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Sustainable Environmental Sanitation and Water Services

Watersheds and water services

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Introduction

Water scarcity resulting from drought and overexploitation of resources, especially groundwater, severely affects the livelihoods of the rural poor in India. Recent experiences in parts of Gujarat state for example, typical of many hard-rock regions of India, showed how groundwater drought and shortages of drinking water (rather than food) may increasingly be expected to characterise future droughts. Three main types of response can be:

- short term relief measures to mitigate water shortages such as tinkering,
- development of regional piped water supply schemes. These are often associated with: high costs of development, operation and maintenance; sustainability problems; and increasingly competition with other users (such as expanding urban areas) for water,
- local and longer-term solutions to promote better local water management through integrated approaches to support rural systems – usually on a watershed basis.

This paper is concerned with the latter approach. Watershed development is an ever-popular rural development mantra in India. The number and range of programmes continue to increase, and the Government of India have invested over US$500 million per year into the rehabilitation of watersheds. The National Watershed Development Programme for Rainfed Areas was formulated in 1990 focussing mainly on the rehabilitation of agricultural land. The Integrated Watershed Development Programme concentrates on wastelands, while the Drought Prone Areas Programme and the Desert Development Programme are influenced by agro-climatic conditions (Farrington *et al*., 1999).

Although watershed development programmes are being continually improved – the 1995 revised guidelines were a major milestone - watershed development remains focused on water resources development for improved irrigation and crop protection. Schemes are generally not coordinated with efforts to improve water services (both domestic water supplies and sanitation) despite the potential synergies between such programmes in promoting better local water management and addressing poverty in rural areas (Butterworth *et al*., 2001; Butterworth *et al*., 2002).

Non-governmental organisations (NGOs) have been shown in the past to be the most effective organisations in implementing watershed development activities (Kerr *et a*l., 2000), and they often have the flexibility and funding to be more innovative in approach. However, few studies have looked at how water services have been addressed within such projects and what the impacts have been. This paper reports on a study undertaken by a large NGO, the BAIF Development Research Foundation, to investigate how domestic supply and sanitation needs were addressed within watershed development programme implemented in different states.

A rapid evaluation in five Indian states

The purpose of this study was to synthesise and document BAIF's experience, for different watershed development models and in different Indian states, of linkages (both planned and unplanned, direct and indirect) between provision of water services and watershed development. The research was based upon seven case-study watersheds (between 500 and 1500 ha in size) in five states.

The watersheds were selected to cover: a range of funding models; a fair representation of agro-climatic conditions, problems pertaining to natural resources, and social and economic diversity; sites where some baseline as well as post-implementation data were available; and watersheds where projects had been implemented at least four to five years ago. Given the original selection criteria for these programmes, all sites represent poorer communities and are also likely to be affected by water resource shortages. The case study watersheds were:

- Rajastan – Govardhanpura-Gokulpura in Bundi District (ICEF)

- Karnataka – Adihalli-Mylanhalli in Hassan (ICEF)
- Uttar Pradesh – Karaondia-Sengur-Jamuna in Kanpur (ICEF)
- Maharashtra – Kelghar-ranjanpada in Thane (CEC), and Manhere in Ahmednagar (IGWDP)
- Gujarat – Titoi in Surat (CEC) and Kharachiya-Kharahiya jam in Rajkot (DPAP/ NWDP).

The watersheds were supported under four different schemes or projects. The investment ranged from Rs 4500 pre hectare in the case of the DPAP/NWDP watershed, Rs 8000 in Commission of European Communities (CEC) watersheds, Rs 7500-10000 in India Canada Environment Facilities (ICEF) supported-sites to Rs 10000 for the Indo-German Watershed Development Programme (IGWDP) project (1 Euro = Rs 44.4).

The main watershed development activities that attracted most of the investment included bunding of farmers' fields, afforestation on field boundaries and common lands, and construction of water harvesting structures such as gully plugs or check dams on larger watercourses. In all programmes community mobilisation and group development was an important component.

