting priorities for use of economic and human resources for development of different water-use sectors, based on proper information about the practicality, costs and environmental impact of different options
* choose technology and service levels, with due consideration to their willingness to pay for the service chosen, and the sustainability of the resource
* have a choice between different implementing agencies, including both the public and private sector, competing on an equal basis.

These choices will only be valid when management decisions on water development and allocation are governed by an awareness of the full cost of providing the water (including the "opportunity cost" of other potential uses). They should also be based on recovery of actual costs, though this does not preclude political decisions to transfer revenue (i.e. subsidies) to help satisfy communities' basic needs.

Demand-driven institutional responsibility

Changes to existing institutional arrangements and legislative frameworks should not be made for their own sake, but in response to an expressed need. To avoid waste of effort, while ensuring improvements in management efficiency where necessary:

* Institutional capacity for water management should be developed when there is a clear demand. Institutional response will therefore vary from time to time and place to place. A need for a river basin authority to regulate water use in one part of a country does not imply that all river basins in that country need the same type of institution. Existing administrative structures will often be quite capable of achieving local water resources management. In other situations, the need may arise for new institutions based, for instance, on catchment areas. Integration too should be demand driven. Organizations are most efficient when they have specific, well-defined and measurable objectives, and special authority.

* Water use regulations, including local bylaws should generally only be introduced when there is an expressed demand for regulation from affected people, organizations or institutions. Sometimes, this demand may be stimulated through awareness raising, but without it, there is little likelihood that regulation imposed for external reasons will be effectively enforced.

* Management and regulation of water and land use should generally be performed at the social and physical level appropriate to a need. Only when a new demand arises or a conflict needs resolving should management be transferred to a higher hierarchical level. Even then, there should not necessarily be a transfer of command and control. The higher management level should create the enabling environment for problem solving to be returned to the lower level.

The enabling environment and the role of government

In creating the enabling environment for management at the lowest appropriate level, the roles of the government include:

* Mobilizing resources for and formulating national action plans for water resources development and management. Such plans should include a definition of the roles of central

and local government, the formal and informal private sector, and communities.

* Creating the infrastructure for the optimal national development and management of water resources, including the delegation of authority for implementation to the appropriate levels.

* Legislation, standard setting and other activities necessary to protect the environment and ensure equity and fairness in availability and access to water resources. Empowerment of local government to introduce and enforce appropriate bylaws. Review and amendment of existing legislation inhibiting decentralized management can be just as important as introduction of new legislation.

* Monitoring and assessment of the use, development and management of water and land resources, and dissemination of information to all interested parties

* Promoting awareness of the needs for water and land resources management at all levels of society

* Creating opportunities for expression of demands for water and land resources development and management

* Building capacity to undertake water and land resources management when the need for it is agreed upon

International agencies and donors have an important role to play, individually and in cooperation, to support developing countries in creating the enabling environment for integrated development and management of water resources at the lowest appropriate level. This should include mechanisms to channel donor support to local levels in developing countries. Local institutions and NGOs from developed countries may be similarly involved under government coordination.

The management hierarchies

Like any other natural resource or sector, water is managed at several institutional levels in the socio-political system from the lowest (household) to the highest (national/international) level. Water itself, however, does not respect administrative boundaries. Water is contained within natural hydrological boundaries, varying from the lowest sub-catchment (or sub-aquifer in case of groundwater) to the largest international river basins.

While integrated water resources management necessarily must consider the natural boundaries of the resource, it must at the same time take place within the socio-political structures of the country concerned.

Hence, in identifying the most appropriate institutional context for any water resources management decision or action, the socio-political and hydrological management structures must

be reconciled. In particular it must be decided at each level whether land and water management institutions are needed, and if so whether they should be advisory or executive.

