

Water Resources, Livelihood Security and Stakeholder Initiatives in a River Basin Context

PROJECT MANAGER

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COLLABORATORS & PARTNERS

- Dr.Sathyasundari, President Bhavani River Protection Council, a leading NGO, involved in various issues related to water conservation and environment in the basin.
- Tamil Nadu Agricultural University, Coimbatore.
- Centre for Water Resources Development and Management (CWRDM), Calicut, Kerala.
- We anticipate fruitful collaboration with IWMI colleagues.

ABSTRACT

In Tamil Nadu - like in many other parts of India and elsewhere - a critical point has been reached. Practically, all readily available surface and ground water resources, i.e. blue water, have already been tapped. Many basins are closing. Increasing water provisions to food production as well as to other sectors will now be a costly and difficult matter and may have serious consequences for poverty alleviation programs and environmental sustainability. Competing and conflicting needs and wants have to be dealt with. It is time to improve allocation and co-operation with different groups to efficiently and effectively utilize and conserve the available resources.

This multi-disciplinary project will benefit from the results of several studies, carried out over many years in the Bhavani River Basin. We have access to ample data sources, covering water quantity and quality, water use and socio-economic characteristics. There is a need for supplementary information and updating of data. Through a collaborative work in a relatively small geographical area, we will be able to forge the various disciplinary perspectives into an integrated project. The results of earlier studies

together with the new information will be framed in a basin context. Water Accounting and Multi Stakeholder Dialogues (MSDs) will be used in an effort to facilitate the policy process towards the building of awareness and effective institutions for integrated management.in a river basin context

TOTAL COST OF PROJECT: US\$ 74,462

DURATION OF PROJECT: One year

LOCATION OF THE PROJECT: Bhavani River Basin, Tamil Nadu, India

The Bhavani River is an important tributary of the Cauvery river which is one of India's largest rivers. It is a perennial river originating in the hilly parts of the basin in Western Ghats in Kerala. Rainfall is dominated by the south-west monsoon in June to August and the north-east monsoon during October to December (Government of Tamil Nadu, 1999). Both water rich and dry land areas exist in the basin and growing urban / industrial centers are increasing the demand and competition for additional water supplies.

Several smaller reservoirs exist in the hilly western region, but the Bhavanisagar Reservoir with a capacity of 33 TMC (Thousand Million Cubic feet) is, by far the largest, providing water to some 220,000 ha. Apart from agriculture, which receives 80 –90 % of its water, it is the source for industry, 10-15 %, and drinking water supply schemes, about 5 %. The general water quality is good, low in ionic strength, slightly alkaline, middle hard in nature and high in dissolved oxygen (ibid). Downstream of the Bhavanisagar reservoir, there are many small-scale industries for textile processing, dyeing and leather tanning. In general, effluents are discharged directly into nearby water bodies and the water quality is thereby highly variable depending on the flow of water, quality and duration of discharge of effluents. The effluents from the textile factories contain large amounts of sodium sulfate, in addition to other wastes, which is a concern for irrigated agriculture in the region (ibid.).

Data Sources

1. Paul Appasamy has done a water budgeting study on the Bhavani basin in 1996 that will provide base line data on rainfall, water resources and its uses for irrigation, industry and domestic purposes (Appasamy, 1998). These data will be updated to analyze changes in the water availability and utilization through the proposed water accounting study (by Mats Lannerstad).
2. Rajagopal & Lundqvist have received a grant from Swedish Research Council to identify the potential of Multi Stakeholders Dialogue (MSD) in the basin. We have identified some of the major issues which should be discussed in such MSD:
 - a. Interstate water dispute between upstream Kerala state and downstream Tamilnadu state due to the proposed plan for obstruction of water by the Kerala government. Recently, a meeting was organized by an NGO inviting farmers' representatives from both states to discuss this problem as a follow up of the workshop held in February NIRD (2003).
 - b. Old *ayacut* vs. new *ayacut*: There is a conflict between old and new *ayacutdars* (command area farmers), which has resulted in court cases and animosity.
 - c. Conflict between agricultural and industry: There are several cotton textile units which use huge quantities of water and discharge almost equal quantum of effluents into water

bodies affecting agriculture and environment. A major industrial unit, South India Viscose, has been closed by the court order.