To investigate how these projects addressed water services issues the study methodology included:
- collation and review of existing background documentation and data from villages, BAIF offices and government,
- field surveys such as walking transects to cover all the villages in the watershed and at least one village downstream,
- village mapping and discussions with the community,
- informal interviews with key families, and
- a household level questionnaire survey

Fieldwork was carried out during the summer season (March to May) in 2001. Full details of the case studies and findings are reported by Kakade *et al*., 2001.

Key findings from case studies

Despite their different physiographic, climatic and geohydrological settings, all the watersheds had a summer water scarcity problem at the baseline. This scarcity was due to either one or more of the following factors:
- natural causes like adverse physical conditions,
- anthropogenic causes such as overexploitation of groundwater (the main source in all cases) in the absence of recharge measures, limited finances for schemes and relief-dominant measures,
- failure of existing government schemes due to poor maintenance and post-scheme management, and
- contamination of drinking water sources.

Water services issues were top concerns reflected in baseline reports. Drinking water sources were defunct in 60% of cases. Sanitation provision was even worse. However, given that these watersheds were funded under different projects, albeit all implemented by BAIF, the solutions and approach varied according to the project objectives and project funding agency.

Table 1. Proportion of watershed development funds used for water and sanitation activities

Project	% investment for WSS	source of funding
Govardhanpura-Gokulpura, Rajastan	1	Mainstream activity
Adihalli-Mylanhalli, Karnataka	1	Mainstream activity
Karaondia-Sengur-Jamuna, UP	2	Mainstream activity
Kelghar-ranjanpada, Maharashtra	1	Entry-point activity
Manhere, Maharashtra	-	Not calculated – funds mobilised from three different sources
Titoi, Gujarat	1	Entry-point activity
Kharachiya-Kharahiya jam, Gujarat	5	Entry-point activity

In three out of the seven cases, water services needs were addressed as an entry point activity for which up to 5% of project funds can normally be utilised (perhaps Rs 10,0000 to Rs 15,0000), although only this much was allocated to water services in one watershed (see Table 1). In three other villages the activities were programmed as main activities. These however still attracted very limited funding – only 1-2% of total funds. In one watershed (Manhere) there were no activities under the watershed development project although this was actually a priority of villagers. By organising funds from other sources, BAIF were able to ensure adequate water supply to the population in this watershed. In Titoi, assistance from the forest department was instrumental.

Interventions relating to water supply in the study watersheds included:
- drilling of new bore wells (six watersheds)
- installation of hand pumps (four watersheds)
- deepening of existing dug wells (one watershed)
- enhancing recharge to groundwater (all watersheds)
- development of springs (two watersheds)
- training in handpump repairs (four watersheds)

Sanitation-related interventions included:

- awareness raising on personal and community health and hygiene (all watersheds)
- construction of bathing platforms (one watershed)
- promotion of waste recycling methods such as vermicomposting

The reported direct and indirect impacts of these interventions are summarised in Table 2. Impacts of watershed development on water services included direct benefits such as a reduction in the number of users per source by providing new wells. Management and maintenance of drinking water sources was improved around sources developed through BAIF's programmes. Water harvesting measures provided additional indirect benefits by improving groundwater levels.

Comparison between two watersheds recently affected by drought, Kharachiya (Rajkot) and Govardhanpura (Rajasthan) showed important linkages between watershed development, drinking water availability and vulnerability to drought. In Kharachiya, watershed development measures were not sufficient to avoid the need to tanker water to the area. But in Govardhanpura, the integration of various aspects of watershed development including community mobilisation and improved responsibility in managing resources helped the community to tackle the drought successfully.