Socio-political, hydrological and water management hierarchial structures often correspond in principle as follows:

* Local level:
  Socio-political: Household, community, village
  Hydrological: Sub-catchment/aquifer
  Water Management: e.g. Local catchment committee

* Intermediate level:
  Socio-political: District, region, province
  Hydrological: Catchment/regional aquifer
  Water Management: e.g. Coordinating catchment committee/authority

* National level:
  Socio-political: Nation (state/federal)
  Hydrological: River basin
  Water Management: e.g. National water committee/river basin authority

* International level:
  Socio-political: International (country, region of countries, world community)
  Hydrological: Transboundary water body/international river basin
  Water Management: e.g. International river basin committee

In addition to these structures, interest groups at local level (as e.g. user groups), and at regional and national level (as e.g. water associations) play a role in pursuing sectoral water interests.

So far these management hierarchies involve mostly institutions in the public domain, and it has yet to include land use management in relation to water resources availability and use. However, it is increasingly evident that the private sector, NGO's, cooperatives, corporations, etc, have an important role to play in water resources management. Users should have the option to use the services of private entities (such as water supply utilities or irrigation water associations), if these can provide cheaper or better services -within the overall framework and guidelines defined in the public domain.

Management decisions and actions

Given various hierarchies, whether existing or potential, the following implementation mechanisms for integrated water resources management should be identified

* The lowest appropriate levels for management decisions and actions, including roles of public and private sector institutions

* Management instruments to implement these decisions

* Required inputs at all levels (higher levels providing the enabling environment for lower levels)

* Mechanisms at each level to promote cross-sectoral integration

The Copenhagen Report contains some examples of typical implementation mechanisms.

WATER AS AN ECONOMIC GOOD

Access to enough water of adequate quality for basic subsistence is a fundamental human need. A prerequisite for sustainable management of water as a scarce and vulnerable resource is that its full economic cost should be identified and acknowledged. With limited funds available for water and other human development needs and competition between different sectors priorities must be set.

Assessing the economic value of water

Making water available and usable involves costs in the form of capital and labour. Growing demand for water means that satisfying the needs of one user increasingly preempts the use of that water by another user. There is therefore an additional cost - the opportunity cost - reflecting the value of the water in its most valuable alternative use, i.e. the revenue foregone by using the water in the chosen way. For domestic water use in most rural areas this opportunity cost is negligible, but in many settings the opportunity cost is high. These include settlements with high population densities, where the combined demands of many small users exceed the capacity of the water resource, and cases where large users dominate to the extent that other potentially valuable water uses are excluded. Finally, in many cases there are additional significant costs of protecting the environment from adverse impacts of the prevailing water use activities.

Meeting basic needs

Increasingly, communities are becoming aware of the growing scarcity of water and its deteriorating quality, and so recognizing water as an economic good. At the same time, they have a commitment to meet basic needs. Some may solve this dilemma by rationing water. Others may adopt water charging systems which secure a minimum provision that all can afford, while additional demands are charged according to a formula which ensures full or partial recovery of all costs.

Charging Options

There are many, and widely different charging options available for domestic, industrial, and irrigation water. The chosen charging mechanism depends on the local conditions and the development goals. Experience has shown that improvements can only be sustained if the felt need of the users is so strong that they are willing to pay for the services. Charging for water use is thus essential not only for inducing conservation and protection of water resources, but also for creating a sense of ownership and responsibility for the functioning of these water systems.

COPENHAGEN FOLLOW-UP

The participants of the Copenhagen Informal Consultation are convinced that widespread adoption of the two key principles described in this Statement will have a major impact on the implementation of integrated water resources development and management in the coming years. They therefore recommend the following actions:

1. That the Copenhagen Statement and the Copenhagen Report be transmitted to the 1992 Dublin Conference on Water and the Environment, and so as a contribution to the preparation for the 1992 UN Conference on Environment and Development in Rio de Janeiro, with a strong recommendation that they be considered essential components of strategies for integrated water resources development and management for the 1990s **and beyond.**

2. That the Copenhagen Statement and the Copenhagen Report be widely disseminated so that governments and sector specialists may adopt the guiding principles in formulating and implementing national action plans.

APPENDIX B

Summary of Nordic Case Studies

(For further details please refer to
the five case study reports listed in Appendix D)

Water from Mountain Streams

A Case Study with Focus on Management at Local Level in Tanzania

Ismani is defined as the area served by the Ismani Water Supply Scheme, which is a piped gravity scheme with 2 small river intakes. It coincides with Mbunga river catchment, and in the dry season only additional sources are a few springs. Low flows are presently sufficient, but allows no further economic development e.g. based on expanded irrigation. Costs of dams or reservoirs for seasonal storage or deep boreholes are probably prohibitively high.

