

CASE STUDIES OF WATER RESOURCE PLANNING IN DEVELOPING COUNTRIES: LESSONS LEARNED

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1. Background

At the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, a strategy for improving natural resource development and management was developed. Known as Agenda 21, Chapter 18 presented a pioneering plan of action needed for moving toward development that is economically, socially and environmentally sustainable. It highlighted the importance of an integrated approach to water resource management based on the perception of water as an integral part of the eco-system, a natural resource, and a social and economic good, whose quantity and quality determine the nature of its utilisation.

One of the principle objectives to be pursued was that of promoting a dynamic, interactive, iterative and multi-sectoral approach to water resource development and management that integrates technological, socio-economic, environmental and human health considerations within an integrated institutional framework. Whilst the benefits of an integrated approach are internationally accepted, the implementation of such an approach presents many challenges.

It is important to draw lessons from current planning practices and experiences to serve as a guide to others as to potential ways forward. A number of case studies were therefore undertaken to review current planning practices, to highlight their strengths and weaknesses, and to identify potential keys to success. A broad spectrum of country contexts were investigated. Four developing countries/regions were selected for study: Zimbabwe; China (Henan Province); Ethiopia; and, India (Tamil Nadu). Each is largely characterised by a semi-arid climate but their aspirations in terms of economic and social development, the relationship between water availability and demand, and present levels of water development vary considerably. A fifth case study was undertaken in the Murray-Darling Basin, Australia. The Murray-Darling basin has had a well established river basin focus for planning and management of inter-state water resources for over a decade. Internationally recognised as achieving significant success, the Murray-Darling Basin provided valuable knowledge on workable frameworks for comparison with the four developing country contexts.

This paper draws conclusions from the case study investigations and presents examples of some of the underlying factors behind successful approaches. The illustrative examples demonstrate the changing perceptions of water sector professionals/practitioners and the growing commitment toward sustainable resource development and management.

3. Selected country initiatives

Integrated policy development: Water is a key component of all sector activities and policy development in one sector will have direct or indirect implications on water availability, demand and use. Development of water policy must therefore be integrated and reconciled with sectoral policies to provide a coherent policy framework. Social and environmental objectives must be incorporated into allocation mechanisms through water policy guidance and supported by the development of a strategy for water resource development and

management. Allocation through sector driven policies, coupled with subsidies for low value water use inevitably leads to inefficient water allocation and use.

Water Resource Control and Review Council (WRCRC) - Tamil Nadu

In 1993, in recognition of the fact that traditionally water resource developments were taking place across the state in a piecemeal manner on a scheme by scheme basis, the government of Tamil Nadu established a high level coordinating body called the Water Resources Control and Review Council (WRCRC). This council is chaired by the Chief Minister and includes ministers representing all government departments concerned with the development and use of water resources. The WRCRC was essentially created to handle multi-sectoral water planning and allocation and acts as the state's principle water policy implementation body. The WRCRC receives support and advice from a technical secretariat on issues such as water policy, strategy, legislation, regulation and allocation within the State.

Water sector co-ordination: Traditionally, high level committees are often formed to tackle particular problems and then disbanded. The emphasis has now shifted toward the need for a permanent high-level apex body to facilitate multi-sectoral integration at the macro-level. The apex body needs to provide strong co-ordination and clear control over water allocation and use whilst retaining a neutral viewpoint which is not biased toward single sectoral interests. Apex bodies are more effective if they are supported by a technical secretariat with an inter-disciplinary resource base who are able to advise and work closely with the apex body and other agencies, including economic planning bodies, to help maintain momentum and support the decision-making process.

Recent institutional reforms in Tamil Nadu

There have been a number of key institutional reforms in Tamil Nadu, many under the auspices of the World Bank funded Water Resources Consolidation Project (WRCP). The principal changes being:

- issuing of the Tamil Nadu State Water Policy
- the creation of the specialist Water Resources Organisation (WRO).
- the creation of a Water Resources Control and Review Council (WRCRC) to oversee multi-sectoral water planning and allocation;
- the reorganisation of the Chief Engineers of the WRO on a river basin basis;
- the institution of river basin allocation and planning committees headed by basin Chief Engineers;
- the strengthening of WRO's environmental management capabilities;

In addition, a major component of the WRCP has also been directed at planning and institutional strengthening in the water sector. The changes and rationalisation of the water sector in Tamil Nadu are consistent with the new international agenda and its focus on integrated water resource management. In particular, the water sector has been given a higher profile via this disaggregation of water sector functions, under the newly formed WRO, from the Public Works Department.

