

# Integrated water resource management in water and sanitation projects

Lessons from projects in Africa, Asia and South America



## **About IRC**

Access to water and sanitation is a basic human right. IRC's mission is to help people in developing countries to get the best water and sanitation services they can afford. Working with partners in developing countries, we aim to strengthen local capacities by sharing information and experience and developing resource centres. We emphasise the introduction of communication, gender, participation, community management and affordable technologies into water and sanitation programmes.

IRC's work focuses on the needs of developing countries in Africa, Asia and Latin America. In each region we work with partner institutions in selected countries to develop new approaches, ranging from empowering communities to make informed choices, to helping governments facilitate the process of development rather than construct and provide systems.

In a process of joint learning, local capacities are built in subject areas linked to those areas of IRC's expertise for which there is a local demand. Partner organizations receive support in the development of skills related to documentation and information, publication, research, training, advisory services and advocacy.

IRC is an independent, non-profit organization supported by and linked with the Netherlands Government, the United Nations Development Programme (UNDP), the United Nations Children's Fund (UNICEF), the World Health Organization (WHO), the World Bank and the Water Supply and Sanitation Collaborative Council.

# **Integrated water resource management in water and sanitation projects**

Lessons from projects in Africa, Asia and South America

**Jan Teun Visscher, Peter Bury, Toby Gould and Patrick Moriarty**

IRC International Water and Sanitation Centre  
Delft, The Netherlands

September 1999



# *Table of Contents*

<b>Executive summary</b>	<b>v</b>
Project outline	v
Principle conclusions	v
Recommendations for further work	vi
<b>Preface</b>	<b>vii</b>
<b>List of abbreviations and glossary</b>	<b>viii</b>
<b>1 Introduction</b>	<b>1</b>
<b>2 Finding out about water resources practices</b>	<b>3</b>
2.1 IWRM: evaluation of the methodology	5
2.2 Conclusions and recommendations	6
2.3 IWRM principles selected for review	7
<b>3 Findings on IWRM principles within projects</b>	<b>11</b>
3.1 Water source and catchment conservation	11
3.2 Adequate water allocation needs to be agreed upon between stakeholders	18
3.3 Management needs to be taken care of at the lowest possible levels	23
3.4 Capacity building is the key to sustainability	28
3.5 Involvement of all stakeholders is required	33
3.6 Efficient water use is essential	37
3.7 Water has an economic and social value	43
3.8 Striking a gender balance is essential	50
<b>4 Conclusions and recommendations</b>	<b>57</b>
4.1 Overall conclusion	57
4.2 Conclusions specific to the eight principles of IWRM	57
4.3 Change is needed	60
<b>References and Bibliography</b>	<b>62</b>
<b>List of participants in the project</b>	<b>64</b>
<b>Summary Description of Participating Projects and Case Studies Reviewed</b>	<b>67</b>



## *Executive summary*

### **Project outline**

- Eight drinking water and sanitation supply (DWSS) and three integrated water resource management (IWRM) projects from seven countries were reviewed to identify the extent to which they incorporated integrated water resource management principles.
- The review covered a wide range of scales, from the micro-catchment (700 people, 900 ha) to the river basin (1.5 million people, 4,300 km<sup>2</sup>); landscapes, varying from the humid to the semi-arid; and socio-economic and developmental backgrounds. They all shared a commitment to participatory approaches aimed at empowering communities and giving them the maximum possible control over their resources.
- Eight principles of IWRM were identified. These were based on the Dublin principles and other more recent developments. A participatory assessment methodology was developed by project staff to assess the degree of implementation of the eight principles. The eight principles are as follows:
  1. Water source and catchment conservation and protection are essential
  2. Water allocation should be agreed between stakeholders within a national framework
  3. Management needs to be taken care of at the lowest appropriate level
  4. Capacity building is the key to sustainability
  5. Involvement of all stakeholders is required
  6. Efficient water use is essential and often an important “source” in itself
  7. Water should be treated as having an economic and social value
  8. Striking a gender balance is essential

### **Principle conclusions**

- **IWRM principles are internationally accepted but not yet truly applied to DWSS.** While many national governments are addressing the issue of IWRM through the development of legislative frameworks, movement towards practical application remains slow. DWSS continues to be poorly integrated into wider IWRM strategies, while principles of IWRM are only partially present in DWSS programmes.
- **Water source and catchment conservation is gaining recognition but requires further work.** Water source and catchment conservation are increasing, but the necessary frameworks to ensure the required communication and cooperation between sectors and levels are often lacking. Within DWSS projects the focus continues to be on limited interventions close to the water source.
- **True stakeholder involvement in water allocation decision making remains limited.** While conceptually widely accepted, stakeholder, and particularly user involvement remains limited. The reality of conflict between competing uses and users is often glossed over. Where stakeholders are involved it is frequently at an information, as opposed to decision making, level. Good, appropriately presented hydrological information is essential to informed decision making.
- **The framework to allow management at the lowest appropriate level is often not available.** The lack of clear legal frameworks enshrining rights and responsibilities within the decentralisation process often causes confusion. While community-based approaches are now accepted as the norm, the necessary underpinning capacity seldom exists in support agencies.

- **Capacity building is promoted but not at all levels, and its effectiveness is not monitored.** Proper monitoring of the effectiveness of capacity building programmes is essential to their success. While widely promoted, capacity building programmes frequently pay insufficient attention to the lower and intermediate levels within decentralised support agencies – with the result that they are unable to fulfil their role in facilitating user decision making.
- **Stakeholder involvement is growing, but is still too limited and too narrow in focus.** Community involvement in the management of DWSS systems continues to show promise, however communities frequently remain uninterested in becoming involved in wider IWRM because of high transaction costs and lack of genuine decision making powers. National and regional fora generally use community involvement in a purely consultative form. Users have multiple perspectives and agendas; the skills needed to reconcile these are lacking and where mechanisms for conflict resolution are in place they remain ineffective.
- **Efficient water use is gaining attention but requires much higher emphasis.** Water use efficiency and demand management is gaining attention, however guidance is often lacking in how to integrate it into projects. Water is generally valued most highly where it is scarcest, or where tariff structures make waste expensive.
- **Water is increasingly viewed as having an economic and social value.** The principle of paying for water is now widely accepted and many projects are introducing water user charges. However the role of water as a social good needs to be kept in view while planning water charges, and the rights of vulnerable groups protected.
- **Striking a gender balance is often taken as enhancing women's involvement.** The case studies concentrated solely on the role of women within projects and agencies. In general women are insufficiently involved in both, but their absence is particularly striking within the staff of support agencies. A wider understanding of gender as encompassing other important aspects of community dynamics such as age, wealth, class, cast etc. is missing.

## **Recommendations for further work**

- Organize a number of case studies to review different projects within the same country and present these at a national workshop;
- Establish national or regional workshops to explore IWRM issues with the 'stakeholders';
- Promote IWRM and include it better in existing training activities to encourage other projects and programmes to adapt their practices;
- Re-visit the participating projects in one or two year's time to explore the effect of the participatory review and the new experience in applying IWRM recommendations;
- Stimulate training of extension workers and community training on IWRM;
- Include monitoring of the eight IWRM principles in ongoing programmes.
- In addition a suggested programme of participatory action research is outlined. The research will be aimed specifically at strengthening the technical and organizational capacity of both communities and the lower levels of support agencies with the aim of giving communities a genuine voice in lower level IWRM fora. The programme will pay particular attention to the management, sharing and use of hydrological data and knowledge, and the mainstreaming of stakeholder analysis, gender, and equity issues into IWRM projects.

## *Preface*

This report is based on work and inputs from all involved in the project “Promising Approaches in Water Resources Management in the Drinking Water Supply and Sanitation Sector”. The project reviewed experience of the application of the principles for good water resources management formulated at various international fora.

The project was initiated with financial support of the Directorate General for International Cooperation of the Netherlands (DGIS), the Dutch Ministry of Housing, Spatial Planning and the Environment (VROM), UNDP, the Swedish International Development Agency (SIDA) and the Swiss Development Cooperation (SDC). Furthermore it received support from the participating projects who financed the participation of their staff in the fieldwork and enable them to come to both the preparatory and the synthesis workshop.

This report presents a review of the experience with water resources management principles from eleven projects in seven countries. This experience was assessed by staff from these projects under guidance of an international advisory group and staff from the IRC. The project examined the way in which projects apply internationally accepted water resources management principles particularly in the drinking water supply and sanitation sector. Projects were identified in consultation with external support agencies who were asked to suggest projects they considered promising in the light of the principles set out in the 1992 Dublin meeting. The project was coordinated by the IRC International Water and Sanitation Centre and implemented together with staff from eleven participating projects with inputs from an international advisory group.

This document is oriented towards professionals, managers and policy makers involved in the water supply and sanitation sector and in water resources management programmes. In addition to the work of the staff from the projects, an important input was provided by Elisabeth Lucas, a research associate from IRC who together with IRC colleagues Peter Bury, Esther de Lange and David Saunders prepared a first document. Subsequently this report was used as a basis for the current document that was prepared by Toby Gould, Peter Bury and Jan Teun Visscher. Throughout the project the participants and the IRC team benefited greatly from advice and inputs from the members of an advisory group, Dinesh Ryakural, Jan Lundquist, Gerrit van Vuuren, Mary Boesveld and IRC colleague Christine van Wijk.

The support and enthusiasm of all parties involved is acknowledged with great appreciation. In view of the crucial part water resources play in our lives it is hoped that the results presented here make a contribution to narrowing the gap between policy and practice in improving water resources management. There is long way to go but there are indeed signs that we are able to learn from past experience as presented in this report.

## *List of Abbreviations and Glossary*

Cinara	Research and development in water supply and sanitation (Colombia)
Danida	Danish Development Assistance
DFID	Department for International Development (formerly ODA) (U.K.)
DGIS	Dutch Directorate General for Development Cooperation
D-WASHE	District Water and Sanitation Health Education
DWS	District water, sanitation health education
DWSS	Drinking water supply and sanitation
DWST	District water and sanitation team
ESA	External support agency
FINNIDA	Finnish International Development Agency (now DIDC – Department for International Cooperation)
IRC	IRC International Water and Sanitation Centre
IWRM	Integrated Water Resource Management
lpcd	litres per capita per day
NEDA	Netherlands Development Assistance
NGO	Non-governmental organization
O&M	operation and maintenance
Panchayat	village ruling body
PRA	participatory rapid assessment
RWSS	rural water supply and sanitation
SEWA	Self-Employed Women’s Association (India)
UNDP	United Nations Development Programme
UNICEF	United Nations Children’s Fund
IWRM	water resources management
WSS	water supply and sanitation
V-WASHE	Village Water Sanitation Health Education

# 1 Introduction

Mismanagement of water and land resources is putting human health and sustainable social and economic development at risk. Explosive growth of urban centres, unsustainable exploitation of natural resources, uncontrolled industrialisation, increasing water demand for food production, and expanding populations lacking proper environmental sanitation have led to progressive depletion and degradation of freshwater resources. Many of the problems in the drinking water supply and sanitation sector (DWSS sector) are related to the improper management of water resources. To safeguard the sustainable supply of safe drinking water, concerted action is needed on all fronts, including agriculture, forestry, industry, transport, urban and spatial planning, population planning, and electricity generation. To prevent further depletion and degradation of freshwater resources, a more holistic approach is being promoted, which is known as integrated water resources management (IWRM).