- d. Several civil society organizations have taken interest in the water related issues like environment, drinking water, drought and inter-state water. Formation of Basins Farmers Organizations is an example for this.
- e. State Efforts: These are also efforts by the State especially related to water distribution at the field level through forming of Water Users Associations as a part of World Bank Programme of Farmers Organisations and Turnover (FOT).
- f. Private Sector: Emergence of water bottling units as a response to scarcity/quality problems.

BACKGROUND

It is increasingly emphasized that integrated water resources management (IWRM) is an effective means in efforts to improve livelihood, including poverty eradication and environmental sustainability. In this application livelihood refers to a combination of poverty alleviation and environmental sustainability. In the report of the World Summit on Sustainable Development (WSSD), which builds on the UN Millennium Development Goals, water has been identified as a priority area for human development (UN, 2002). In the Plan of Implementation accepted at WSSD, it is stated that all countries should: “Develop integrated water resources management and water efficiency plans by 2005, with support to developing countries, through actions at all levels”.

By WRM, we refer to physical structures as well as to institutional issues. The latter component has been much less understood and developed as compared to the hardware. Similarly, quantity aspects have been in focus whereas quality issues have not. Although water development programs have contributed to considerable progress to the increase of food production, income, GDP, etc., high levels of poverty remain in many countries. Intensification in water development and use has also resulted in scarcity, including groundwater overdraft, competition, pollution, etc. (Shah et al., 2003). These, in turn, constitute threats to livelihood security, social stability and sound links between society and its resource base.

Both socio-economic conditions and income levels have been shown to differ depending upon water accessibility. In many developing countries, especially India, the agrarian structure, urban development and livelihood systems show marked differences between water abundant regions and water scarce regions (Lindberg et al., 1986; Bouton, 1985, NIRD, 2003). Similarly, environmental disruptions are primarily affecting the poor. There is an increasing political and social pressure associated with the access to water from various groups as well as to safeguard the environment.

Urge for Integrated Strategies

Many water resource projects in India are designed with regard to irrigation requirements, and rarely, if ever, address competing demands from various stakeholders, including environmental concerns or poverty issues. It is still not well recognized among policy makers how access to water could be beneficial in poverty alleviation programs, to generate income through labour, time-saving, etc. In many programs, water is treated as an end in itself and technical aspects of provision have been the single focus.

This lack of understanding of relationships between water use dynamics, allocation and social issues is seen even in major water development programmes, like the Water Resources Consolidation Project (WRCP) implemented with World Bank funding and Tank Modernization Programmes (in South India) by EEC. WRCPs have recently been implemented in Rajasthan, Haryana, Orissa, Tamil Nadu, Andhra Pradesh and waiting for clearance from World Bank in other states like Karnataka. Both these programmes aim towards rehabilitation of surface irrigation systems and the handing over of their management to farmers' organization. They typically exclude the landless and other sections (like potters etc) from participation. Hence they are contradictory with local village *panchayats* (mangement council) where all villagers participate (Rajagopal & Janakarajan, 2001).

The understanding of the interaction between technical, social, economic, financial, agricultural and environmental aspects of WRM is weak. For proper planning and utilization of the water resources in a long-term perspective, there is a need to integrate the results of these kinds of studies in a "river basin" context.

In this project, we will assess the dynamics of the hydrological system and relate this to the needs and demands of water for households, agriculture, industrial use and environmental flow in various parts of the basin. We will also attempt to include water quality issues and analyze the links to poverty.

GOAL

The goal is to improve the understanding the significance of water in social and bio-physical dynamics and interactions in a river basin context. More particularly, the goal is to identify WRM strategies, which may facilitate the achievement of socio-economic and environmental objectives. Poverty alleviation is an important component in this regard.

PROJECT PURPOSE

The purpose is to develop a methodology for linking hydrological information with aspects of livelihood issues. Water accounting will be used to compare the availability and use of water and how that is matched with the demand side.