Clearly defined roles and responsibilities: Coordination mechanisms between government departments and sector-based agencies must be retained at all levels from national to regional and local levels. In addition, clearly defined roles and responsibilities including definition of lead and cooperative agencies will prevent over-lapping responsibilities and duplication of effort. Roles and responsibilities need to be specified in water-related policy or legislation.

Roles and responsibilities – China

Coordination between sectors and government at all levels remains central to the planning process in China. Following the issuing of the Water Law (1988), the responsibilities and mandates of ministerial and government departments, including definition of lead and cooperative agencies, became clearly defined. This aims to prevent over-lapping responsibilities and duplication of effort.

The primary function of the Ministry of Water Resources is to organise and enforce implementation of the Water Law, Soil Conservation Law, and other water-related laws and regulations on behalf of the State Council. The ministry has a wide range of responsibilities ranging from policy formation, strategic planning, economic regulation measures, implementation of the water permit system, as well as arbitrating in water-related disputes and conflicts.

River Basin Conservancy Commissions are responsible for planning and management along the main river courses but Provincial Water Resource Bureaus take responsibility for development along the tributaries. Coordination between the Conservancy Commissions and Provincial Water Resource Bureaus is therefore critical.

Planning for water pollution prevention and wastewater discharge sites is undertaken in close collaboration between the Environmental Protection Bureau and the Provincial Water Resource Bureaus and, if necessary, the River Basin Conservancy Commission.

Although there are clearly defined roles and responsibilities, a critical factor remains one of coordination of the large number of authorities involved at the national, river basin, provincial and local levels. In addition, lack of financial support can also hamper the effective implementation of key responsibilities within the various authorities.

Building on existing structures: Radical institutional change is not necessarily the most appropriate approach. Flexibility and adaptation of existing institutions through a process of gradual change may be as beneficial, whilst also retaining greater stability and continuity. Unnecessary institutional change can be avoided if the mandates of key organisations are redirected. In association with this, clarification of roles and responsibilities through the

auspices of water administration policy and/or legislation will prevent over-lap and potential conflicts.

Changing roles and responsibilities in Tamil Nadu

One of the changes introduced by the TN-WRCP has been the reorganisation of operation decisions onto a basin, rather than district basis. Tamil Nadu therefore finds itself with at least three families of institutional structures. District collectors from the colonial period, sectoral departments of the 1960's, and the new river basin institutions headed by Basin Managers.

Water allocation decisions at a basin level will be made by committees comprising of the basin managers, local representatives of other sectors such as agriculture, industry, domestic water supply, and the collectors of the relevant districts. Basin managers will head these committees, but the changing roles and responsibilities may lead to conflict or resistance from the district collectors. Despite the potential for conflict, the reorganisation has generally met with wide approval.

Avoiding superimposed administrative structures: Introducing institutional change is not straightforward. Institutional inertia and rigidity can lead to resistance, multi-layers of authority and increased bureaucracy. Introducing a river basin approach is a typical situation in which these difficulties need to be overcome.

Shifting from master plans to management strategies: A national water resource management strategy provides a means of translating policy into action. It provides a set of action programmes to support the achievement of development goals and to implement water-related policies. Implementation of the strategy therefore bridges the gap between policy frameworks and subsequent planning, investigation and implementation of programmes and projects. This differs from traditional master planning approaches which usually result in a set of investments to be made or site-specific projects to be implemented without a broader recognition and of associated issues such as institutional strengthening, human resource development and capacity building.

Water Resource Management Strategy – Zimbabwe

The climate of change in Zimbabwe is very positive. This is largely a consequence of the relative youth of the nation though the capacity and willingness to enact constructive change in the water sector. As a consequence, a number of major, on-going initiatives are taking place including: a review of the Water Act; the development of a Water Resources Management Strategy; and, the creation of a National Water Authority, as well as regional initiatives with other SADC countries.

In 1993, the government initiated a study to provide guidelines on the development of a water resource management strategy. Key activities to develop and implement the water resource management strategy were: to assess key issues and explore policy options; to devise and implement national guidelines; to provide a resource assessment methodology; and, to develop a framework for water resources allocation and management. These activities would be supported through specific studies, institutional strengthening and legislation. The development of the water resource management strategy will consider: available water resources; water allocation and use; water demand and forecasting; pricing strategy; demand management;

institutional reform; legislation and regulation; and capacity building.