Back in Mar del Plata (UN, 1977), water resource management (WRM) was globally discussed for the first time, but it was not until the early nineties that it was really put on the international agenda. A number of significant meetings were held, such as the 1990 New Delhi meeting, the 1991 Nordic Freshwater Initiative in Copenhagen, the 1992 Dublin meeting, the 1992 UNCED meeting in Rio de Janeiro (UNDP, 1992), the 1994 Ministerial Conference in Noordwijk and the 1994 OECD/DAC meeting in Paris (OECD, 1994). These meetings challenged existing sector-oriented management practices of water resources as being unsustainable from an economic and environmental perspective, and have set out a number of principles and recommendations for integrated water resource management.

In an attempt to provide guidelines for the implementation of Chapter 18 of Agenda 21 (the action programme of the Rio de Janeiro Conference), the Noordwijk Ministerial Conference summarises key issues in IWRM on which international agreement has been reached, and gives an overview of the main IWRM principles for the DWSS sector. The meeting concluded that "access to adequate water and sanitation is a basic need, and the long-term objective in the DWSS sector therefore continues to be 'safe drinking water supply and sanitation for all'". However, access to water must be accompanied by the need to use water efficiently and to dispose of waste in an environmentally sound manner for the benefit of future generations. This is a precondition for substantial progress towards the common targets of health for all, poverty alleviation, environmental conservation and economic and human development. To achieve these goals, water and environmental sanitation programmes need to be tailored to the "ability of the local community, the local socio-economic, environmental and cultural conditions; the needs of men, women, and children; and to the availability of resources" (IRC, 1994).

The interest in water resources continues to grow and it is now a key issue on the international agenda. The UN General Assembly Special Session (UNGASS) in 1997 called for urgent action in the field of freshwater. Furthermore the UN Commission on Sustainable Development in April 1998 made recommendations on comprehensive strategic approaches to freshwater management. The challenge remains to transfer this high level political commitment into action.

The objective of integrated water resources development and management is to ensure optimal and sustainable use of water resources for economic and social development, while protecting and improving the ecological value of the environment (Box 1). Today, a wide range of international and national agencies support these principles, and information on key recommendations is finding its way into the world.

However, although IWRM touches upon many issues that are crucial for the adequate planning, implementation and management of drinking water supply projects, there is little evidence of IWRM principles being applied within the DWSS sector. In addition, where the principles are being applied there is a general lack of documentation and sharing of experiences, and existing case studies only rarely adopt a genuinely evaluative approach that enables others to learn from the experience.

**Box 1: Integrated Water Resources Development and Management**

IWRM is necessary to combat increasing water scarcity and pollution. Methods include water conservation and reuse, water harvesting, and waste management. An appropriate mix of legislation, pricing policies and enforcement measures is essential to optimise water conservation and protection (UNDP, 1991).

Water resources means water in the broad sense as available for use and susceptible to human interventions. Water can be surface or groundwater, and is characterised by both quantity and quality. Development and management cover all phases of resources planning, development, use and protection, i.e. assessment, planning, implementation, operation & maintenance, and monitoring & control. They include both combined resource and supply management and demand management. Integrated means development and management of water resources as regards both their use and protection, and considering all sectors and institutions which use and affect water resources (cross-sectoral integration).

*Nordic Freshwater Initiative (Danida, 1991).*

Recent thinking emphasises the need to include a consideration of the whole water cycle, including rainfall, and both “blue” – ground or surface water – and “green” - soil moisture – components of the resource in order to gain a truly holistic overview.

*(NEDA, 1998)*

The 1994 publication *Towards Better Water Resources Management, a Catalogue of Policies and Strategies of External Support Agencies* (Visscher & Sörensson, 1994), comprises profiles of different external support agencies (ESAs) and project activities they considered promising and was used as a starting point for the identification of the projects included in this review.

The rest of the document is set out as follows:

Chapter 2 provides a brief background of the review including an overview of the projects participating in the exercise. It presents and reviews the methodology used in the assessment and in addition details the framework of eight principles for good water resources management that directed the project. Chapter 3 is divided into eight sections dealing with the results of the assessment under each of the principles. Where possible, results are presented according to the level of intervention: local, district/regional, and state/national. Emphasis is placed on the ability of the projects to further the understanding and practice of the principles in their country. Distinctions are made between the methods and experiences of the three IWRM projects (Umgeni Water, South Africa; Bilaspur, India and Gujarat, India) and those of the eight DWSS projects. Each section ends with conclusions and recommendations for that principle.

Chapter 4 summarises the main findings of the review and presents ideas for activities that could help to close the gap between policy and practice. Recommendations are formulated on how to promote and implement good water resources management practices within DWSS programmes. Detailed information on participating projects, contact addresses of all involved in this project, and methodologies used during the assessments is given in the annexes.

## 2 *Finding out about water resources practices*

Following the OECD/DAC meeting on water resources management in Paris in 1994 the idea was developed to review DWSS projects that adopted promising approaches based on internationally accepted IWRM principles. It was felt that this information sharing would help to raise awareness on the need for improved IWRM practices and would indicate promising practices that could be shared with others.

The participatory approach used also contributed directly to building capacity among staff from the projects involved, towards conducting participatory assessments with stakeholders at relevant levels. Under this approach national project staff reviewed and documented their own projects. The activities were facilitated by IRC staff and carried out under guidance of an international advisory group. Projects were requested to participate in, and make staff available for the review as well as the preparatory and the synthesis workshops. In total eleven projects in seven countries accepted the challenge and made resources available to participate.

A framework paper was drafted by the IRC team to guide the collection and analysis of project information. This paper was reviewed by the international advisory group before being discussed with the participants from the projects. It suggested eight leading principles on IWRM drawn from different international meetings as outlined in section 2.3 and summarised in Box 2.

A preparatory workshop was held in November 1996 at IRC, during which participants reviewed and adopted the framework paper, also developing guiding questions and indicators to be used in the assessments (IRC, 1996). In the workshop participants presented information on their projects. Eight of the projects focus on drinking water supply and three are broader IWRM projects addressing wider issues including irrigation, inter-sectoral allocation, basin and catchment management. Five are from Africa, five from Asia and one from Latin America. At the workshop participatory assessment methods and tools were identified and practised and a participatory review methodology was jointly developed. For more information see annexes 2 and 3.

### **Box 2: Key IWRM principles addressed**

1. Water source and catchment conservation and protection are essential
2. Water allocation should be agreed between stakeholders within a national framework
3. Management needs to be taken care of at the lowest appropriate level
4. Capacity building is the key to sustainability
5. Involvement of all stakeholders is required
6. Efficient water use is essential and often an important "source" in itself
7. Water should be treated as having an economic and social value
8. Striking a gender balance is essential

Following the workshop participants returned to their countries and carried out the assessment with key stakeholders in their country and project area. The assessments were carried out over a period of six months. Throughout the assessments participants received advice and support from members of the advisory group and IRC where required. Draft assessment reports were reviewed by the advisory group and IRC staff.

A synthesis workshop was held at IRC in September 1997, where the outcome of the participatory assessments were presented (IRC, 1997). These were then synthesised in terms of experiences with respect to the application of IWRM principles in projects, and recommendations were formulated on how to improve field practices.

### **Box 3: Summary of participating DWSS projects**

- *Volta Rural Water Supply and Sanitation Project, Volta Region, Ghana assisted by Danish International Development Assistance (Danida).*  
Improvement of DWSS through the provision of safe drinking water supply and sanitation (DWSS) involving local technologies, integrated with hygiene education and community management; targeting 50 percent of the rural communities in Volta region.
- *Northern Province Development Programme, Kasama/Mbala Districts, Zambia assisted by Irish Aid*  
Provision of safe drinking water to targeted rural areas, and integration of line ministry resources and capacities for IWRM.
- *Support for Water, Sanitation and Hygiene Education Projects in Drought-Affected Areas, Kalomo District, Southern Province, Zambia assisted by the United Nations Children's Fund (UNICEF)*  
Drought mitigation and access to safe DWSS through construction of water points and sanitation structures.
- *Tonga Water Supply and Sanitation Project, Mpumalanga Province, Mvula Trust, South Africa*  
Extension of DWSS to former rural homeland areas characterised by poor water supply infrastructure and unpredictable river flow, primarily through bulk reticulation.
- *Rural Water Supply and Sanitation Project, Lumbini Zone, Nepal assisted by the Finnish International Development Agency (FINNIDA)*  
Rural water supply, sanitation, hygiene education and irrigation development, promoting local institutions for local management. Reflecting the established project, the assessment involved analysis of two areas with contrasting priorities of DWSS and irrigation.
- *Cambodia Water and Sanitation (WATSAN) Project, Ministry of Rural Development, Royal Government of Cambodia, assisted by Cambodia Area Rehabilitation and Regeneration (CARERE), and the United Nations Development Programme (UNDP)*  
Capacity-building of government institutions to decentralise service provision activities, including DWSS, to the village level. The assessment included an analysis of an urban waterworks to represent national-level policy initiatives.
- *Rural Water Supply and Sanitation Project, DFID Maharashtra, India assisted by the Department for International Development*  
Rural DWSS and progressive decentralisation of management to district, block and village levels; the assessment included analysis of water supply to the dominant irrigation sector.
- *Community Drinking Water Treatment Project, Tolima Department, Colombia assisted by the Institute of Research and Development in Water Supply and Sanitation (Cinara)*  
Post-volcanic disaster relief for provision of a sanitary infrastructure as well as capacity-building for management of the systems; the assessment focused on a demonstration project of drinking water treatment.

### **Summary of participating IWRM Projects**

- *Mgeni Catchment Management Plan, Umgeni Water, South Africa*  
Rural and peri-urban water supply and sanitation, primarily through bulk reticulation, emphasising IWRM at the catchment level and involvement of key stakeholders.
- *Integrated Watershed Development Project, Bilaspur District, Madhya Pradesh, India*  
Water conservation, DWSS and economic improvement in a poverty-affected region, using local level technologies and institutional management capacities.
- *Rural Water Resources Management Gujarat State, India, assisted by the Self-Employed Women's Association (SEWA) and the Dutch Ministry of Foreign Affairs (DGIS)*  
Economic and social improvement of poor rural communities, particularly women, by building DWSS management capacities at the community level.

## 2.1 IWRM: evaluation of the methodology

The approach used provided a good learning opportunity as project staff were able to incorporate the participatory assessment into other aspects of their programme work, thereby accruing benefits in terms of increased stakeholder involvement. Results were used to influence project activities in conjunction with other evaluations and assessments. Specific findings of the review of the methodology by the participants can be summarised as follows:

- ***Assessment by project staff is positive but entails limitations***

As all assessment work was carried out by project staff and other stakeholders rather than external consultants, most projects benefited from the capacity building engendered in the process. Many of the assessment teams commented on the usefulness of the participatory tools used for carrying out the review. Some participants in the assessment were eager to take the tools and use them in other projects, and even in other sectors (Gujarat, India). As no external consultants were used no time was required to understand the intricacies of each project.

