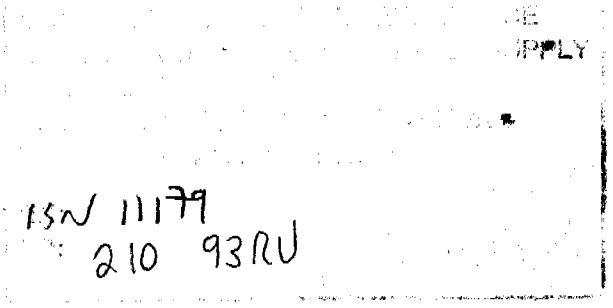
RURAL WATER FOR EXPANDING CITIES?
A case study on water re-allocation in Tamil Nadu, India.

Paper for the International Conference on
Environmentally Sound Water Resources Utilization

Bangkok 8 - 11 November 1993

Jan Lundqvist
Department of Water and Environmental Studies
Linköping University
S-581 83 Linköping

fax: +46 13 13 36 30



ISN 11179
210 93RV

RURAL WATER FOR EXPANDING CITIES?
A case study on water re-allocation in Tamil Nadu, India.

Jan Lundqvist

Department of Water and Environmental Studies
University of Linköping , 581 83 Linköping, Sweden

ABSTRACT

For several decades, rural development has been a key feature in development efforts in Third World countries. As part of a vision that rural development could be a leverage for national development, considerable interest and investments have been channelled to rural areas. Water supply schemes, for irrigation and other purposes, have been an important component of this strategy. Today, the hey-days for rural development programmes are no more. Scarcity of funding, rapidly growing urban populations and a lack of visionary models for rural development have contributed to a more complex picture.

The expansion of cities means, among other things, that local sources for water are insufficient and/or are being heavily polluted. Supply must therefore be arranged by re-allocating water that used to be exclusively alloted to rural areas. In theory, this is not seen as much of a problem because (i) the amounts needed in urban areas are comparatively small, and (ii) the allegation of a low water use efficiency in the agricultural areas, implies that there is scope for reducing supply to that sector without loss of production or income. Needless to say, the view of people in rural areas is likely to differ from this point of view.

The article gives details of a water diversion project in Tamil Nadu, India. Through the project, the supply in urban centres will improve while comparatively less water will be available for irrigation and other uses in down-stream areas. It is argued that a just, sound and efficient utilization of common water resources, requires a catchment approach and that the (re-)allocation of water between and among competing demands and needs must be based on the principle of "water as an economic good". In addition, a proper water management is unconceivable, unless the users have a fair opportunity to influence decisions about water management and be responsible for them.

BACKGROUND AND SCOPE OF ARTICLE

In Tamil Nadu, India, water is to be diverted from Bhavani river to improve supply in Coimbatore city (population of 1.1 million), 20 towns and some 520 villages through the Pillur Diversion project. Apart from this project, there are several other, although smaller, abstractions along the Bhavani river. The project means a transbasin transfer of water which will reduce the amount of

water available for downstream uses which is mainly irrigation, but there are other categories of users as well. Apart from presenting some details of the project as such, it is of prime interest to see this project as illustrating a challenge that is of world-wide relevance. In India as well as in many other parts of the world, the urban centres are growing rapidly. This expansion has some important consequences. With regard to water, it means that:

- sources in the vicinity of the agglomerations are inadequate for the growing needs and demands in these centres,

- increased supply of water is given a high priority while proper treatment of sewage and waste water is generally neglected,

- pollution is serious, and in the absence of abatement policies and measures, the use of local water sources is often inhibited.

Changes in the physical situation are parallel with important shifts in the sociopolitical structure. The increasing share of urban population will change the overall power structure between rural and urban sectors. Although the urban share of the total population is still comparatively small, urban interests are increasingly getting an "upper hand" with regard to resource allocation and development priorities. Rural development which for long has been widely acclaimed and supported, may loose some of its pivotal position. A number of coinciding circumstances suggest that urban areas are becoming more focused upon in development policies in years to come. This, in turn, may speed up rural exodus. It may also jeopardize improvements in urban areas and impinge upon the role of urban centres as nodes for national development. It is therefore crucial that policies for the development and allocation of water and other resources, are based on a regional perspective where the various needs and demands within catchments are duly considered.