Legislation and regulation: An effective and workable legal and regulatory framework is essential. It is important that legislation is seen to be fair and equitable. Implementation of water-related legislation requires commitment from central authorities in terms of appropriate levels of manpower, institutional strengthening and technical facilities. The legislative framework also needs to be integrated and consolidated with other aspects of natural resource management to avoid conflict and confusion. Flexibility of legislation to meet local conditions and characteristics are more likely to be embraced by local communities and to meet the objectives of long-term sustainability.

Water Law (1988) - China

In 1988 the Water Law of the People's Republic of China came into force. The Water Law (1988) sets out the basic principles for the future administration of the water sector. The Water Law covers the development and utilisation of water resources, protection of water resources, water environment and water-related projects, management of water uses, flood control and preparedness, and management of water projects.

The Water Law (1988) aimed to address many of the conflicts and shortfalls of the inadequate and fragmented system which had arisen during the 1970's and early 1980's. The Water Law and its body of associated legislation and regulation stipulates that a unified system of administration is adopted

The basin as a planning unit: The river basin has many advantages for planning water resource development and management, particularly with respect to data collection, monitoring, resource availability and use. However, river basin boundaries do not, in general, correspond with political or administrative units, aquifers or socio-cultural aspects of the population. River basin planning must therefore resolve and unify planning processes at different levels and planning spheres. Balancing a basin-wide approach with administrative and sectoral planning and management requires the adoption of appropriate organisational structures with a clear mandate for lead and co-ordinating agencies.

The Murray-Darling Basin Commission – Australia

The Murray-Darling Basin Commission is an inter-governmental organisation whose main role is to coordinate the management of natural resources across state borders within the Murray-Darling Basin. The main aim of the Commission is to achieve sustainable use of water, land and other environmental resources of the Basin, advises the Murray-Darling Basin Ministerial Council on environmental management issues throughout the Murray-Darling Basin, and also administers a Natural Resources Management Strategy in the basin.

The commission office employs about 40 technical and support staff in the areas of river management, natural resources, finance, administration, and communications. The office undertakes close consultation with both State and Commonwealth agencies and is also

responsible for the financial management of all activities shared between the four Governments under the Murray-Darling Basin Agreement. All member Governments refer to the Commission for comment on any development proposal or change in water management policy that could have adverse effects on the water quality or quantity in the River Murray. Under the Commission, there are more than 20 working groups with experts drawn from government departments, universities, private organisations and community organisations.

Improving environmental planning: Environmentally-sound development is a key principle behind sustainable water resource utilisation. Environmental concerns and action plans need to be firmly integrated in to planning and management processes to ensure adverse impacts are minimised and mitigation plans established. In many cases, effective integration relies on strengthening environmental planning and management capabilities.

Environmental Units - Tamil Nadu, India

An environmental action plan (EAP) has been drawn up with the aim of fully integrating environmental management in planning, investment and management of the State's water resources. A key element of the EAPn was to strengthen WRO's environmental monitoring and analysis capabilities via the creation of specialist Environmental Units/Cells. Two such units have been established in the main planning departments (basin- and project-level) with responsibility to:

- prepare environmental plans for all river basins in Tamil Nadu;
- provide policy advice to WRO on environmental matters and establish state-wide planning standards;
- perform environmental review of projects to comply with Environmental Protection Acts and Regulations;
- provide expert advice on environmental matters to WRO management units;
- plan for environmental mitigation and enhancement;
- provide environmental clearance from Government of Tamil Nadu
- undertake periodic (environmental) reviews during operation and maintenance.

Involving stakeholders: Stakeholder interests lay at all levels from individuals to central government. A key to success lays in dovetailing top-down and bottom-up approaches at the catchment and sub-catchment scale. A two pronged approach based on *demand-side* initiatives at the community level and *supply-side* initiatives from government are required to build strong communication and participation. Success relies on the strength of community commitment and the willingness of government to embrace participatory processes.

Community action in Tigray Region - Ethiopia

Regional government policy emphasis is on rural development and food self-sufficiency. The strategy to achieve this is through self-help, bottom-up identified projects which concentrate on soil and water conservation of arable rather than non-arable land (ie not concentrating on steeper land). Small scale irrigation (100 to 200 ha), micro-dams and a range of physical and biological conservation measures are included in the programme. Lowest rainfall areas are given priority under the SAERT Commission (Sustainable Agriculture and Environmental Rehabilitation of Tigray).