Many of the assessment team members from the project or government staff still had to continue their own jobs while planning and carrying out the assessment (Umgeni Water, South Africa and Kalomo, Zambia). Their workload increased significantly and as a result some projects had to reduce the scale of their assessment.

It can be argued that by using staff from the projects to carry out a self-assessment there is less objectivity in the results, however this is outweighed by the benefits in terms of deeper insight into the project, and the development of staff competence and confidence.

- ***The assessment framework and guiding questions provided a strong basis for case studies***

From the ability to compare eleven disparate projects from all parts of the developing world it is clear that the framework and principles of the assessment were extremely useful in guiding participants in the assessment process. Selecting principles from the 1992 Dublin meeting and the 1994 Noordwijk conference meant that they were internationally recognised as important and meaningful. Refining the language and setting guiding questions for the principles ensured maximum applicability to each project. Nevertheless, there was some confusion in the exploring of some principles; some projects did not apply all the principles and others thought some principles lacked pertinence.

In particular, Principle 2: “adequate water allocation needs to be agreed upon between stakeholders within a national framework”, and Principle 5: “involvement of all stakeholders is required”, seemed to address very similar topics and caused confusion amongst assessment teams. A few teams concentrated on the involvement of stakeholders in Principle 2 rather than water allocation and the need for a national framework and hence covered much the same ground in Principle 5.

Participants in some project reviews felt some principles were not applicable to their situation. In particular, Principle 2 was considered irrelevant by smaller DWSS or micro-catchment projects (Bilaspur, India) and principles 6 and 8 relating to gender and tariff structures respectively received least discussion and participation as these were furthest from existing practice of the communities in Lumbini, Nepal and in Bilaspur, India.

- ***Use of participatory tools gave variable results***

Although almost all assessment teams used the participatory techniques they had been introduced to at the preparatory workshop, it seemed that some put these to more effective use than others. The presentation of the results varied from long reports of discussions and exercises with community members to one word or short sentence responses to the guideline questions. It is difficult to draw firm conclusions on the methods used from the results alone, but it seems likely that some of the projects did not pursue participation by the community in this assessment as far as they could have. Other projects, possibly with more experience with community involvement, were able to use the methods and adapt them to their own situation to produce results that were representative of the community's views on the principles.

It was agreed that directly involving stakeholders in the assessment was a crucial element of the approach. In order to achieve this a number of different participatory tools were used by assessment teams (IRC, 1997). Active involvement leads to shared ownership of and responsibility for the results of the assessment and should increase the likelihood that individuals involved will pursue changes or improvements based on those results. The assessment by stakeholders, often with conflicting interests in the same resource, through discussion and sharing of opinions or experiences can in itself be a major "eye opener", helping participants see issues from the others' viewpoint. Furthermore the action of analysing, assessing and recording information may lead to increased understanding of an issue or problem. Simply through involving stakeholders in joint assessments of issues relating to a common resource such as water it is possible to promote their interest in the longer-term issues related to sustainability and resource management.

## **2.2 Conclusions and recommendations**

Although there are drawbacks in the participatory methodology used to evaluate the projects, direct and indirect benefits seem to outweigh these. Most notably, the involvement of the users as key informants has promoted their sense of ownership of the results in some of the projects. Similar participatory assessments are thus considered useful and can benefit from the following recommendations.

### **Prepare strong guidelines and ensure continued guidance from a leading body**

Strong guidelines with dedicated training in assessment methods and continued guidance (through telephone and written communications) ensure that the initial direction is followed throughout the assessment. This participatory assessment methodology in many ways requires greater input from the coordinating staff than would be needed if they carried out the assessments on their own.

### **Participatory assessments require an action orientation to enhance their usefulness**

The use of participatory techniques will produce better results if they are grounded in an environment where users already have a voice and are experienced in discussing similar issues amongst themselves and with others. Even in such situations, however, they need to include an active feedback to the participants that encourages them to take action where appropriate.

### **Care must be taken to ensure multi-disciplinarity**

The results from the review tended to lean strongly towards institutional and socio-economic aspects of IWRM, and made little mention of technical aspects, in particular the problems associated with making accurate assessments of water resource availability upon which to base management decisions. This seems to reflect that many DWSS projects do not pay much

attention to water quantity and quality issues as they assume that drinking water supply has priority. It may, however, also be the result of many of the team members not having a background in database management. IWRM is by nature a multi-disciplinary subject, and it is important to ensure that in project implementation all the key aspects are covered by team members.

### **2.3 IWRM principles selected for review**

This section presents in greater detail the eight IWRM principles (Box 2) which have emerged at the international level and which provide the framework for this review. Each principle is presented with a brief explanation and one or two examples of the guiding questions and indicators which were used to investigate it in the review.

Not all the projects applied all the principles; important information in itself as it may indicate that some principles are considered less relevant to some projects, or equally that some projects did not have the resources or conditions to implement them. It may also imply that not all principles are required at the same time or are equally valid.

#### **Principle 1: Water source and catchment conservation and protection are essential**

Environmental degradation of water resources may have an immediate and severe impact on the water supply situation of the users. It may result in inadequate performance of water supply systems because of pollution and siltation problems, or systems being abandoned because of water sources drying up. This may have an effect on the health of the users but also may involve considerable economic losses. Agricultural output and productivity also decline because of environmental degradation resulting from poor drainage and irrigation practices. At the same time, people with marginal livelihoods may have very few options apart from “unsustainable” practices.

Water source and catchment conservation and protection includes amongst others, soil and water conservation strategies, pollution control measures, and sound land use practices.

##### *Example guiding questions*

- Has water source and catchment protection been identified as a need presently or in the longer term? (Why? By whom? When? How?)
- Are catchment areas negatively influenced by any activities?

##### *Example indicators*

- Reduction in flow volume/water level over the last five to ten years.
- Deterioration of water quality over the last five to ten years (taste, turbidity, appearance etc.).

#### **Principle 2: Water allocation should be between stakeholders within a national framework**

Water management is fragmented among sectors and institutions, with little regard to potential conflicts among social, economic and environmental objectives and users. There are multiple sectoral agencies for water use, including irrigation, municipal water supply, rural water supply, energy, production, and transport. Interactions between these different sectors and uses, although all forming part of the same system, are usually ignored. Furthermore in many countries where individual states and provinces have jurisdiction over water in their territory, the same water source will be developed without considering the impact on other states. Integrated IWRM calls for holistic management of freshwater and the integration of sectoral

water plans and programmes within the framework of national economic and social policy (Serageldin, 1995b and World Bank, 1993).

*Example guiding questions:*

- What water allocation mechanisms exist, who is consulted and who makes decisions?
- What legal framework and traditional practices for water resource allocation exist? Are they effective?

*Example indicators:*

- Accessibility of information to stakeholders (percentage who feel they do not have good access).

### **Principle 3: Management needs to be taken care of at the lowest appropriate levels**

In many countries there is a heavy dependence on centralised administration to develop, operate and maintain water systems. However, centralised (top-down) approaches to water resources development and management have often proved inadequate to address local water management problems. While recognising the need for a central mechanism capable of protecting national economic and social interests, the role of central governments needs to change, to enable users, local institutions, and the formal and informal private sectors to play a more direct role. The government needs to become a facilitator and regulator instead of a provider. The current trend towards decentralisation in many countries is promising in this respect and may help to bring about management of water resources to a lower level.

The most appropriate level of water resources management may range from the household level to the level of international river basin committees, depending on the issue at hand. The important point is that consultation, planning, decisions and actions concerning water resources management should take place as close to the root of the problem as possible, and that higher levels should primarily provide an enabling environment for decentralised and integrated management (Danida, 1991).

*Example guiding questions*

- Who manages water supply systems? How long have they managed systems?
- Does management currently take place at the lowest appropriate/possible level? If yes, describe constraints in having management at the next lower level. If not, why not?

*Example indicators*

- Percentage of systems with functional monitoring systems.
- Percentage of management committees with a clear task assignment.

### **Principle 4: Capacity building is the key to sustainability**

Effective integrated water resources management requires an enabling environment and conscious and competent actors. Education, skills development, and capacity building are essential to promoting this. Capacity building of the organizations involved in IWRM is crucial both for the proper implementation of a project and for its subsequent sustainability. It consists of three basic elements, namely 1) creating an enabling environment with appropriate policy and legal framework, 2) institutional development including community participation, and 3) human resources development and strengthening of managerial systems (Alaerts et al., 1991). However, institutional capacity for water resources management should be developed only when there is a clear demand. Institutional response will therefore vary from time to time and place to place (Danida, 1991).

#### *Example guiding questions*

- Is capacity building a part of project activities? If so what are the key capacity building initiatives at different levels?
- Which techniques are/philosophy is used for capacity building?

#### *Example indicators*

- Percentage of budget allocated for training or capacity building.

### **Principle 5: Involvement of all stakeholders is required**

To ensure that water resources are developed and managed properly, it is important to involve all stakeholders as much as possible and practicable. This involves enabling the coordination and collaboration of different users groups (i.e. domestic, irrigation, industry, recreation, and the environment). These stakeholders should have a common platform for decision making where they can voice their concerns and ideas, and can discuss and vote on measures to be taken and activities to be developed to manage the resource. The above implies that it is important that stakeholders have access to information and can play a true role in decision making, and if required are helped to make their case. In the DWSS sector we already see a positive trend in which the idea of community participation, often still implying provision of physical labour, food and shelter, is changing towards community management, empowering communities to take things in hand and claim their role in decision making.

#### *Example guiding questions*

- Who are the stakeholders? Do they perceive themselves as stakeholders and as being actively involved?
- Do stakeholders wish to be actively involved in IWRM?

#### *Example indicators*

- Percentage of stakeholders perceiving themselves as being involved.
- Number of systems being constructed versus number handed to community/farmer cooperative.

### **Principle 6: Efficient water use is essential and often an important “source” in itself**

Domestic water supply and irrigation systems often face major water losses, with leakage percentages of over 50 and 70 percent respectively. Efficiency of water use should be optimal, minimising water losses during transport, storage and use. Reducing water loss involves aspects related to design, construction and operation and maintenance of systems, as well as user behaviour such as leaving taps open or not repairing them. Enhancing efficient water use may also include demand management, reuse, and introduction of water-saving measures.

#### *Example guiding questions*

- Is inefficiency in water use identified as a problem? If yes, who perceives it as a problem, and why?
- What inefficiencies have been identified?

#### *Example indicators*

- Percentage of persons in user groups who identify inefficient use as a problem.
- Percentage of persons in user groups adopting water-saving measures.

### **Principle 7: Water should be treated as having an economic and social value**

Water is recognised as having both a social and an economic value. Water is considered a social necessity and therefore a basic right for all. On the other hand water also has an economic value. The supply of suitable water and the disposal of sewage has a cost, and systems can only be maintained when this cost is covered, either through donations, subsidies or by users contributions. When treating water as an economic commodity, optimum use should be made of market-based instruments, like the “user pays” and the “polluter pays” principles. The charging mechanisms adopted must be appropriate and reflect local socio-cultural and economic conditions (Danida, 1991). Making the concept of water as an economic commodity operational includes shifting emphasis from supply to demand management principles.