URBAN EXPANSION - A SCENARIO

When India received its Independence in 1947, it had a total population of about 350 million and the share of the urban population was about 15%. Today, the population is half a billion larger or slightly more than 850 million. The share living in urban centres has increased to some 25% or about 220 million. The pace of urban growth has shown a certain decline, but there is nothing to suggest that it will slow down significantly in the near future. Data from the last two population censuses show that the decennial urban growth rate between 1971-81 was 46.1 %whereas it was 36.2 % between 1981-91 (Appasamy 1993). In absolute numbers there is no decrease of the urban population.

It is to be noted that the large cities are growing most rapidly, while the towns with a population of 10,000 or less have decreased in numbers. The number of socalled metro-cities, that is, with a population of 1 million or more, has in fact doubled from 12 to 23 in the ten year inter-census period.

Let us for a minute widen our horizon and have a look at urban expansion in a worldwide perspective. According to UN statistical projections, the total world population will increase from about 4.0 billion in 1975, 6.1 billion in 2000 to 8.2 billion in 2025 (Table 1). Most of this growth will take place in Africa, Asia and

Latin America. Out of the projected total increase of about 3.6 billion in Third World countries between 1975 - 2025, about 2.8 billion are supposed to end up in urban areas and cities while the rest are supposed to be found in rural areas - and we might assume - as potential migrants to urban centres. For the period between 2000 - 2025, the corresponding figures are even more striking. Almost the entire growth may accrue in terms of urban population (see table 1).

It must be emphasized that these projections are based on assumptions which are uncertain, especially in that time horizon. However, they could be seen as a scenario and it is important to discuss the implications of such a scenario. In order to get an idea of the possible demographic changes, we may compare them with some known statistics. The expected increase in urban population in Third World countries during the coming generation could be in the same order of magnitude as the current total population of the world's two most populous countries, that is, India and China together.

Table 1. Scenario of demographic trends by Third World regions and world total.

YEAR / REGION	1975		2000		2025	
	total	urban	total	urban	total	urban
Africa [1]	413	102	872	340	1617	895
China	927	187	1256	315	1475	645
Asia [2]	1230	283	1996	720	2657	1440
Latin America [3]	321	198	546	420	780	655
ALL REGIONS	2891	770	4670	1795	6529	3635
WORLD	4076	1564	6122	2844	8206	4932

INCREASE OF POPULATION IN THIRD WORLD REGIONS

	total	urban
1975-2025	3638	2865
2000-2025	1859	1840

1) North Africa, West Africa, Middle Africa, East Africa and South Africa.

2) South Asia, Southeast Asia and other East Asia.

3) Tropical South America, Temperate South America, Central America and Caribean

Source: Table compiled from Lowry (1991, p.152). Figures based on entries in UN publications; Centre for Human Settlements Global Report on Human Settlement (1987) and Dept of Social aand Economic Affairs The Prospects of World Urbanization, Revised as of 1984-85. Populations Studies No. 101 (1987).

Changing Urban-Rural Balance

As implied by the figures in table 1, the growth in urban population is likely to be substantial for several years and slow down only at a later stage. Since a majority of the population still are living in rural areas, a small out-migration from these areas means a substantial in-migration to urban centres and a sizeable fraction of overall growth. A decline of the birth rates in urban areas, which is expected as a result of high costs of living and changed attitudes towards large families etc, may also be delayed due to the influx of people from rural areas who are supposed to retain a comparatively high birth rate for some time (Lowry 1991).