Institutional Aspects

According to Tanzanian law a permission to extract water is required for most purposes. In practice, the authorities rarely use permissions as a tool of resource management.

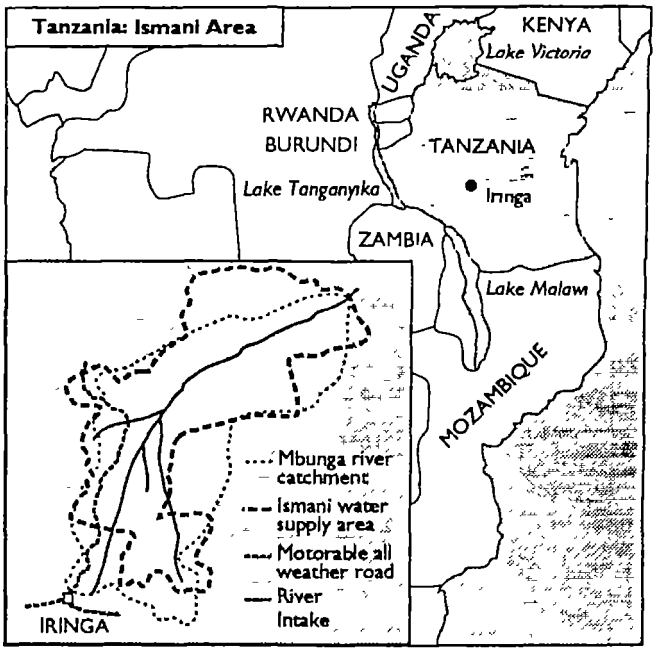
Locally, each village has the ownership and responsibility for operation and maintenance of the village scheme through a Village Water Committee. Management of the entire scheme is supported by a Group Scheme Committee comprising two representatives from each village.

Possible Reasons for Conflicts Between User Groups

- Competition over water mainly between domestic and different commercial use (irrigation, livestock).
- Settlers in intake areas responsible for degradation of water quality.
- Government institutions (oil pumping station and police station) fail to pay the fees to the village water funds.

Suggested Improvements of the Management System

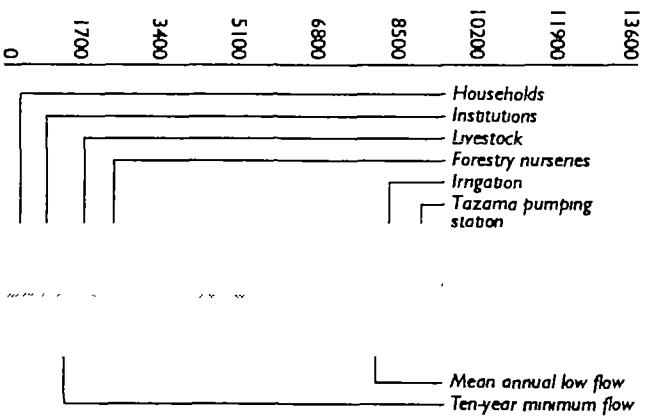
- Decentralisation of the water management hierarchy with the aim of decisions being taken at the lowest appropriate level, also in relation to the physical hierarchy. According to this the individual households and user groups will be the first level. Another level will be the villages which extract water from the same source. Only major sources serving bigger areas with conflicting interests should be managed at higher levels
- Assistance of community workers to try to achieve better cooperation with settlers in the intake areas.
- Introduction of a m^3 pricing system with water meters for house connections as well as for farmers with livestock and irrigation.