#### *Example guiding questions*

- Is there a tariff system for different water users? If so describe the system.
- Does the tariff system (or cost recovery system) meet the:
  - capital cost?
  - O&M cost?
  - replacement cost?

#### *Example indicators*

- Percentage of water users that pay for water (water supply, irrigation, industry).
- Percentage of users considering they pay a fair price.

### **Principle 8: Striking a gender balance is essential**

Communities, organizations and groups involved in and/or benefiting from a project are not homogeneous and do not have the same interests. They differ in gender, and in economic and cultural background (e.g. religion, ethnicity, class), and these differences often imply different needs and perspectives, among others related to the use of water. This often has implications not only for the use of water supply facilities, but also for operation, maintenance and management. In particular the tasks and responsibilities (and hence needs and interests) of men and women can differ considerably, and projects have to take special measures particularly to involve women.

#### *Guiding questions for the review*

- How are gender differences, if any, perceived at:
  - planning level?
  - decision-making level?
  - user level?
- What are the differences in the degree of participation and influence over decision making by men and women?

#### *Examples of indicators*

- Percentage of persons indicating need for gender differentiation (planners, decision makers and users)
- Percentage of gender-specific activities (differentiate between men and women).

### 3 Findings on IWRM principles within projects

#### 3.1 Water source and catchment conservation

Whereas at the international level a clear understanding exists that water source and catchment protection and conservation are essential, this is only very partially adhered to in practice. It is apparent from the case studies that many factors reduce both water quality and quantity including increasing pressures put on water supplies and catchments through greater demand for water, and a history of neglect through pollution, deforestation and over-abstraction.

The notion that water sources and catchment areas are deteriorating and could jeopardise efforts to improve drinking water supply was present among most people interviewed. Despite this understanding the attention given to water catchment protection in DWSS projects is very limited and normally focuses only on the immediate surroundings of water sources. Unsurprisingly in the three water management projects that were reviewed, greater emphasis is placed on water catchment protection.

With the growing awareness among sector staff and increasingly also among politicians and the public at large a clear opportunity exists to turn the situation around in favour of better water catchment management and protection.

*Water pollution through irresponsible waste disposal, Cambodia*



##### 3.1.1 Catchment areas are increasingly threatened by human activities

Water quality and quantity are under pressure in all of the projects reviewed except for the village Nyagbo Emlil Israel in Volta, Ghana (see Box 4). Five projects reported drops in surface water levels and four in groundwater levels. Four projects showed decreases in biological water quality (due to fecal pollution indicated by the presence of *E. coli*); three showed decreases in the chemical water quality (pollution from fertilisers, high salt content due to irrigation and excessive water abstraction measures, and high iron content), and three reported high turbidity (from soil erosion and mining).

**Box 4: Traditional catchment management shows a possible way forward**

The Nyagbo Emlɪ Israel villagers in Volta, Ghana see the catchment and its wooded grove as a sacred area and trespassing is taboo. This taboo extends to:

- not allowing people to step in the water when collecting it
- prohibiting farming activity in the catchment area
- prohibiting disposal of waste in the catchment area

The villagers were adamant that no one carried out any activities in this area and the spring has continued providing an adequate supply during droughts with no apparent deterioration of water quality.

Three projects showed an increase in the frequency or magnitude of floods but Bilaspur, India reported a decrease due to improved conservation measures. Not all responses could be directly related to the situation in the catchment areas. Two projects indicated an increase in drought occurrence (Maharashtra indicated this through its increasing dependence on water tankering), while the assessment in Mpumalanga, South Africa registered an unstable weather pattern with droughts and floods experienced in the past 15 years.

**3.1.2 Threats to catchments and water sources are becoming obvious to all**

All the assessments have reported that people at all levels see that their water sources and catchments are being threatened by other activities (with the notable exception of the Nyagbo Emlɪ Israel villagers). Table 1 summarises the response of the people who took part in the assessments. It sets out the main activities that they see as negatively influencing catchments and water sources and links these to the effects they see on the catchment and water sources. The last column indicates where the link between the activities and their effects is noticed: whether by people living in the upper catchment, people living in lowland areas or the authorities (whose views are generally expressed by the case study authors).

Deforestation, irrigation and population growth are more frequently mentioned as activities negatively influencing water sources and catchments than other activities. Their negative influence is noticed by communities in upland and lowland areas but the recognition of their effects differ between the two areas. Broadly, the more specific effects are recognised in the areas where they occur. Bank erosion and landslides are seen as a problem in upstream areas whereas sedimentation and increasing turbidity are seen as problematic in lowland areas. Soil erosion is a more generalised problem, its results are seen throughout the catchment.

**Table 1: Reported activities and their effects that negatively influence catchments and water sources**

<i>Activities perceived as having a negative impact on catchments and water sources</i> <sup>1</sup>	<i>Effects of activities on catchment and water source</i>	<i>Effect of activity</i> <sup>2</sup>
Deforestation	Soil erosion Landslides Decreasing spring yield Siltation/sedimentation of rivers and lakes and increased turbidity in surface water Floods Drought	A,B,C A A B,C B,C C
Irrigation	Increased salinity in groundwater Decreasing surface and ground water levels	B,C B,C
Population growth	Dry wells and reduced yield in boreholes, surface water levels reduced Increasing water treatment costs	A,B,C C
Extraction of gemstones and other mining activities in the upstream catchment area	Siltation/ sedimentation of rivers and lakes and increased turbidity in surface water Poor river bank stabilisation	B,C A,C
Little control of private water supplies abstraction	Decreasing surface and ground water levels	B,C
Agriculture		C
Livestock rearing	Contamination by agrochemicals	A,B,C B,C
Bathing, clothes washing, swimming, defecation in water source	Water-borne diseases Overgrazing	B,C
Urbanisation	Water-borne diseases	B,C
	Decreasing surface and ground water levels	C C C
Industrialisation	Reduced water quality Algal blooms Flooding	C C C
Invasive alien plant growth	Chemical pollution of water sources Algal blooms Degraded river health	C C C
	Reduced water availability	C

1. The position of activities and effects in the table does not reflect their relative importance. The first three activities were strongly perceived by all the different groups, whereas the others were felt by fewer people
2. Effect noted by: A: upper catchment communities;  
B: lower catchment communities  
C: authorities and implementing agencies (national, regional or local authorities, NGOs and private sector)

### **3.1.3 Source and catchment protection gain ground**

In all eleven projects the local population and district and national authorities say that water source and catchment conservation and protection are important, but understanding, attitudes and actions taken vary considerably.

#### **Communities need to understand cause and effect of the problem**

The project reviews (Table 1) showed that where the association between the deterioration of the water source or catchment and its cause are visible people better recognise the importance of its protection. At the local level people could more easily understand threats to their water sources where the links between activities and water quality or quantity were apparent.

Surface water users in Lumbini, Nepal and Battambang, Cambodia were able to see that mining and deforestation created soil erosion and increased sedimentation in their rivers and lakes. People who relied on groundwater in Mbala, Zambia did not see deforestation as a possible threat to the recharge of their aquifers and wider catchment conservation problems such as drought were attributed to God's will.

### **Good results are achieved by involving the communities in problem identification and solving**

There is a strong link between the level of community understanding and empowerment, and the perceived importance and breadth of activities of water source and catchment protection.

- Sometimes community mobilisation is aimed solely at the provision and continuation of water and sanitation services such as in Kalomo, Zambia, where the villagers saw catchment protection only as community-built fencing around boreholes and regular cleaning of the water point.
- A stronger health education component to the project in Tonga, South Africa has led the community to link practices such as bathing, washing and swimming with the incidence of water-borne diseases such as diarrhoea and schistosomiasis.
- A wide variety of erosion prevention measures in Bilaspur, India, carried out through community participation, have led to the productive use of 15 hectares of land that was previously waste ground and an understanding by stakeholders of the importance of such work.
- In Gujarat, India, SEWA has helped set up many local committees tasked with the responsibility of finding solutions to their own catchment and water supply problems and implementing them. This approach of prioritising self-enhancement has enabled the beneficiaries to recognise that there was a need for catchment protection; that highly technical solutions imposed on them by the government could not be relied upon; and that the deep tubewells and fertilisers of rich farmers were depleting and polluting their water sources. The understanding of these threats led them to return to local technologies such as rainwater harvesting.

### **Local communities can monitor and regulate their own catchments**

Communities are beginning to see the importance of controlling and monitoring their own catchments and water supplies. In Volta, Ghana at Tedeapenu a dam management committee of all stakeholders has recently been set up to organize water allocation. As the demand increases due to extensions of their water supply system and possible large-scale farming they fear that abstraction will outstrip supply and that water quality will deteriorate. One member of the Dam Steering Committee commented:

*“We intend meeting the farm owners at the upper part of the catchment to discuss with them not to cultivate any new farms or use agrochemicals.”*

SEWA, having helped communities to improve their water sources in Gujarat, India is now helping women's groups to monitor their water quality and to report problems to the government. Furthermore they are building their capacity to eventually be able to carry out repairs themselves. In San Felipe, Colombia, Tolima Health Service is running training courses on surveillance and control of water supply systems with an emphasis on training rural technicians, participant diagnosis of problems, and sanitary inspection.

### **Traditional beliefs and customs can support catchment protection**

Traditional beliefs or practices can provide practical tools for the protection of catchments and water supplies. The use of taboos in Ghana (Box 4), is very effective in catchment protection. In Northern Province, Zambia traditional laws and witchcraft are used to deter the cutting of trees around water sources, shrines, and graveyards.

#### ***3.1.4 Protection activities are different in nature and level***

Although there seems to be a general awareness that deterioration in water quality and quantity are linked to catchment activities, typically the response in terms of catchment protection consists of insufficient physical measures and ad hoc or ineffective policies and guidelines. Integrated water resources management provides a framework to encourage the balancing of protection measures with economic and social activities to ensure sustainable use of the catchment. Even so, in practice the IWRM projects still find difficulties in ensuring that adequate catchment protection measures are carried out.

### **Physical protection measures are often limited to the water source**

Table 2 shows the difference in the main protection foci between the eight RWSS and the three IWRM projects. Catchment protection measures implemented in most drinking water supply projects tend to concentrate only on measures around the water point and not on the catchment area itself. The project in Volta, Ghana is a notable exception, where the communities seem to be traditionally motivated towards catchment protection. In two DWSS projects a broader approach is taken by including afforestation activities or limitations to deforestation, probably as a result of the more visible impact deforestation has on the catchment.

As may be expected, the IWRM projects focus on the catchment and implement a more complete range of activities and regulations aimed at catchment and water source protection. These measures reap benefits other than just the protection of the catchment, among others the reclamation of waste ground and eco-tourism.

### **Unless IWRM policies are put in place, catchment protection is unfocussed and ineffective**

Government policies have generally been ad hoc and ineffective with local protection methods focusing on the water point and rarely on the catchment. Greater awareness of the problems are leading governments to start developing IWRM policies and motivate local communities to protect and monitor their catchments.