There are, of course, forces which tend to reduce growth. Urban areas are in most areas on the brink of being able to absorb people at the current rapid rate. The relative slow-down in growth rate in India can, for instance, be attributed to this circumstance. The hardship of urban living is tremendous for the poor and, what is more, the wage rate in urban informal sector is probably as low as the corresponding rural wages for agricultural workers (Appasamy 1993). The concentration of the growth to the largest centres is noticeable in this context. Livlihood in these centres is most streneous but at the same time they offer a range of opportunities and are perceived accordingly.

The drift of people to urban areas is, at least partly, a reflexion of the changing attitudes towards rural and urban areas respectively. During the preceding decades, notably the 60's and 70's, the future in rural areas looked different as compared to the situation today. The "green revolution" and a set of visionary rural development models contributed to create a favourable image and to improve livelihoods in rural areas.

Today, the context is different. There are hardly any offensive, visionary models for rural development. Comments are rather weary about the "romanticism" of rural development. The high per unit cost of rural development projects and long gestation periods before tangible results are to be expected, let alone experienced, are impairing for attracting investments in times when the financial situation is tight. In policy papers, The World Bank, among others, has recently argued for channeling more investment resources to urban areas. The advantages of such investments are supposed to be not confined to benefits in the urban areas alone, but to stimulate overall national development, that is, also in the rural areas (IBRD 1991).

It is not only the pay-offs in economic terms which matter in decisions about where to invest, but also returns in the form of political control and support. The political voice of urban people is to be reckonned with since they are close to important decision makers, media, foreign representatives etc. Poverty and destitution in cities is probably by most observers looked upon as more threatening than rural dito and something which needs urgent attention, if prevailing order is to be maintained.

It is a daunting scenario. The challenge is twofold. It is necessary to deal with the problems in the growing urban areas and at the same time to tackle the changing rural-urban balance. The increasing concern for urban areas is motivated. But it would be most serious if this growing interest for urban issues will deprive rural areas of support and resources. A regional policy is particularly relevant when urban and rural interests compete for common finite resources,

like water, and where the allocation to one group or area will exclude or reduce the availability to others.

THE PILLUR DIVERSION PROJECT

Elements of the above scenario are noticeable in various parts of the world. In Tamil Nadu, India, the rapid growth of urban areas has led to severe scarcity and pollution of water, for households as well as for other user categories, notably industries and public utilities. In Government of Tamil Nadu's recent five year Plans, considerable resources have been allocated for projects that aim to improve water and sanitation in the capital of Madras, three other major cities (Coimbatore, Salem and Madurai), 75 small towns and a large number of villages within the project areas. The projects are financially supported by the World Bank and are scheduled to be completed by the mid 1990's. One of the projects is the Pillur diversion. It will serve Coimbatore (1.1 million), 20 towns and 523 villages. About 90% of the supply is intented for household needs and the rest is for industrial and commercial demand (see Figure 1).

The climate in this part of Tamil Nadu is semi-arid with a precipitation of about 650 mm/y and a potential evapotranspiration of between 1500 - 2400 mm/y. Water supply for irrigation and other sectors has, to a large extent, been catered for through extraction of ground water (Sivanappan et al. 1987). A large number of open wells dot the landscape and recently the drilling of borewells has become common. Altogether, it is estimated that some 90,000 wells/borewells have been sunk in the Coimbatore district and more than 100,000 in the neighbouring Periyar district, both of which are located mainly within the Bhavani river basin (Personal communication; Sivanappan 1993). The heavy withdrawal of groundwater has resulted in a gradual lowering of the ground water table - with considerable interannual variations - during the last three to four decades.

Repeated Efforts to Meet Escalating Demands

A lot of efforts have therefore been devoted to develop and use surface water sources, especially for urban supplies. For Coimbatore city, a scheme was started in 1927 to bring alltogether 11 mld (million liters per day) of water from the Western Ghats to the city, satelite towns and socalled wayside panchyats. Around 1931, when the Siruvani project was ready, the population of Coimbatore was about 95,000. In the 70's, the supply was inreased to about 34 mld through a technical improvement. Only a decade later, in 1982, the supply had to be increased again. Through an interstate agreement between Tamilnadu and Kerala State it became possible to augment the supply to 101 mld to cater for the needs of about 1.2 million people. In 1991, the population of Coimbatore city alone was 850,000. It then received 85 mld from Siruvani, that is, 100 lpd (liter per capita per day) which would be satisfactory under normal conditions.