Ismani Area

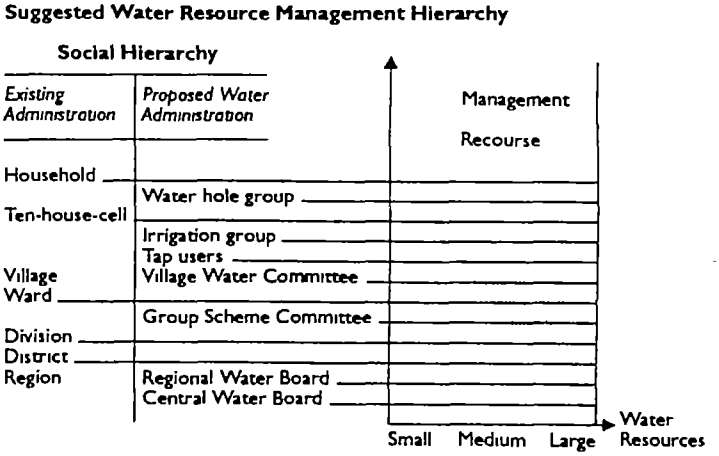
Area, km²	1800
Villages, no	21
Population	31,100
Climate	Warm and wet Nov -April Dry and cool June-Sept.
Precipitation, mm/year	500-750
Potential evapotranspiration, mm/year	1400-2000
Runoff, mm/year	100-200

Present Water Demands From the Intakes of Mgera and Kigasi and their Total Flows (m^3/day)



Future water demands are uncertain, especially those related to agricultural water use

Suggested Water Resource Management Hierarchy



Augmentation of a Water Resource

A Case Study with Focus on Management at Watershed Level in India

For management on a watershed basis it is important to consider how land use will effect the various components of the hydrological cycle. An important objective in an area as Allikuli catchment, where lack of water is a constraint to the agricultural activity, is to augment the available water by increasing the infiltration and reducing unproductive losses (e g. overland flow), and this is one of the aims of the afforestation and water conservation measures of the Interface Forestry Programme (IFP). Increased ground water withdrawal since the start of the IFP has resulted in larger agricultural production with a value equivalent to 1 Rupee/m^3 of irrigation water.

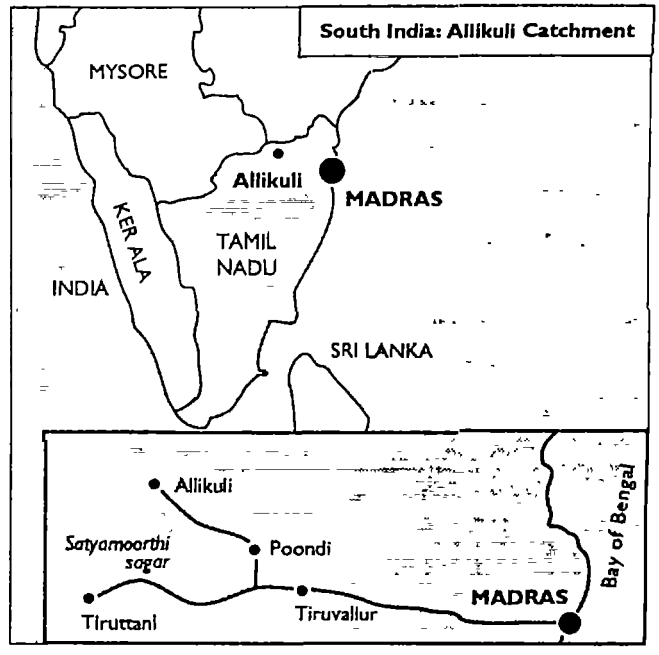
Possible Reasons for Conflicts

There seems to be no local reason for the government decision on restricting loans to well digging, since aquifers according to the best estimates are not being depleted. However, the watershed drains into the water reservoir used by Madras Water Supply, which is currently being extended, and thus there is a clear possibility of conflict between the national level and the local level.

Conflicts may arise between the Reserve Forest and farmers if evidence is given that afforestation at a later stage of the IFP causes reduced water amounts in farmland.

Suggested Improvements of the Management System

- Strengthening of local administration (Village IFP Committee) and inclusion of technical expertise at local level.
- Introduction of incentives, disincentives, and training to farmers in optimization of water use efficiency (crop selection, irrigation efficiency etc.)
- Monitoring of surface water and ground water resources in the watershed to assess the effects of the IFP.