**Table 2: Focus of protection measures in the reviewed projects**

<b>Case study</b>	<b>Main protection focus</b>
Volta, Ghana	Spring and reservoir catchment protection through limiting activities on catchment land
Mbala, Northern Province, Zambia	Well protection
Kalomo, Southern Province, Zambia	Borehole protection
Tonga, Mpulamanga, South Africa	Restrictions on groundwater abstraction rates to sustainable levels
Lumbini, Nepal	Afforestation of catchment and restriction of activities on catchment
Phnom Penh, Battambang and Panh Nha, Cambodia	Improved sewage treatment in Battambang Town
Maharashtra, India	Restrictions on construction of private sources, community restrictions on logging
San Felipe, Colombia	Participatory water quality monitoring, water conservation measures.
Mgeni, South Africa <sup>1)</sup>	Household water conservation programme, afforestation review, reducing spread of alien plants on waterways, hazardous waste management, eco-tourism and reserves around water sources, soil erosion studies
Bilaspur, India <sup>1)</sup>	Afforestation, soil erosion check measures, groundwater recharge methods, wasteland development
Gujarat, India <sup>1)</sup>	Groundwater recharge, dam protection and soil erosion checks, afforestation, wasteland development

Notes: <sup>1)</sup> Water Resources Management Projects

While the lack of a clear national policy or act on IWRM is seen as a threat to the proper management of water sources in district and community levels in Lumbini, Nepal, policy development alone is not sufficient. The National Water Policy of Zambia is in place but little information has been disseminated to the public, rendering it ineffective. Even worse from their point of view is a new land bill that chiefs in Mbala, Zambia are finding has reduced their traditional powers to control catchment use. Box 5 illustrates the confusion created by a lack of coordination between government departments.

**Box 5: Government departments providing confusing advice to villagers in Mbala, Zambia**

Villagers have received the following advice from different government departments:

- to uproot trees (Ministry of Agriculture)
- to plant trees around water sources (Forestry Department)
- to uproot trees and replant them with orange trees to protect water sources (other advisers)

Where the legislation is not backed up by action it is useless: the anti-logging laws of Cambodia are largely flouted, negating the impact of a government-sponsored reforestation day. Previous policies can also cause difficulties in enforcing an integrated water resources management policy. Decades of state provision of water in India has meant that more recent efforts to promote community ownership and responsibility of water sources have not been easy.

Cambodia has at present no legal framework to regulate water use although government departments are expected to collaborate in water allocations. Hence the protection of catchments is seen as a low priority. Nevertheless, the Ministry of the Environment is looking at guidelines for water quality and solid waste disposal and the government, of necessity, has had to create specific water allocation mechanisms in Phnom Penh to ensure equitable water distribution in times of low flows.

Where governments have IWRM policies in place results can be seen at local, regional and national levels. In Ghana the government has set up a Water Resources Commission to coordinate all water activities and departments and a Water Resources Research Institute to monitor water quality and quantity at a regional level (see chapter 8). In India and South Africa, government laws have enabled and strengthened water source protection by using watersheds as the basic organizational unit for managing and developing water resources (see chapter 7). The Indian government has included a watershed development plan in its latest five-year plan that has boosted local catchment protection initiatives, yet private abstraction of groundwater is not fully controlled and decreasing water tables are prevalent. In 1996, South Africa rewrote its laws concerning water under two new bills: the Water Resources and Water Services Acts, with the result that organizations such as Umgeni Water can ensure regional catchment management. Nevertheless Umgeni Water still sees that a lack of coordination between the South African government and regional departments threatens catchment protection.

The management of water sources at a watershed level has produced benefits in India and South Africa. Nevertheless, latest thinking (Winpenny, 1997) shows that there can be controversies in managing at such a level. The biggest problems indicated are the following:

- the river basin does not match with administrative or political boundaries;
- the river basin is often of an unsuitable scale, being either too large or too small for solving the problems of its member parts;
- sectoral interests can act pre-emptively to secure their allocations.

Wide-ranging legislation can help protect catchment areas such as those in Nepal where wood cutting for fuel and construction are restricted, open grazing is prohibited, approved latrines are being promoted, and integrated health education includes the protection of water sources.

Effective cooperation between agencies can produce extra benefits such as the evolving eco-tourism around Mgeni River's reservoirs in South Africa.

Proper funding of catchment management facilitates effective programmes: the Colombian government's National Environment System requires that 1 percent of DWSS and 3 percent of irrigation project funds to go towards catchment protection, community monitoring of water quality, and training of water technicians.

### ***3.1.5 Water source and catchment conservation and protection is increasing***

We may conclude from this chapter that it is increasingly understood that decreasing water quality and quantity coupled with an increasing demand necessitates strong water catchment management and protection methods. A sectoral approach, giving control of abstraction to irrigation departments, drinking water authorities and control of indirect use to forestry departments or wastewater authorities no longer works. To cater for better water catchment management and protection the following key suggestions emerge from the review:

#### **Sustainable catchment protection and management requires a national framework**

Water laws need to provide direction for IWRM (South Africa's new Water Resources and Water Services Acts). A coordinating body at national or district level (Ghana's Water Resources Commission) can ensure that different sectoral departments' directives reinforce each other. There must not only be horizontal coordination between different sectors but also vertical coordination between national, district and local actors so that national policies can be translated into local action. There has to be an adequate budget to manage the catchment and to enforce controls on abstraction and discharges (Colombia's National Environment System).

#### **Build interventions on understanding and on local beliefs, customs and practice**

Stakeholder understanding of water catchment problems and solutions needs to be supported with sound methods. Traditional beliefs and practices should be incorporated into catchment protection schemes as they can provide the basis for setting up water catchment and allocation committees (Volta, Ghana). Catchment monitoring by the community (San Felipe, Colombia) enhances their understanding of the need for catchment protection and encourages positive action.

#### **Empower the stakeholders and particularly involve communities in decision making**

Maximising decision making and implementation of catchment protection measures at community level helps promote their sense of ownership of and responsibility to the catchment (SEWA, Gujarat, India). Bringing stakeholders together in the decision-making process enables all views to be heard and agreements on allocation and protection measures to be consented by all parties.

## **3.2 Adequate water allocation needs to be agreed upon between stakeholders**

As the sources of water become increasingly scarce and over-utilised, there is a growing tendency to deal with requirements of the different sectors in a coordinated manner. It is increasingly understood that adequate water allocation needs to be agreed upon between stakeholders within a national framework. While catchment level bodies are seen as one way forward, matching consultative boundaries to hydrogeographical ones, catchment management and IWRM are not synonymous. As mentioned in the previous section there are a number of concerns as to the applicability of the catchment model (Winpenny, 1997).

It is generally accepted that it is important to explicitly recognise and protect the rights of the economically and politically weaker sections of society, such as rural domestic users, and the environmental sector, and laws and guidelines are being amended to reflect this.

It is, however, indicative that despite the widely recognised necessity of managing water resources in a more integrated manner, none of the projects in this review were represented in

water allocation bodies outside of the local level. This section therefore deals with the involvement of stakeholders in allocation decisions at levels below the national, generally at the local/sub-catchment or district/catchment level and as such it covers some of the same ground as Principle 8.

### ***3.2.1 Stakeholders are more satisfied if decision making is transparent***

For a water allocation system that is not only equitable but is seen to be equitable, stakeholders must be involved in the decision-making process. Where stakeholders are represented in deciding water allocations they are able to see the reasoning behind the decision making and are more satisfied even if the decision goes contrary to their interests.

In Gujarat, India the water users of Datrana pond set up the allocation systems themselves with public meetings held where those that suffered most were encouraged to speak out. The case study reports that:

*“because they had a substantial say in designing the allocation system, the [workshop] participants [a cross section of the community] ... expressed a high level of satisfaction with the allocation.”*

In Bilaspur, India the Gram Panchayat (village ruling body) makes allocation decisions in consultation with Watershed Association and Village Watershed Committees. The Watershed Association has a meeting with the entire adult village population before decisions are made. The population did not complain about allocations even though there was limited water for irrigation because they had good access to the water resource data and took part in the decision-making process.

Although all stakeholders are not involved in the allocations in San Felipe, Colombia, the transparency of the process allows users to challenge others' claim to abstraction and the allocations before they are finalised (Box 6). This example underlines the importance of having reliable data on which to make informed decisions.

#### **Box 6: Transparency of water allocations in San Felipe, Colombia**

The minimum flow data of the San Felipe catchment area is used to calculate abstraction rates. Once the acceptable rates (allowing 20 percent of the maximum flow to remain) have been calculated they are announced in the Town Hall and calls for applications to abstract are spread using local newspapers. CORTOLIMA coordinates requests made for water rights, allowing one month to enable other parties claiming the same right to come forward. Demands for water supply connection are made to an administrative committee and need to be backed up by an environmental impact study and a management plan. As an example, a request to connect a housing estate has been denied because there is not enough available water; similarly a chicken farm was blocked from using the water for industrial purposes since the committee had not yet established industrial tariffs.

However, where stakeholders do not take part in the allocation process they can see it as unjust. The Mbala Municipal Council, Northern Province, Zambia does not hold formal or regular consultations with stakeholders who see the allocation of water as inadequate. In Maharashtra, India decisions on allocations from reservoirs are made by the Irrigation Authority with little input from other stakeholders. The Industries, Agriculture and Cooperation departments were unhappy with their allocations but as the state gave overriding importance to drinking water, the water authority was reasonably satisfied. Table 3 presents

the different stakeholders at state and local level in Maharashtra and their roles in water use, and shows the overriding influence of the Irrigation Department.

**Table 3: Water supply stakeholder classification**

(adapted from Maharashtra Case Study Report)

<b>Stakeholder</b>	<b>Allocator*</b>	<b>Regulator*</b>	<b>Water Supplier *</b>	<b>Monitor*</b>	<b>User*</b>	<b>Opinion Leader*</b>
<b>State</b>						
Irrigation Department	X	X	X		X	
Power Department				X	X	
Agriculture Department				X	X	
Pollution Control Department				X		
Health Department				X		
Water Conservation Department			X			
Water Supply Department			X	X	X	
Animal Husbandry Department				X	X	
Dept. of Natural Calamities		X		X		
Cooperation Department				X	X	
Environmentalists						X
<b>Local</b>						
Farmers					X	
Cooperatives					X	
Village/Municipal Body				X	X	
Cattle Owners					X	
Political Leaders				X		X
Commercial Establishments					X	

- \* Allocator: allocates water to the various users
- Regulator: sets and regulates by-laws pertaining to water usage and management
- Water Supplier: supplies water to users
- Monitor: monitors and implements the by-laws
- User: uses the water supplied
- Opinion Leader: mobilises public opinion to encourage the changing of by-laws etc.

Even though the calculations for water allocations carried out by the Department of Water Affairs and Forestry in South Africa are to be accurate and impartial, many larger stakeholders are unhappy with their allotted amounts; particularly as they normally cannot renegotiate their allocations. Industrialists would prefer less regulation and agriculturists, especially commercial foresters, would prefer larger quantities. The department sees stakeholder satisfaction as important but has to balance it against regional and national interests within a context of a scarce and over-utilised resource.

### 3.2.2 National IWRM frameworks emphasise environmental and social concerns

Where national governments have put in place an integrated water resources management strategy they have seen the importance of social and environmental issues and have regulated their allocation mechanisms accordingly (see also chapter 7).