Irrigation and agriculture were boosted through watershed project interventions and were the major focus. Impacts of watershed development on irrigation included increases in area in all watersheds, by up to 290%, and a doubling of crop production. Overall income increased by 1.5 to 4 times. While clearly positive, this must be cause for some concern given that increased

Table 2. Direct and indirect impacts of watershed development on water services in case-study villages

Watershed	Direct impacts of programmed activities to address water and sanitation needs	Indirect impacts of project on water and sanitation	Other water-related impacts
Govardhanpura-Gokulpura, Rajastan	• installation of 13 handpumps (increase in no of drinking water sources from 34 to 47 reducing time to collect water for average family reduced from 10 to 3.5 hours per day • better water quality at new handpumps, and chlorinating of wells • user groups formed and training in handpump maintenance provided • kitchen gardening, vermicomposting and accelerated pit composting promoted to recycle agro and domestic waste.	• water-harvesting and recharge measures improved surface water storage and groundwater levels	• 66% increase in area under irrigation • reported benefits to drinking water sources in downstream village
Adihalli-Mylanhalli, Karnataka	• new bore well provided for defunct water supply scheme in Hunsekatte village • supported development of mini piped water supply scheme in Adihalli by local government improved awareness of cleanliness and hygiene through 'nature clubs' of school children, their parents and teachers • vermicomposting and NADEP composting to recycle waste. Successful biogas plant and kitchen gardening supported.	• network of farm ponds improved groundwater recharge and raised water levels	• increase in irrigated area by 290%
Karaondia-Sengur-Jamuna, UP	• project provided handpumps on existing dug wells and newly developed tube wells (increase from 20 to 35 sources) • vermicomposting developed		• 133% increase in irrigated area
Kelghar-ranjanpada, Maharashtra	• sources still distant from village • water quality not assessed • community bathing facilities provided for women	• increased stream flow (reported from 6 to 8 months) and benefit for groundwater sources close to stream	• 10% increase in irrigated area
Manhere, Maharashtra		• conservation measures helped augment springs and dug wells (tanker supply period reduced from 2-3 months to 15-20 days a year)	• 18% increase in irrigated area
Titoi, Gujarat	• community worked with forest department to develop drinking water scheme as part of a joint forest management project (not related to watershed development efforts)		• 109% increase in irrigated area
Kharachiya-Kharahiya jam, Gujarat	• borewell, pumps, overhead tank and stand pots provided as an entry-point activity (5% of total project cost) • troughs provided for livestock to drink	• check dams and well recharging structures improved groundwater levels until drought (tankers still required)	• 82% increase in irrigated area

irrigation water use can mean less for other uses, such as domestic water supply, especially during droughts.

Lessons and conclusions

Despite differences in geographical locations of the watersheds, some common lessons and conclusions can be drawn:

- *Water services can be effectively combined with watershed development programmes.* Where NGOs have the capacity to address needs in both these sectors and projects provide a broad framework and sufficient funds, BAIFs experiences demonstrate that this can be achieved. Drinking water was considered a priority in all the programmes and implementation of some intervention, even without formal provision, was observed across all the study watersheds.
- *Little impact on personal sanitation, although all watershed projects improved waste recycling*. Sanitation is often not given enough priority in rural water supply projects, and this was also the case in the watershed development projects studied here.
- *Water management interventions in the watersheds were generally limited to supply-side interventions such as development of new sources*. Although its integrated approach and focus on developing community institutions could help to promote demand management, there were no examples from the case study watersheds. User groups were established in all cases as required (like Water User Groups and Village Watershed Committees), to manage new assets such as check dams but these did not extend to management of groundwater - the key resource. There was little social or legal control over the use of most water resources in all watersheds. As a consequence, positive impacts from water harvesting on domestic water sources may well only be short-term.
- *Watershed development programmes should carefully evaluate impacts on irrigation.* Where increased irrigation impacts on domestic water supplies, mitigation measures such as improved irrigation efficiency should be promoted.
- *Water harvesting structures can be sited to benefit domestic water sources.* Projects should also target these sources rather than being focused on improving farmer's irrigation wells.

Unlike the case studies discussed here, watershed development programmes are normally pursued independently of water supply projects, both by government implementing agencies and NGOs. If there happens to be a water supply project and a watershed development project in the same village, it is likely to be a happy coincidence. A coordinated effort is now required to promote watershed development and protect domestic water supplies at the same time.

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