Allikuli Catchment

Climate	Early summer hot and dry
	Sep-Nov heavy rain from North-East Monsoon
Estimated precipitation, mm year	1100
Annual actual withdrawal from wells	
Prior to IFP, mill. m^3 est	3.25
Post to IFP, mill. m^3 est	4.6
Population	4,400
Villages	4

Allikuli Catchment

Government land 3,000
- Reserved Forest 2650
- Arable Land 350

Private land 750
- Tank Irrigation 230
- Drylands 170
- Well Irrigation 350

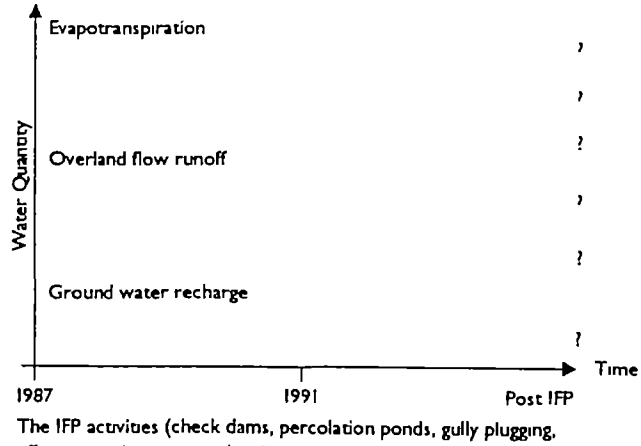
Total area 3,750 ha

Variations in Rainfall
Recorded in nearby town of Poondi

Year	Rainfall	1990	Rainfall
1981	1047	Jan	0
1982	701	Feb	0
1983	1931	Mar	0
1984	1118	Apr	40
1985	1040	May	374
1986	720	Jun	50
1987	1236	July	87
1988	1150	Aug	58
1989	999	Sept	161
1990	1347	Oct	289
		Nov	275
		Dec	13

The erratic character of the rainfall and the seasonal and inter-annual variations pose serious problems

Effects of Interface Forestry Programme (IFP)



The IFP activities (check dams, percolation ponds, gully plugging, afforestation) is expected to increase both infiltration and evapotranspiration The net effect on water availability is not known.

Where Water is in Abundance

A Case Study with Focus on Users' Participation in Kenya

North of Lake Victoria in Kenya are hundreds of small streams, thousands of springs, and good water resources. People have never felt a big need for water development or been aware of water hygiene problems, the cause of much disease. Here, the Western Water Supply Program (WWSP) was initiated with a supply-driven approach with the aim of effective increase of safe water supply.

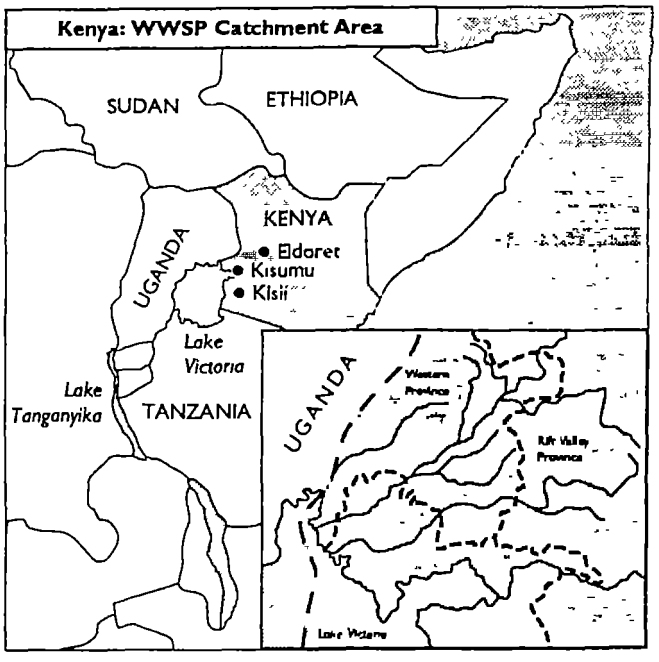
Problems

Because of the supply-driven approach:

- The population has been regarded as passive beneficiaries which has inhibited their own initiative and responsibility. This has weakened the program's economic and operational sustainability and even caused contamination of water sources.
- The program has not considered productive water usage such as cattle watering. This limitation to drinking water only has affected the program's economic sustainability and even reduced the health benefits through neglecting the problem of water washed diseases.