In the 1950s and 60s India's water use priority was heavy industry; in the 60s and 70s the emphasis changed to agriculture with rich farmers profiting most. In 1996 the Chief Minister of Gujarat stated drinking water was the priority: industrial water tariffs were increased, laws against pumping drinking water from irrigation reservoirs were repealed and up to 40 percent of the stored water in reservoirs can now be used for drinking water. In areas where there has been an over-abstraction of groundwater, the Central Ground Water Authority of India has put restrictions on further exploitation. In Faridabad and Ballabhjarh, Haryana State the Authority

viewed groundwater levels as critical and they prohibited and restricted further construction of groundwater abstraction facilities and registered all existing facilities (Hindustan Times, 1998).

With the introduction of its new water act South Africa has moved from a riparian allocation system to one that assumes no ownership of water but rights of use for basic human and environmental needs. Perpetuity of use is no longer authorised and the preferential right to water use for those who inhabit the riverside has been discontinued. Environmental requirements have become a factor in the new act; they previously were considered but had no legal standing.

### ***3.2.3 Consultation at catchment level is not yet effective***

None of the projects reviewed seem to have a type of consultation group in place for water resource allocations. This is unfortunate because the involvement of each relevant sector, private companies, user groups and other interested groups (especially environmentalists) in the consultation can result in more equitable allocations. The only example is the panel for commercial forestry (which affects water resources) that has been set up in the Mgeni catchment in South Africa. The Forestry Review Panel ensures that when issues pertaining to commercial forestry are to be decided in the catchment, the views of stakeholders across all levels are taken into consideration. The forestry industry is seen as having the biggest impact on runoff to water courses. Previous serious errors forced the formation of this panel so that all interested parties are represented in discussions. Members of the panel include key stakeholders from the department, environmental lobby groups, forest and timber companies, research institutes, NGOs and the general public.

### ***3.2.4 Traditional and community-based methods of water allocation are an option***

Locally, allocation methods that are accepted by the community, either because of their traditional nature or because the community has been involved in the inception and management of the method, are seen as equitable. Box 7 illustrates the management system for irrigation and drinking water in Lumbini, Nepal, set up over 70 years ago.

#### **Box 7: Traditional water allocation mechanisms in Lumbini, Nepal**

In Kapilvastu district, Lumbini Zone, the Kulai Samitee set up *rules* for irrigation water allocation, while drinking water from community and private wells is managed by Water User Committees (WUC). The Village Development Committee (VDC) consults both sectors about allocation, overseen by the District Development Committee. Irrigation water allocation is based on a traditional system of land size *Bighatti Kulai*: a daily amount is available for plots of more than 2 hectare; access on alternate days for 1-2 hectares; and access every third day for up to 0.5 hectares. Local scales are installed at the branching points of canals to distribute water evenly and Badghars (watchmen) monitor users. The system has been operating for over 70 years without any major disputes.

In Gujarat, India the community manages the Datrana pond to provide water equally for all. Allocation systems were set up by the community and SEWA facilitators through village meetings where those suffering the most were encouraged to speak out. The distribution system ensures equal use of the pond and is flexible, allowing for variations in season and need, rather than being calculated on a per head basis. Every member of the community has

equal access: small, medium and large farmers, schools and even neighbouring communities use the pond, and it is situated so that people walk the same distance to collect water.

Although there was no formal allocation mechanism for the users of Tedeapenu Dam in Volta, Ghana there was harmony between the water users from several communities. The purchase of the dam and surrounding land for irrigation farming by an Israeli investor threatened the continuation of their supply. They set up the Tedeapenu Dam Committee to ensure their voices were heard at the District Assembly, the legal authority in water allocation decisions. At the same time the Israeli wanted to join the Dam Committee to ensure cooperation between all stakeholders.

While in many cases there is clear potential for traditional management structures to play a role in water resource management at the catchment level, it is important to realise that in the quickly altering conditions presented by rapid population growth, urbanisation, or agricultural intensification these may become overwhelmed, lose their legitimacy or cease to be relevant to the new conditions.

### ***3.2.5 Adequate water allocation can be agreed upon between stakeholders***

From this chapter we see that because of general reduction of water resources and increase in demand there is a preparedness to prioritise. However, most water resource decisions continue to be made in an ad-hoc fashion at a local level. Nonetheless, laws that have been passed in India show the way forward by ensuring the primary concern is the provision of drinking water, while guidelines in Colombia and South Africa also stress the importance of environmental controls on water and watershed usage such as the prescription of minimum flows in rivers.

### **Coordination of water allocation decisions promotes equitable and transparent decisions**

The prioritisation of water use should be balanced between the economic, social and environmental value of the allocations. Laws should be amended to incorporate protection for domestic users and environmental concerns as in India and South Africa respectively. There needs to be openness and transparency in the dealings of the water allocation body through discussions with all stakeholders and through public access to water resource data and allocation requests. This is best done at catchment level, matching the consultation body's boundaries to that of the water course, while keeping the overall national perspective in view. Stakeholder involvement is linked to decentralisation of the regulatory authority, allowing them to become involved in and assume ownership of allocation decisions at the local or regional level.

### **Encourage traditional and community initiatives to allow for flexible and locally-effective solutions**

Local methods that often rely on trust and cooperation are well-tested, acceptable to the community and flexible to local conditions. More formal regional or national initiatives should assess and build upon, rather than stifle local arrangements.



### 3.3.1 Governments are promoting decentralisation

All projects show decentralisation in DWSS and IWRM taking place. Typically, governments have introduced measures that move away from a centralised, providing role for themselves and ensure a role in the management of water sources for the community.

In sector-specific DWSS projects, management is generally split into three levels (Box 8). For drinking water, national-level roles are often limited to policy and guideline setting: Colombia has produced various national laws and guidelines, among them the Public Domiciliary Services and National Environment System laws that clearly set out the roles of decentralised public service bodies and their responsibilities in domestic water and sanitation supply and environmental protection respectively. At a district or regional level planning, monitoring and technical support and sometimes the management of large water supply schemes takes place: in Zambia, the district water, sanitation and health committees monitor the planning, implementation and operation of water supplies; Zilla Parishads are regional bodies in Maharashtra, India that operate larger water supply schemes, providing water to 700 to 1000 villages. Operation and maintenance of small-scale supply projects occurs at a local level: in Lumbini, Nepal the Kulai Samitee (traditional irrigation user committees) have been operating and maintaining irrigation systems for over 70 years. Unfortunately high flown rhetoric about the need for decentralisation and empowerment of communities frequently masks lacklustre implementation of policies that are often either externally driven (and contrary to the generally centralising instincts of most governments), or simply an acknowledgement of de-facto inability to carry out expected functions.

**Box 8: Decentralisation of water supply management in Ghana**

Ghana Water and Sewerage Corporation is the main public sector institution to develop and manage water and sewerage facilities in Ghana. The Volta RWSS has set up District Water and Sanitation teams (DWST) equipped with skills in community development, hygiene education, sanitation and water supply. District Management Committees also oversee the planning and implementation of projects in the districts and manage the programmes at policy level for the District Assembly. At the community level the water and sanitation (WATSAN) team elected by the community is to manage the water supply, raise funds for its operation and maintenance and carry out hygiene education. A minimum of one-third of the WATSAN members are female. The DWSTs also advise and assist the WATSAN committees in their dealings with private contractors.

IWRM projects have a similarly tiered division, but with geographic rather than administrative boundaries: policy directives are devised at national level; monitoring and resource management at catchment level; and local resource management at sub-catchment or village level.

Of the case studies covered only Mgeni in South Africa, (and to some extent San Felipe in Colombia) showed a truly IWRM focussed approach, with the management of DWSS clearly subsumed within a wider catchment resource management programme. The management structure for Mgeni water is shown in Figure 1.

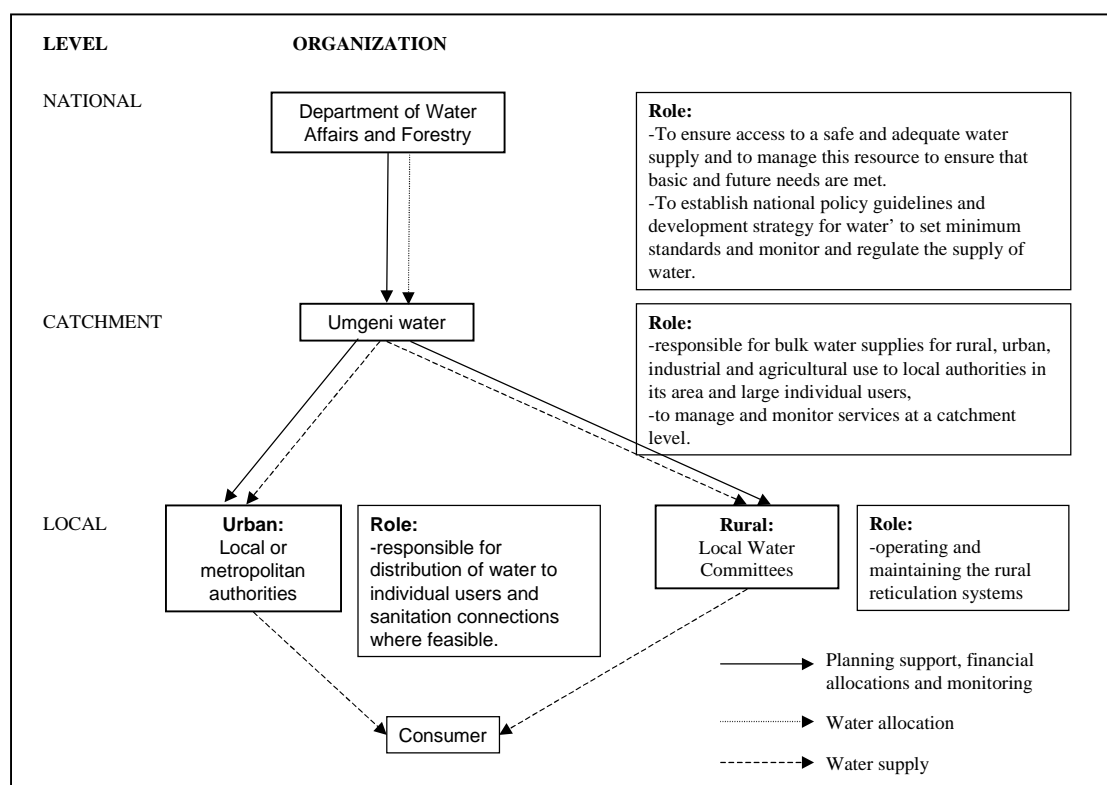


Figure 1: Organizational and operational diagram for water supply and resource management in Mgeni Catchment, South Africa

### 3.3.2 A lack of legal backing for decentralisation leads to confusion

In all project communities, water committees are responsible for the management of the water systems and for catchment management. However, four out of six projects reported that their committees did not have legal backing. They also found that confusion exists between different bodies charged at different times to run the systems. In Volta, Ghana the water and sanitation (WATSAN) committees were set up to manage their village water supply but have no legal backing within the decentralised system. At village level Unit Committees were created as the lowest level of legal decision making. At present there is conflict and duplication of duties between the two committees. WATSAN committees are also encouraged to write a set of water use and hygiene by-laws which then need to be presented to the District Assembly for ratification. Fines for misuse of water are starting to be challenged by defaulters as many WATSAN committees have not had their by-laws ratified. Similar problems occur in Bilaspur, India between the Gram Panchayats and the watershed committees. The watershed committees are in charge of planning, managing and maintaining integrated watershed development works but are not statutory authorities and as a result conflicts arise in asset allocation. In Lumbini, Nepal water user committees are not registered and therefore do not have the authority necessary to manage the water supply systems.