But conditions are not "normal" for large parts of the year and certainly not for all members of the community. Vulnerable sections of the community do experience shortages. They rely on public taps and due to time and energy constraints, their per capita consumption is quite low. During the summer period, supply drops by more than half in the absence of rains and the position becomes critical for parts of the community. To make up for shortages from the

Siruvani dam, the city corporation operates some 250 wells and a fleet of 15 water tankers to provide water to areas with inadequate supply. But this is not enough. Reliance on alternative and supplementary systems increases, and purchase of water from private vendors at high cost becomes necessary. For periods of the year, a number of households have to pay about 10 times for their water supply as compared to the tariff charged by the municipality.

All sectors rely on diversions

Efforts devoted to improving water supply so far are thus not sufficient to meet contemporary and particularly not projected needs and demands. Hardship to aquire sufficient amounts of water is most noticeable in terms of household water. But a thriving industrial and commercial sector and a number of public utilities (schools, hopitals etc.) do face problems to secure water to meet their requirements. The very majority of these units supply themselves with water from individual wells which have to be continously deepened. It is not known to what extent the establishment of new industries or expansion of existing ones, is hampered by shortage of water.

In some places, water provision from external sources has become of prime importance. This is, for example, the case for the booming Tiruppur town of about half a million inhabitants, located some thirty kilometers downstream of Coimbatore. A large number of manufacturing units engaged in hosiery production, are dependant upon water supply from a large number of wells in the surrounding farming areas. The problem is compounded by the fact that only a minority of the about 600 industrial units have treatment plants for their waste water (Kilhage & Magnusson 1992). Due to discharge of untreated effluents from the industrial activities and also due to loads from the households and animal population, the quality of water within the city area, has deteriorated to the extent that it has become unsuitable for human as well as industrial utilization (ibid; Jacks & Sharma, 1982). Efforts to treat water are under way, but an important part of the solution, is to bring water from the Bhavani river.

There are thus a number of new, comparatively large diversions of water from Bhavani. The biggest one, the Pillur project, will add another 125 mld to Coimbatore, 20 towns and 523 villages (Figure 1). About 90 % of this water is intended for the households while the rest is for the industrial and other sectors.This diversion as well as the other ones, mean that downstream areas will be deprived of some of the water that used to be available to them. The implication of the current and future diversions is quite different from the previous major projects, which brought water from neighbouring Kerala State, and which obviously had none or very marginal influence on water availability for other users in that State. Another significant difference are the escalating costs associated with new schemes. Both of these circumstances will make it imperative to review policies of allocation and how to recover costs for supply, operation and maintenance.

THREE ARGUMENTS FOR THE DIVERSION OF WATER

As a rationale for the diversion, three principle arguments can be identified. One is that drinking water supply has first priority over other needs and demands in the State. There is no objection to this. Another argument is that the

amounts to be diverted are so small, about 3% of the projected downstream supply, that availability to current beneficiaries will remain virtually the same. As will be shown below, this argument is far too simple. A third argument is more complicated to deal with. It says that even if availability to downstream users to some extent will be reduced , they could very well make up for the losses since the current water use efficiency (WUE) in the agricultural sector is quite low. It is frequently reported that the WUE is about 50% or less (see for instance, Sivanappan 1991). By improving WUE by a few percent in downstream irrigation schemes, the farmers would be able to maintain the same level of production, income, etc. also after the diversion of some of the currently available water resources to towns and villages.