Suggested Improvements of the Management System

- Diversion to a demand-driven approach, where the basis for improvements will be the beneficiaries' own needs, affordability and environmental circumstances.
- Reducing the authorities' and project's role to that of a promoter's, controller's and supporter's one. Management should be taken care of by the users.



WWSP Area
Western Province and Siaya District in Nyanza Province

Climate: ..... Tropical, mean daily temperature 20-25 C. Rather even rains
Precipitation, mm year: 1000-2000
Water resources ..... Abundant
Project Achievements ..Over 2500 point sources, serving over 750 000 users
Piped scheme rehabilitation

→ promotes cattle

Suggested Impovements of the Management System

Users

Household — Cattle

Irrigation — Production

↓ Needs and Prerequisites — ↑ Supply and Impacts

Community Level Management

Water Supply/Management

Production and supply
Resource management and protection
Management of O&M
Financing of investments and O&M

← Support

← Control

Agents:

- Health education, water promotion, training, system development
- Planning advice, spare part support, equipment production, O&M support
- Subsidies, credit arrangements, tariff policies
- Allocation of resources, pollution control, monitoring (health, technical), legislation

Authorities only
- Local, regional and national water authorities
- Health, Environment, Agriculture and other state organisations
- Training institutions etc.

Participation from private sector
- Banks and other financing institutions
- Consultants, contractors
- Producers

Community-Level Management — National and Regional Management

Water Flow across the Boundary

A Case Study with Focus on Management at River Basin Level in Zimbabwe

Rivers constitute potentials of drinking water supply, agricultural produce via irrigation and industrial production. The utilization of the potentials often requires large investments. This can have negative effects on environment and living conditions of local populations. Furthermore, the utilization in one country can be on the expense of another country, which the river runs through. All this is the case in the Save River Basin, where the plan is to use 80% of the potential by construction of new reservoirs.

Institutional Aspects

- The Zimbabwean part of Save River Basin covers 5 provinces and 23 districts.
- The water management system of the basin involves 8 ministries, 1 regional water authority and 5 river boards.
- There is no agreement between Zimbabwe and Mozambique on water rights.

Possible Reasons for Conflicts

Intensification of water use:

- Requires several expensive dam projects, and for financial reasons the government is inclined to give priority to irrigation in commercial farming areas in stead of in the densely populated communal areas.
- Implies industrialisation of the area with possible disputes over pollution and competition over water rights in drought periods as a result.
- Raises the question of distribution of water rights between Zimbabwe and Mozambique.

Overpopulation in communal areas causes environmental degradation, which results in increased sedimentation of reservoirs.

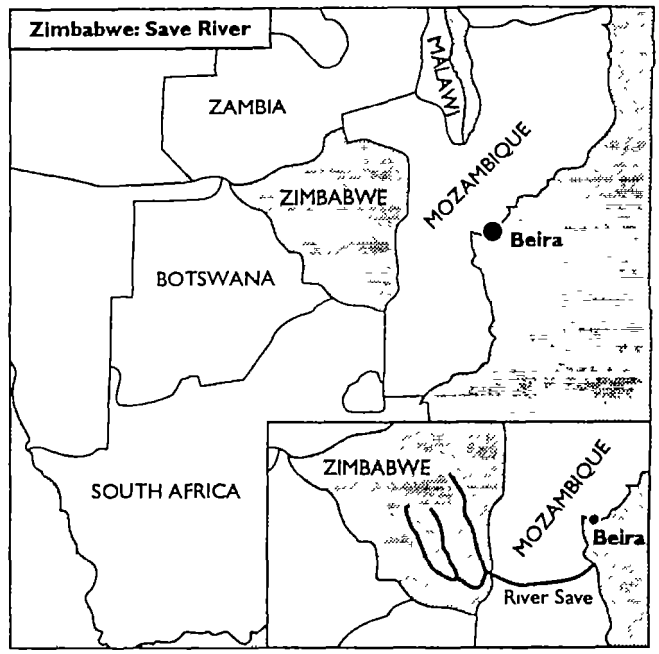
Suggested Improvements of Development and Management

Local level

- Delegation of management and development of water projects to lowest appropriate level, e.g. Rural/District Councils or River Boards set up in specific problem areas.
- Integration with management of land resources.