Interaction with different stakeholders of the chosen river basin is essential. The poor are an important stakeholder group and they are always vulnerable to change and face the greatest risks when competition for water and other resources increases. We will study the accessibility of poorer groups to water and how this relates to their livelihood options and choices. An important part of the project is to discover how various segments of water users and interest groups perceive their situation and to what degree they relate their livelihood strategy to variations in water availability/accessibility and in relation to other stakeholders. The results of this project will provide a strong base for a strengthening of multi-stakeholder dialogue and more effective institutional arrangements in the river basin.

The following research issues will be covered:

- A. Analysis of the dynamics of water availability including variation in quality parameters. This will include a scrutiny of the trends in the water flow in various parts of the basin (as a result of land-use changes, abstractions and climatic variability)
- B. Analysis of the significance of water accessibility to the variations in socio-economic position in various settings in the basin.

- C. Assessment of the perception of poor groups of their livelihood constraints and options as related to water accessibility.
- D. Apply and refine the methodology for water accounting to synthesize A-C.
- E. Design a method and protocol to facilitate and document multi-stakeholder meetings.

OUTPUTS

The results from this research will form an important component of the research that will lead to PhD theses (Mats Lannerstad and Jenny Gronvall). Generally, it is necessary to make inventories of previous studies and existing data sources. To facilitate the Multi Stakeholder dialogues, it is essential to compile and present information and results of the analyses in an “easy-to-understand-form” e.g. charts, time series, etc. For the same reason, essential parts of the study must be translated into the local language. Documentation of MSD is supposed to illuminate social and formal challenges in the modification/creation of institutions.

Research reports on aspects of River Basin Management will be presented and discussed at relevant seminars/meetings preferably in collaboration with IWMI and then converted into publication(s), e.g. CA Report Series. The study will also result in new networks among people, researchers, government, civil society organizations and other stakeholders in the basin.

ACTIVITIES & METHODOLOGY

Three aspects will form the “building blocks” of the project. They will then be synthesized and used in a Water Accounting exercise for the basin and in a Multi-stakeholder dialogue. The three aspects are:

a. The dynamics of water availability

The natural environment sets the framework for the amount of water that an area gets each year through climatic variations. Physical circumstances such as geology, topography and soil types also dictate the potential for groundwater storage. Despite high rainfall, if surface runoff is high, groundwater recharge will be low and dry season water shortages will ensue. The amount of water flowing in different segments of the river is also affected by land-use changes and diversions.

A simple hydrological model will be set up for the study basin to see the natural variation in flow (Principal researchers: Jan Lundqvist and Mats Lannerstad). This will show the “supply side” of the water resources for the chosen study basin. The hydrological data obtained in this building block will be the first step data input in the Water Accounting Model used in the over all synthesis (see below).

Methodology: The description of the key features of the present state and potential of water resources (both surface and groundwater) and utilization (household water, sanitation, agriculture, industry, etc.) will be performed using quantitative and qualitative measures. Findings from former and ongoing studies will be put in a river basin perspective. A simple rainfall-runoff model (the HBV) will be set up for the chosen sub-catchments in the Bhavani basin to describe spatial and temporal variations in *blue water flows* in different time scales (for which hydrological data area available). We will also make an assessment of the consumptive use of water in different sectors, to get an indication of *green water flows*. Hydrological models will be calibrated and validated against observed stream flow data to relate climate to stream flow in the periods for which data is available.

b. Environment and water quality

Water accessibility is not only related to the quantitative availability of water but also by its suitability for different uses. Pollution from land and other sources is a growing problem in India and makes previously fertile land unsuitable for agriculture and creates health risks (Government of Tamil Nadu, 1999). The source areas of different types of pollution, their pattern of diffusion are an important component of water (use) budget and how they affect livelihood options (Principal researcher: Paul Appasamy).