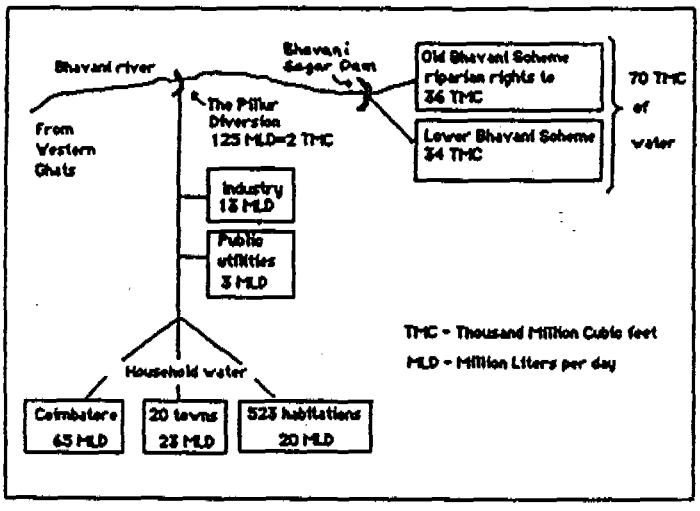


Figure 1. Schematical presentation of Pillur diversion project

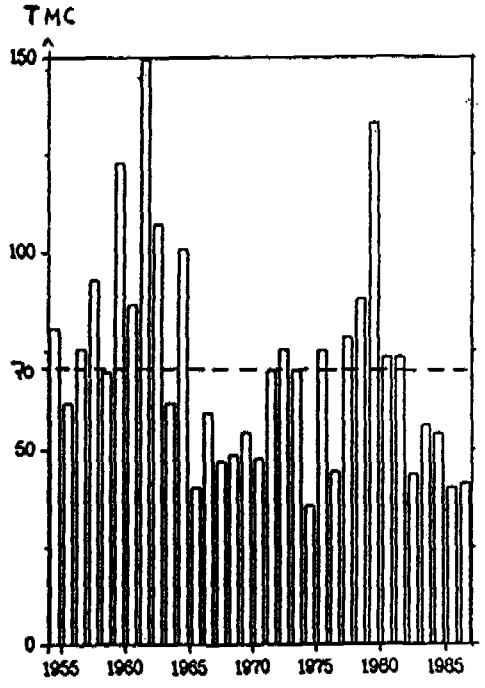


Figure 2. Variation in water availability in Bhavani Sagar Dam

The amounts of water to be diverted correspond to about 2 TMC (thousand million cubic feet) per year. Under normal conditions, this is a tiny fraction, making up a couple of percent of the overall flow of the Bhavani river. The amount can be compared to the projected need of the two downstream irrigation schemes, the Old Bhavani Scheme and the Lower Bhavani Scheme. Together, these two schemes are supposed to get 70 TMC of water per year. Given these figures, the Pillur diversion means a reduction of slightly less than 3%.

Complicating circumstances

There are at least three complicating circumstances which have to be considered in connection with the diversion. First of all, the amount of water resource available varies from year to year. As seen from Figure 2, the amount available during the period between 1965 - 85 was below 70 TMC during 11 years, while it was sufficient or above 70 TMC during 9 years.

Another important circumstance is that the farmers in the Old Bhavani Scheme have riparian rights to 36 TMC of water, that is, they will get water on a priority basis. In years when there is sufficient amount of water available, this is OK, but in times of scarcity, like during the 11 years mentioned above, the situation for people in Lower Bhavani becomes problematic. They have either to raise dry crops, use well water or to leave their land fallow under extreme conditions. The extraction of groundwater is, however, approaching the potential. During years when overall supply is below 70 TMC, the abstraction through the Pillur diversion will be significantly more than 3%. When it is 50 TMC, for instance, a withdrawal of 2 TMC will mean about 14% reduction for the people in Lower Bhavani.