Regional level

- Overall responsibilities for operation of dams and monitoring of water quality should be delegated from the national level to the Regional Water Authority for the basin area.
- Strengthening of the River Board system coping with conflicts.



Zimbabwe Save River Basin

Area, km²:	84,500
Population, million:	2 6
Population density, pers/km²:	From 4 in commercial farming areas (formerly reserved for white farmers) to 60 in communal areas.
Precipitation, mm/year:	Geographical variations, 500 and 1200
Runoff, mm/year:	Geographical variations, 4-300

Allocation
Water yield allocation in the development plan, %

Reserve 9%
Existing Water Rights 23%
Planned Primary Water Use 2%
Planned Irrigation Water 60%
Planned Urban and Industrial Supply

National level

- Concentration of all superior responsibility including pollution control in one ministry.

International level

- A formal cooperation between Zimbabwe and Mozambique.

The Green Province of a Dry Country

A Case Study with Focus on Management at Intermediate Level in Burkina Faso

Today, there is enough water in Banfora, the main city of the green province in Burkina Faso. But especially in dry periods shortage may well arise in the near future, causing interest conflicts between the three user sectors, households, irrigated farms and industry. Water resources are evaluated to be 60 million m3/year, but may be substantially lower in years with drought.

Institutional Aspects

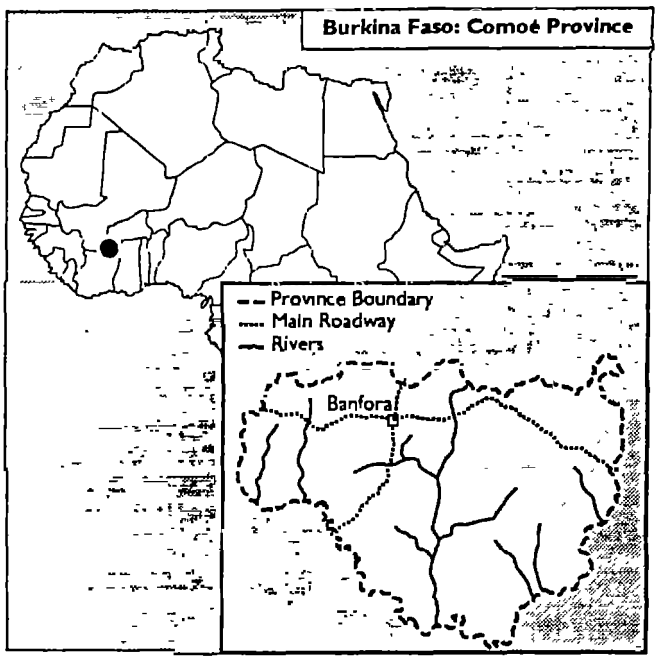
In principle, all water utilisation in Burkina Faso is regulated by the authorities - and human consumption is given first priority. The ONEA is the official organisation in charge of distribution. However, the 20 km pipeline connecting Banfora to the reservoir is owned and controlled by one enterprise, a sugar factory using 95% of the present total demand, mainly for irrigation of sugar cane. The ONEA has made an agreement with the company for the maintenance of hydraulic equipment outside of the production site and for the payment of a charge for water use, according to the overall water tariff structure. The company, which is a parastatal, has not full-filled the obligations.

The water resource management cannot be said to be effective, and it is difficult to place responsibility. There is no obvious forum for solving interest conflicts between different sectors.

No water master plan exists or is being planned. The resource assessment is lacking scientific foundation.

Suggested Improvements of the Management System in Banfora

- Creation of a committee to undertake the intermediate level management of all water resources of the Comoé involving all major water consumers, leaving the village level to deal with local resources, which are independent of the main river.
- Implementation of the water tariff structure.
- Improved monitoring and control of resources and contamination.
- Preparation of a Water Master Plan.