Methodology: Agriculture in the basin has been affected due to the discharge of industrial effluents. First, an inventory of pollution sources – industrial units, towns discharging sewage, etc. will be prepared using secondary sources of data. Based on the stakeholder discussions, land and water bodies that have been affected by pollution will be identified. Surveys of farmers in the affected villages will be taken up a sample basis. The impact on productivity and income, and hence on livelihoods will be estimated for the sample farmers. Information on landless laborers who may have been displaced will also be collected from the sample villages. Drinking water problems if any and the consequences will also be discussed and data collected from the same villages. In addition, water quality monitoring of the groundwater (pre-monsoon and post-monsoon) will be taken up. Soil samples will also be collected to study the impact of pollution on soil. Data will also be collected from medical practitioners and health professionals in the area on health effects.

c. Water accessibility and livelihoods

The purpose is to analyze the relationship between access to water in a location and livelihoods of different classes of population. In other words what are the institutions and social forces at work in determining who gets access to water, how much, etc. and what is the economic and social value for an individual or a group? How do the poor fare in this regard? The significance of this part of the research lies in the approach in understanding poverty from the perspective of entitlements available naturally and legally to natural resources like water. In addition it also aims to understand the negotiating capacities of the resource poor through appropriate institutional innovations like Multi Shareholders Dialogue (see below), which provides opportunities for voicing their concerns in a well organized platform (Principal Researchers: Peter P. Mollinga, A. Rajagopal and J. Gronvall).

Methodology: Intensive field studies will be conducted to understand the role of different water sectors (irrigation, drinking water and industrial use) in affecting poverty and livelihood issues. Groups to be included for studying the perception and risk handling will be: farmers, agricultural and non-farm (including industrial) labourers. People from different income, caste and gender groups will be approached and a series of focus group meetings performed using a checklist. In addition a household survey will be conducted to analyze the relative dependency of water to their social, cultural and economic security of households across different classes and risks faced by them, the methods of adjustments of risks including the role of institutions. About 50 households from two sub-basins (totally 100 households), which are different in terms of availability and utilization, will be selected for the survey.

Because of the complexity of the issues, fieldwork will be concentrated to a relatively small area. Preliminary field visits will be conducted with the aim of locating two relevant sub-basins, which are representative of the issues we have previously discussed. Areas where livelihoods depend on industry and agriculture are important interfaces of competition, both for water but also labour.

Where water becomes scarce because of actual scarcity or pollution, conflicts arise and we will choose sub-basins that have a potential for addressing these issues

Stakeholders meeting will be organized around contentious issues in water in the basin to get the perception of different stakeholders on the problem and strategies to be followed for consensus in the better utilization of water. The inputs from the meetings will be used appropriately in the studies.

Integration of cross cutting issues of the study

We have distinguished three aspects of the study, which will be studied by three teams of experts. These issues are cross cutting in nature and have to be analysed in an integrated manner for a useful understanding of the problem that later can be used for dialogues in the basin. While each team will focus on their main theme these issues can be integrated through appropriate research questions on cross cutting issues taken up in each part of the study. For example we will pose questions in the water budgeting part of the study on how the issue of availability of water in a location affect the environment and livelihood especially in the river and its tributaries and ground water. Similarly there will be research questions on the impact of pollutions in the surface and ground water on the livelihoods to be taken up in the environmental part of the study. To visualise the relation of water use etc. between different sectors in the basin the results from the three research teams will be integrated in a Water Accounting Model developed by Dr Molden at IWMI (Molden et al. 2001). Through the model, use and water productivity by various categories will be quantified and conflict of interest can be clarified. The output from Water Accounting will be used as background information in dialogues.

BENEFICIARIES AND IMPACT

As mentioned already, the research will contribute to an improved understanding of the linkages between water availability, access and livelihoods of different sections of population. The study will bring out the role of stakeholders in mediating conflicts among different interests in the use of water and the opportunities and constraints for participations of poor in the negotiations. In the long run, the efforts in organization of dialogue may result into a permanent platform at the basin level for discussing and solving contentious issues on water by different stakeholders.

IMPLEMENTATION AND MANAGEMENT

Madras School of Economics (MSE) will be responsible for the environment and water quality study. A similar study on environment has been carried out earlier in the Noyyal river basin by MSE earlier. The laboratory work will be sub-contracted to either TNAU or the Soil Survey and Land Use Organisation, Coimbatore. Purposive sampling will be done in those areas that report the impact of pollution. The Department of Environment and the Loss of Ecology Authority are agencies that would be interested in the result of the study.