Since 1997, in Mpulamanga, South Africa local government has had the mandate to manage the rural water supplies but often lacks both the skills and resources to carry this out effectively. Previously, village committees ran many water supply systems, having been trained by NGOs. There is now confusion between the two groups as to their roles. Emphasis is being placed on partnerships between the local government and water committees through project steering committees.

In Battambang, Cambodia, parts of the distribution network have been sold to four entrepreneurs who buy bulk water from the Town Waterworks. Little monitoring is carried out of their cost recovery or collection of general data so the effectiveness of the privatisation and the value for money to the consumer is not apparent.

### ***3.3.3 District and regional institutions lack management direction***

District level management and monitoring is often left under-resourced. As implementation occurs at village level, outside funding and other resources concentrate mainly at this local level. Similarly government funding is focused at a national and local level and often bypasses the regional management. This is a critical failing; effective intermediate levels are crucial if stakeholder participation at the community level is to effectively feed up to inform policy making at the national level. Poorly resourced and motivated intermediate level agencies act as a block to the free flow of ideas from national level to community and back.

District level water, sanitation and hygiene education staff in North and South Zambia complain of a lack of transport and funding to enable them to supervise and advise in the construction and operation of local DWSS systems. In Maharashtra, India the Zilla Parishad (regional water managers) are not able to carry out repairs on local and regional water supplies without contributions of up to 25 percent of the costs from the village Gram Panchayats. Rural regional councils in South Africa are mandated to manage secondary water supply and sanitation where there are no water boards present. As they have limited management capacity, they tend to concentrate on water supply with the result that there are no sanitation facilities in many rural areas.

Even with the decentralisation of management in place, Umgeni Water, South Africa considers that fragmentation of responsibility and a lack of consistent national, regional and local policy for IWRM complicate their management problems. Inter-agency and inter-departmental boundaries at all levels of government make interference by government into the group responsibility of communities likely.

### ***3.3.4 Local initiatives can be strong but often lack capacity and orientation***

Traditional and community-based methods for drinking water and irrigation are often well-supported by the community. Community management does, however, require management skills from people who generally have little formal management experience or formal education. Time and resources are required to train management committees to run water supply systems and water resources management bodies.

*Local level management involving illiterate women, India*



In Gujarat, India, the success of SEWA in promoting management by the community is attributed to the many resources provided, especially in training. Similarly in Lumbini, Nepal, problems with illiteracy in villages have meant that a high level of training for bookkeeping and minute taking was required. Basic concepts of management also needed to be instilled. Even then, disputes are still often sent to the district level for solving. Umgeni Water in South Africa provides managerial, technical and financial support to 70 Local Water Committees. It helps LWCs for up to two years mainly with labour disputes, individual water connections, meter readings and accounts management. Projects are handed to the community to manage at the end of successful training. Surveys have shown that 90 percent of the communities are satisfied with the management of the water supplies.

Where there is not a strong sense of ownership by the community and accountability of the committee they tend to fail: the community is no longer interested in the water supply and the committee becomes ineffective. The membership of many of the water user committees in Volta, Ghana have not changed since inception and most of these rarely meet, the secretary or chairman being the only ones having active roles. Some communities no longer have respect for their WATSAN members and as they cannot change the members, they ignore them. There is an inability or unwillingness on the part of some committees to have their accounts viewed by the public, which has led to tariff collection difficulties from parts of the communities. Inter-ethnic problems also have reduced the effectiveness of the committees.

In Mbala, Zambia committees manage protected wells. Some have only met once, others wait until there is a problem or until a project worker arrives before meetings take place. Decisions are typically made by a headman, chairman of a well committee or politician rather than the whole committee, or at village meetings.

### ***3.3.5 Community management remains within government guidelines***

There is undoubtedly a commitment to management of water supplies at the lowest level in all the reviewed projects. Water user committees or similar organizations have been set up to manage the projects, and a community's responsibility, through fee-paying, for the operation and maintenance of the supply is also in place in all projects. However, these measures are generally only following the strategies laid out by the government. Admittedly all projects are implemented by, or in close partnership with, government departments yet few seem to advance thinking and practice around decentralisation in their country.

A notable exception is the project run by SEWA in Gujarat, India, whose commitment to self-enhancement of women in villages has led to community participation and management at all stages of the project. The villagers have been involved since the inception and their level of knowledge of the project and its management procedures are high. Women make up the majority of members in the water user committees and hold the positions of influence within them. Female monitoring teams have been set up by the water user committees to alert the local authorities about leaks and water quality; they are also to be trained in basic maintenance of the systems. Similar monitoring activities by communities are taking place in San Felipe, Colombia.

In Volta, Ghana an innovative emphasis on training of local contractors and suppliers as well as managers is leading to increased control and autonomy at the lowest levels. Water user committees can call on trained local suppliers (many of them women) and contractors to construct and carry out repairs on their water supplies and sanitation facilities (see chapter 9) rather than wait for district construction and maintenance teams.

### 3.3.6 *Decentralisation of management is ongoing, but much remains to be done*

From this chapter it may be concluded that management of water supplies and water resources is being decentralised to allow control at the lowest levels. The setting up of a strong legal framework is essential to define the roles and responsibilities between the different management levels and ensure logical links between them. Without it the potential of decentralisation of management will fail to achieve its potential.

The private sector will become more involved in project implementation and operation and maintenance of water supply schemes: therefore roles and partnerships with the private sector need to be clearly set out with safeguards for the consumer. The roles of central and regional authorities will also change to reflect this, becoming more facilitators and monitors than implementers.

For the DWSS sector, the role of regional management is likely to be aimed more at facilitating local management through training and technical expertise than service provision. There is a special need for community management at the local level to ensure the continued working of the water supply systems. This will require a lot of training and capacity building both of local management committees, to ensure they are able to carry out their role, and of local government to ensure that properly support them.

DWSS and IWRM remain separate in most countries. This is a serious weakness, as true IWRM implies the subsuming of all water-related sectors under a common umbrella. Box 9 shows how the different structures of DWSS and IWRM must come together at various levels to ensure proper integration within a decentralized framework.

#### **Box 9: Institutional levels and roles for decentralised IWRM**

##### ***National body:***

Formulating legislation and guidelines for IWRM with DWSS a key sub-sector; regulation of public concerns such as water quality and environmental health standards; required to delegate responsibility to lower levels.

##### ***Catchment-level/ district government institutions:***

Coordination of direct and indirect water use within a catchment; access to data regarding water quality, supply and demand; and practical implementation of IWRM projects. This institution requires a clear mandate for IWRM to prevent responsibilities merging with those of other government agencies. Within this framework DWSS projects must look to the catchment level institution for water resource decisions while also integrating with health, sanitation and education programmes. DWSS decision making will continue to be overseen by relevant local government, who will be either subsumed into or delegate responsibility for water resource decisions to catchment bodies.

##### ***Local management bodies:***

Practical implementation of IWRM including DWSS projects by a local institution, with guidance from higher levels such as the district and where necessary sector-specific agencies. Enabling of local fora and decision making through consensus, and provision of reliable water services and management systems.

(adapted from IRC, 1997).

## **3.4 Capacity building is the key to sustainability**

Essential to the decentralisation of IWRM is the building of capacity in newly mandated local organizations such as water user committees, to function as water resource managers. Similarly, as roles of government departments and other bodies change from service providers

and managers to facilitators, they need training to adapt to their new responsibilities. Capacity building refers to three general areas: creating an enabling environment with an appropriate policy and legal framework; institutional development including community participation, and human resource development and the strengthening of managerial systems (Alaerts et al., 1991).

Only one case study reported that its government did not strongly support capacity building through guidelines and policies. Nevertheless, all reviewed projects carried out capacity-building activities that were generally based at the community and internal staff level. Two projects seem to be leading the field by placing capacity building as a core activity in their programmes and by incorporating it into their relations with the community and other institutions they work with.

Progress is being undermined by the lack of adequate resources being directed to district levels and the lack of monitoring and evaluation to assess whether approaches are indeed building capacity. The contribution of traditional community management structures is only gradually being recognised and sensitivity to local cultures incorporated into training programmes.

### ***3.4.1 Most governments promote capacity building***

Legislation that underpins decentralisation and community management is being put in place. Of the eleven reviewed projects, only Cambodia reports that there is little government support for capacity building in IWRM and Lumbini, Nepal does not mention that the government has a role. All of the other projects' governments are stated as supporting capacity building through national policies such as the National Water Policy in Zambia and the National Community Water Supply and Sanitation Programme in Ghana.

At the state (regional) level in Maharashtra, India a training working group consisting of people from all concerned departments and agencies has been set up to plan strategy, identify training needs, design modules, identify training materials and prepare training manuals. In Colombia a national structure, the General Directorate for the Integration and Development of Community Action (DIGEDAC) has been set up. Its main functions are to facilitate capacity building of social and community organizations; to support their promotion and development; and to encourage a citizen and community culture through encouragement to build organizations that follow the mechanisms of participation at national, departmental and municipal level. DIGEDAC has set up a community training school that has the following programmes: design and dissemination of teaching packages in development organization and community participation; a national and regional net of information programmes and community training; and monitoring and evaluation of these activities. Both countries' programmes also have an emphasis on technical skills in water efficiency measures such as training in water connections, installation of meters and meter reading.

### ***3.4.2 Capacity building components are included but not monitored***

All of the eleven projects report capacity building as important. Activities carried out are detailed in Table 4, but could be summarised as centring around training of the community committees that managed the water resources, training of community members to operate and maintain the water sources and training of government and project staff to carry out the management of the project. Techniques used were generally participatory and included participatory rapid assessment (PRA) tools and training of trainers.

**Table 4: Training activities reported in the various reviewed projects**

<i>Project</i>	<i>Capacity building activities</i>			
	<i>Training WUCs</i>	<i>Training O&amp;M operators</i>	<i>Training staff</i>	<i>Other activities</i>
Maharashtra, India	X		X	
Volta, Ghana	X	X	X	training of suppliers, contractors, school teachers
Cambodia	X	X	X	
Bilaspur, India	X		X	
San Felipe, Colombia		X	X	training of community water quality and sanitation inspectors
Kalomo, Zambia	X	X	X	training of women's clubs in hygiene education
Lumbini, Nepal	X	X		training of village health workers and teachers, female literacy programme
Mpulamanga, South Africa	X			
Gujarat, India	X	X		training of villagers to manage all steps in the project cycle
Umgeni Water, South Africa	X	X	X	
Northern Province, Zambia	X	X	X	

All of the projects train the water user committees and most report the training of operation and maintenance personnel (either their own or from the community) and of their own staff. Two projects placed more importance on capacity building.