Although the details of projects are determined locally, the type of project and organisation for implementation are largely determined by the Regional Council. Indeed, villagers are obliged to contribute 20 days of labour towards community projects at a slack time of the year. Bye-laws define beneficiaries of community built dams and responsibilities for operation and maintenance.

It is too early to assess the overall impact of the Tigray rural development policy on water resources cannot yet be assessed. Some concerns which need to be addressed include permits for water utilization, the effect on downstream users and the combined impact of numerous small projects on the overall river basin. Basin plans which are being developed need to take into account such community based initiatives.

Supporting education, training and research: Education and training is vital to support changing roles and responsibilities. It is important to recognise the need for training at all levels - from central government to individuals - in order to carry the pace of change forward through co-operation and mutual understanding. Although often marginalised, research also has a key role to play in meeting the new challenges. Greater use of pilot projects and application of research findings can help to create awareness and build confidence in new approaches.

Water Resource Research Fund – Tamil Nadu, India

Under the Tamil Nadu WRCP, a Water Resource Research Fund (WRRF) has been established to fulfill an essential need to modernise planning and management of its land resources. The WRRF is intended to fund high quality applied research with the following objectives:

- to promote the culture of applied research among water and irrigation professionals in the field
- to identify and support applied and problem solving research, specifically addressed to land and water production and sustainability in the water and irrigation sector, especially at the river basin level
- to promote research on social issues, such as farmer's and women's and disadvantaged groups participation in field level activities and decision-making for better management
- to promote cooperation between WRO and research institutions from Tamil Nadu, India, and overseas.

4. Conclusions and discussion

The illustrative examples outlined above focus primarily on institutional aspects of water resource development and management and the need for a strong and supportive enabling environment. The measures aim to provide a framework in which policy frameworks and sectoral plans/programmes can be integrated, co-ordination mechanisms are improved at all levels (both vertically and horizontally), and the potential for conflict minimised.

Many other aspects were also identified as essential during the case studies. In particular these included enhancing the knowledge base and improving education, communication and participation among key stakeholders. Initiatives to support knowledge-based solutions included: to establish inter-disciplinary knowledge base and water-related information systems; to facilitate information access and exchange; to improve assessment methods and decision support tools; to build inter-disciplinary teams geared toward planning and management; and to provide research support to new initiatives. Greater involvement from stakeholders required: to facilitate community involvement in planning and management; to develop community awareness; to enhance and empower community groups; to foster ownership and support; to provide upward feedback for policy formulation; to improve the skill base in the water sector.

It was evident from the case studies that a transformation has been taking place in recent years to reform national water sectors. The driving forces behind these changes not only relate to rising demand, competition for available resources and deteriorating water quality, but also to an increased awareness of the need to manage water in an environmentally-sound, sustainable manner. However, it is also necessary to raise a number of precautionary points:

institutional change does not guarantee sustainable resource development as this remains heavily dependent on commitment to change, adequacy of enforcement mechanisms, human resource capabilities and coherent policies;

the move toward a fully integrated approach to water resource development and management is likely to be a long and tortuous path requiring significant changes in attitudes, practices and procedures and needs realistic time-scales to become entrenched if the desired objectives are to be achieved;

it is important that the process of change is consolidated step-by-step in order to carry with it the support of politicians, professionals and communities alike, as change for change sake is unlikely to be beneficial;

careful consideration needs to be given to ensure that political, social, and economic settings are compatible with the direction of change as prescriptive solutions will undoubtedly meet with resistance and solutions will only be identified mutual co-operation and consultation;

expectations for change in the developing world remain high and over-estimation of immediate benefits or over-simplification of the complexities of meeting the new challenges will lead only to opposition and/or demoralisation;

change must be embraced from within the country but assistance from external support agencies will inevitably be crucial in promoting and supporting change.

5. Further reference

Full details of the case studies are given in the following publications:

Case Studies for Water Resource Planning – Lessons learned and keys to success. HR Report OD 138. 1997.

Case Studies for Water Resource Planning - Murray-Darling Basin (Australia). HR Report OD/TN 89. 1997.

Case Studies for Water Resource Planning - Tamil Nadu (India). HR Report OD/TN 88. 1997.

Case Studies for Water Resource Planning - Henan Province (China). HR Report OD/TN 79. 1996.

Case Studies for Water Resource Planning - Ethiopia. HR Report OD/TN 75. 1996.

Case Studies for Water Resource Planning - Zimbabwe. HR Report OD/TN 74. 1995.