SaciWATERS along with Wageningen University will be in charge of the study on water accessibility and livelihoods. The results of the studies will be valuable inputs for the Water resources Organisation of the state, which is involved in a pilot project on River Basin mangement in Palar and Thamparaparani basins as a part of World Bank programme on FOT.

Linköping University will be responsible for project management and the Water Accounting studies. All partners will be involved in preparation and carrying out of the MSDs.

DISSEMINATION STRATEGY

The results of the impact studies on environment and livelihoods would be discussed in the workshops involving the stakeholders in the basin – farmers’ organizations, other researchers, NGOs, Government agencies involved in agriculture, irrigation, drinking water, etc. The proceedings of the workshop can be brought out in Tamil (the local language). This was done earlier in a project under the “Capacity – 21” programme in the Bhavani basin.

MONITORING

It would be desirable to set up a Project Steering Committee, which can meet every quarter. A representative of IWMI can serve on the Steering Committee. Indicators could include

- Inventory of Pollution Sources
- List of Impact Sites (Agriculture)
- Survey Results of Affected Farmers
- List of Health Impact Measures
- Workshops with Stakeholders

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BUDGET

	Particulars	Amount (in USD)
1.	Salaries: <i>Senior staff:</i> - A. Rajagopal, 50 %, @ Rs. 20,000/month - P. Appasamy, 25%, - P. Mollinga, 10 days @ 400 USD/day - J. Lundqvist, salary covered by Linkoping Univ	5,275 2,200 4,000 --
	<i>PhD students:</i> - M. Lannerstad, 2,5 months @ 3,725 USD (incl. social fees) - J.Gronvall, 2,5 months @ 3,725 USD (incl. social fees)	9,312 9,312
	<i>Research assistance:</i> - three Research Associates 9 months @ Rs 15,000 - three Research Assistants 6 months @ Rs 5,000	8,181 1,818
2.	Water and Soil Quality Studies	3,295
3.	Travel Expenditure - Within India - Europe – India, altogether 5 return tickets	4,000 9,000
4.	Office and research support	1,000
5.	Publication and Dissemination	1,000
6.	Over Head Expenditure and Taxes - For Indian Partners, 20% - For Linköping, 42,5% on salaries, travel and other expenses	4,754 11,315
	Total	74,462

Two workshops and two stakeholders meetings in collaboration with Bhavani River Protection Council, estimated cost 8,000 USD. These expenditures will be covered by a research grant from the Swedish Research Council (Lundquist and Rajagopal).

We are optimistic about obtaining additional funding for Mats Lannerstad and Jenny Gronvall from Sida/SAREC for their PhD projects.

LOG FRAME

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
<p>Goal</p> <p>Improve the understanding of social and natural dynamics and interactions in a river basin context; identify WRM strategies, which may facilitate the achievement of socio-economic and environmental objectives. Poverty alleviation is an important component in this regard.</p>	<p>Interest from policy makers in the output from the project.</p>	<p>Descriptions of temporal and spatial variations in water resources and correlation with socioeconomic information.</p>	<p>Possible to have a relevant description of poverty and its relation to water.</p>
<p>Purpose</p> <p>Water accounting will be used to compare the availability and use of water and how that is matched with the demand side.</p> <p>Interaction with different stakeholders of the chosen river basin</p>	<p>Tables with statistical information about hydrological aspects, water use and demands.</p>	<p>Compatibility and coherence between different sources of data.</p> <p>Number of stakeholders and stakeholder groups participating.</p>	<p>Baseline data exist and current data accessible.</p> <p>Stakeholders willing to participate in MSD.</p>
<p>Outputs</p> <p>Compilation of previous studies and existing data sources and “easy-to-understand” material</p> <p>Research reports</p>	<p>Update of datasets and pamphlets</p> <p>Written document</p>	<p>Peer review</p>	<p>Possible to translate scientific information to various stakeholder groups</p> <p>Relevant to the CA Report Series</p>
<p>Activities</p> <p>-The dynamics of water availability -Environment and water quality - Water accessibility and livelihood</p>	<p>Fieldwork and results from laboratory analysis</p>	<p>Reporting and check of research assistants’ work</p>	<p>Reliable data and valid information can be found.</p>