A third significant circumstance is that the withdrawal of 2 TMC will only cater for expanding needs and demands for a couple of years or upto 1996. A doubling of the supply, that is, 4 TMC, is planned. In the example given above, the reduction of water for people in the Lower Bhavani project will then be in the order of 1/4, as compared to the pre-Pillur project situation. It is also to be noted that apart from the Pillur diversion, a large number of other diversions - varying in size from individual farmer schemes to those intented for other towns - have been constructed, are under construction or are likely to be constructed along the stretch from the Pillur Diversion to the Dam supplying the two irrigation schemes.

POLICY IMPLICATIONS

Escalating costs to develop and distribute water and increasing competition between various sectors and geographical areas are two significant circumstances which will have implications for water policy in Tamil Nadu as well as in other parts of India. The growing competition between urban and rural interests is particularly noticeable. Hydrological and geographical characteristics of the area put a limit as to how much water that can reasonably be made accessible. Concern about allocation and re-allocation and efficient use of water, will therefore be more important than conventional concerns about expanding supply. In addition to social and economic considerations, the focus has to be broadened to include aspects of diposal and treatment of waste water.

Obviously, there is a need for a comprehensive water management policy with clear criteria for how to allocate scarce water resources between the various competing demands on a basinwide scale.

One of the issues that needs careful attention is how to value water and, related to that, how to decide prices, subsidies and whom to charge. Currently the price of water varies significantly between various sectors and also within single sectors as commented upon above. In view of the escalating costs, prices and subsidies have to be re-considered. Today, the Government only recovers a small part of the operation and maintenance costs in the irrigation sector. For proper allocation criteria and in order to discourage wasteful and improductive use, it is necessary to promote the concept of water as an economic good with a value reflecting its most potential use (ICWE 1992; Lundqvist 1993). Awareness of water as a finite, vulnerable resource for which there is mounting need and demand from various groups, needs to be promoted.

A related issue is the significance of proper institutional arrangements to handle the growing competition for water between various interests and groups

of people. Far too often, institutions have a hierarchical structure with a flow of information, decisions, etc. from "top to bottom" and where the logical response from the users is lack of compliance with instructions and protest. The water sector is no exception in this regard. Lack of clear rules and arbitrary use of sanctions against those violating existing regulations, contribute to poor water management. Allegations of wasteful use of water in the irrigation sector and heavy pollution from the industrial and other sectors, illustrate shortcomings in this regard. The lack of coordination between various sectors and the changing urban-rural balance described in this article, is also a contributing factor. Obviously, there is a need for a new water resources policy.

REFERENCES

Appasamy, P. (1993) "The Linkage Between Urbanization and Environment in India", Madras Institute of Development Studies, Bulletin, April.

IBRD (1991) Urban Policy and Economic Development. An agenda for the 1990's. A World Bank Policy Paper.

International Conference on Water and the Environment, ICWE, (1992) The Dublin Statement. 26 - 31 January 1992, Dublin.

Jacks, G. and Sharma, V.P. (1982) "Hydrology and salt budget in two tributaries to Cauvery river, India". French-Swedish seminar on Hydrology of Arid Zones, Lund, Sweden. Assoc. Franco-Suedoise pour la Recherche, Report no. 41:155-165.

Kilhage, M. and Magnusson, C. (1992) Salinity Problems in Noyil River Basin. Examination Project Work 1992:M15. Högskolan Kalmar, Sweden.

Lowry, I. S. (1991) "World Urbanization in Perspective" in: Resources, Environment and Population. Present Knowledge and Future Option, by K. Davies and M.S. Bernstam (eds.), Population and Development Review (supplement) Vol 16, 1990.

Lundqvist, J. (1993) The Nordic Freshwater Initiative. AMBIO, 22 no. 1

Sivanappan, R.K., et al. (1987) A Study on Over-Exploitation and Under-Exploitation of Ground Water in Tamil Nadu. WTC/PUB. No.54/87. Water Technology Centre, TNAU.

Sivanappan, R.K. (1991) Land and Water Resources and Rural Development in India: Situation and Prospects. Tema V Report 16, Linköping University, Sweden.