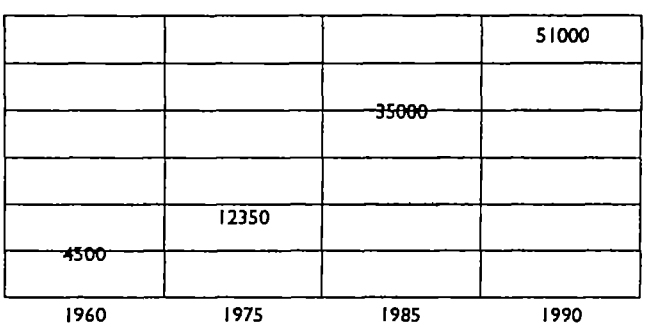


Komoé River Basin

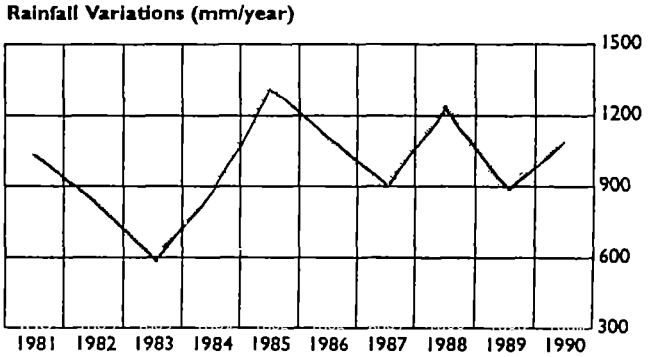
Climate	Humid tropical
Area, km²:	9600
Precipitation, mm/year:	1100
Potential evapotranspiration, mm/year	2000
Runoff, mm/year:	70
Storage capacity in surface water reservoirs, mill. m³:	48

Exploitable aquifers exist

Population, Banfora town



Rainfall Variations (mm/year)



	Present Demand		Medium-term Demand	
	1000 m3/year	%	*1000 m3/year*	%
Banfora water supply	515	1.6	1,000	2.0
Sugar factory	30,000	95.2	40,000	78.4
Irrigation	1,000	3.2	10,000	19.6
Total	31,515	100.0	51,000	100.0

Water demands of the Banfora area, presently taken from the reservoir 20 km from town

Water for rural and village households and for livestock and small irrigation schemes is supplied locally, partly from aquifers

APPENDIX C

List of CIC Participants

COPENHAGEN INFORMAL CONSULTATION (CIC)
ON
INTEGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT
November 11-14, 1991

List of Participants

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APPENDIX D

Reference List

The following important documents have been utilized in the work leading up to and under the Copenhagen Informal Consultation:

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Water Resources Assessment. World Meteorological Organisation (WMO).

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A Note on the Nordic Initiative on the Freshwater Resources Issue in Relation to the Dublin and UNCED Conferences. CIC Secretariat, October 1991.

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Jannik Boesen and Eggert Hansen: Case Study on Local Water Management in the Ismani Rural Area, Tanzania. Case study prepared by Danida. August 1991.

Jan Lundqvist, R.K. Sivanappan and T. Ramakrishnan: Water Conservation and Integrated Resources Management. A Case Study on Interface Forestry Programme in Allikuli Watershed, Thiruvallur Division, Tamil Nadu, India. Case study prepared by SIDA. October 1991.

Paul Silfverberg and Pentti Yletyinen: Kenya-Finland Western Water Supply Program. Case study prepared by FINNIDA. September 1991

Julien Sawadogo, Abdou Hassane, Per Lindskog and Thorkil Ørum: Local Water Management in Rural Areas and Small Towns. Case Study: Banfora, Burkina Faso. Case study prepared by Danida. August 1991.

Gulbrand Wangen: Case Study on Water Management in the Save River Basin, Zimbabwe. Case study prepared by NORAD. November 1991 (This case study was not available at the CIC).

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Coping with multi-cause Environmental Challenges - taking a Water Perspective. Draft ICWE key note paper by Falkenmark and Lundqvist.

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January 1992

Designgrafik