In Gujarat, India, SEWA's main focus is on the empowerment of poor women, and capacity building is necessarily a major part of this. As their activities are demand-driven they must build village women's capacity to articulate their demands. They also train women in continually planning, implementing, monitoring and evaluating during the project cycle to assure the sustainability of their activities. They work with leaders and provide on-the-job and formal training to help build capacity to:

- organize and mobilise themselves and their communities
- manage financial matters such as bookkeeping, accounts and banking
- plan, write reports and present ideas
- market products

SEWA also trains them in more strategic issues such as organizational skills to establish linkages with government programmes. Many programmes opted for the traditional approach to training programmes: to produce new training materials (which could be measured as an indicator of the projects success), thereby duplicating and wasting resources, rather than evaluating existing materials to see if there were any gaps that required filling. Monitoring and evaluation of process activities such as capacity building, and associated benefits that may develop over a period of years following implementation was not carried out, often because of the limited time horizon of donor funded projects.

**Box 10: Capacity building in Volta, Ghana**

As the Volta Regional Water Supply and Sanitation Project has expanded to all 12 districts in the region, extra training capacity is needed. The training unit is looking to develop other local training institutions and then gradually hand over training assignments to them with the eventual goal of institutionalising the training programmes. The development of the training institutions requires major inputs from Volta RWSS which include:

- training of academic staff of the institution
- rehabilitation of physical infrastructure (building repair and furniture provision)
- pre-financing of teaching equipment, especially manuals

The commitment Volta RWSS has made to capacity building is strong. Government and project staff in all areas of the project have received training and where necessary equipment to carry out their roles. Training is also given to much of the community, increasing their ability to benefit from the water supplies. People and groups receiving training include: WATSAN committees, teachers, artisans for latrine building, school teachers for health education, suppliers and contractors.

**3.4.3 Local authorities often lack capacity and resources**

Much emphasis in capacity building is placed at a national and local level through the intervention of the government and locally acting NGOs. There is often a gap in regulations, training and especially equipment at a district or regional level. In both the Northern and Southern Provinces of Zambia, district water, sanitation and health committees lack the financial resources for necessary training and support to village committees, and in the Northern Province, village committees lack the capacity to organize themselves. The RWSSP in Volta, Ghana is able to counter this through provision of office equipment and training to District Assemblies as it is a regional actor, able to see and act upon the deficiencies at district level.

**3.4.4 Local traditions and skills are an important asset that can be built upon**

Few projects reported a willingness to investigate and use local traditions and skills. It is likely, though, that this is happening in many projects but in an unstructured way whereby much is not noticed or used. An indication of the importance put on these by the projects in Volta, Ghana and in Umgeni Water, South Africa is that staff were given training to speak in local languages and dialects if they could not already, thus enabling them to be more sensitive to local cultures. However in both Volta, Ghana and the Mgeni Catchment, South Africa, in spite of this and other resource and management capacities, setting up water committees and imparting knowledge was found to be difficult as it threatened the political balance.

In Lumbini, Nepal the implementing agency has built on the existing capacity of the traditional irrigation management systems rather than starting up new systems. In Gujarat, India, SEWA aims to build on existing capabilities and remain flexible enough to meet local needs and circumstances, but they have been constrained by government guidelines which mean that as part of the official approval required to start a new project a college graduate is needed on the team for Watershed Development Programme projects. There are few graduates within the community and few city graduates want to stay in the villages for extended periods of time.

**3.4.5 Building capacity in local communities requires patience**

Four projects found that the knowledge and understanding specific to the management of water sources of the communities proved to be limited. Some realised that efforts to build capacity in local management committees was slow, especially when new methods of learning

and understanding were introduced. Similarly, the motivations of the people involved could and were likely to be at odds with those of the project team (Box 11).

**Box 11: Conflict of interests in Umgeni Water**

In carrying out the Vulindlela water supply scheme in South Africa, Umgeni Water's objectives included providing job opportunities for the community and empowering people through skill and capacity development within the community. A major drawback was seen in the timing of the training: the executive committee was elected from the community as the decision-making body during and after construction with recommendations being made by the project manager. The training of the executive committee took a long time before they were able to identify the needs of the community, preventing further capacity building of community members from taking place and delaying the whole project. The executive committee was also unwilling to be too consultative in their decision making as this was seen as a dilution of their power. In order for community participation to be successful there needed to be a degree of certainty in product delivery from Umgeni Water. Disputes broke out with threatened violence when one section of the work force was to be laid off and new workers were to start on a new area outside the district of the first. The project was halted and lengthy discussions took place before it could be continued.

In Gujarat, India, SEWA realised that villagers found lessons from formal classroom lectures difficult to absorb unless they were mixed with practical sessions. Substantial time was needed in some cases in just getting people used to the classroom training and ensuring they would get the most from it. Eventually through continued training the local organizations were able to carry out the training of others.

In Lumbini, Nepal, and Bilaspur, India illiteracy is a major constraint to successful training and female literacy classes are a long-term part of the capacity building programme.

**3.4.6 Capacity building needs to be a main focus**

From this chapter it may be concluded that capacity building is felt to be important and does receive attention. Strategies, however, are still rather conventional and under resourced, and continue to remain largely focussed on the community, ignoring the necessity of developing capacity in higher, supporting levels. Bridging this gap is crucial if effective IWRM is to become a reality. As scale expands, communities become more heterogeneous and fragmented and the need for legislation and facilitation (rather than consensus and tradition) becomes more pronounced. It is thus necessary to:

**Recognize capacity building as a priority in sustainable DWSS management**

Government and donors must recognise the need for capacity building at all institutional levels, and particularly at that of local government, as roles and responsibilities adjust under the process of decentralisation. At a national level governments need to enhance their capacity to enact and enforce enabling IWRM legislation. Furthermore at the regional/catchment level government and stakeholders (water boards, catchment councils) need both the necessary legislative backup, and the training and resources, to carry out their role of supporting community/grassroots management structures. Regional and district-level institutions including the private sector need to provide guidance and support to lower levels through training/awareness raising and monitoring and evaluation of progress in capacity building. At district and local levels emphasis should be on training/awareness raising in day-to-day management functions such as O&M. A strong component of awareness raising should relate to gender and cultural considerations such as valuing traditional management practices and institutions.

### **3.5 Involvement of all stakeholders is required**

The realisation that all stakeholders need to take part in discussions and decisions about water resources management is only now starting to result in positive action. Many DWSS projects in developing countries now promote stakeholder involvement at a local level to encourage community ownership and sustainable water supplies. IWRM though, signifies the involvement of all users of a water resource. All of the eight reviewed DWSS projects promote stakeholder involvement with communities having a role in decision making. It was found that the involvement of users in IWRM discussions is more difficult to sustain than in DWSS fora, probably due to the less quantifiable and direct nature of their “stake” in IWRM. Out of all the projects reviewed, only two of the three IWRM projects seem to indicate any level of stakeholder representation at a higher catchment level through stakeholder watershed fora. Even these two, though, do not appear to be front runners as they had not started such discussions to create a platform for analysis and decision making. Instead they initiated this type of activity when a concrete problem occurred, such as the change of catchment characteristics due to poorly regulated forestry activities in Mgeni Catchment, South Africa. These fora are therefore only single issue bodies and do not tackle any other considerations of IWRM. At a national level, stakeholders are not directly represented through user groups in policy decision-making bodies.

#### ***3.5.1 Stakeholder fora exist at community level but are often ineffective***

All of the projects encourage stakeholder involvement at the local level. Water user committees or their equivalent are the norm for managing rural water supplies although their effectiveness varies. Ideally committees should represent all sectors of the community, with an importance attached to the involvement of women in management (see Box 12). In some villages in Volta, Ghana the respect for water user committee members diminished and initiatives they carried out were ignored due to the perceived lack of accountability to the community in keeping accounts. A reflection of this was that several years after the setting up of the committees, no re-election of members had taken place. In the Mgeni Catchment, South Africa friction between political groups within the communities is seen as an impediment to reaching agreements.

All case studies indicated that stakeholders were involved at some level of decision making in water resources management or in the planning and operation and maintenance of the water supply systems, but the actual levels of involvement and the prolongation of the interest in the programme were often limited. All of the four case studies that noted the depth and continuation of involvement by the communities also stated that there were problems and difficulties in maintaining levels of interest. In Cambodia, inhabitants of Phnom Penh using the water supply are only interested in getting enough water but do not want any involvement in the management of water resources. Similarly, in Battambang information is only requested by users when issues directly relate to them, such as a change in tariffs. Although the community in Panh Nha village, Cambodia was involved in project planning, management and hygiene education at the start of the project, genuine commitment dropped off quickly. Similar efforts were made in Mbala, Zambia. However, the results of a community survey showed that people thought the main stakeholders were Irish Aid (the project implementing agency) and the Ministry of Health, while few thought of themselves as stakeholders. Approximately 70 water supply schemes have been or are in the process of being constructed in the Mgeni Catchment, South Africa. The schemes have been designated to be handed over to the communities to run once they have the management capacity, originally after two years. Although training has taken place there is still a lack of capacity in the communities and

Umgeni Water has carried out a only partial handover while maintaining control over many aspects.

**Box 12: Local stakeholder involvement in Gujarat, India**

SEWA realised that by merely allowing stakeholders to participate, those with most at stake: the villagers and especially women, still do not have their voices heard, as they have the least experience and power to communicate with higher authorities. This led to the premise that rural women must be given and sometimes taught the capacity to become and remain involved and to gain control. Unless local stakeholders have the capacity to be involved they cannot negotiate with other stakeholders at higher levels such as landowners, local government and industry.

To counteract this and to ensure the continuation of management committees at a local level in Gujarat, India, SEWA heavily prioritised the use of funds and resources for training committees in management functions. SEWA uses three main approaches to ensure that local stakeholders are involved: empowering poor women to voice their needs; the organization of local management; and holding open village meetings that are designed to ensure that everyone (especially minority and vulnerable groups) are able to speak.

The villagers recognised that their involvement at every stage was vital to develop their ability to organize and control the projects. People said that increased participation heightened their sense of ownership and their ability to organize and articulate their needs. It also increased the government's awareness of village issues and even their own responsibilities. As a result many villagers found the government was more willing to co-ordinate with them in other areas.

It is of course only natural that people will be more interested (and more willing to invest precious time) in managing issues that are local and affect them directly. However, it is also important that for IWRM to become a reality they should also be involved in the higher level decision-making process. A key area in which work is needed is in identifying the most appropriate strategies to ensure that grassroots concerns do indeed get heard and taken into account at higher levels of decision making.

**3.5.2 Regional or catchment-level stakeholder fora are advisory in nature**

Only two of the projects indicated higher level fora with any real level of stakeholder involvement. All of these were advisory in nature: they could only make recommendations to decision-making bodies that were generally made up of technical or political appointees. Similarly they were also single issue bodies, without the mandate to look into the broader concerns of integrated water resources management. In many ways this is the reverse of what is needed for genuinely decentralised IWRM, under which it is government that should act in a facilitatory and advisory role, and stakeholders who make final management decisions.

In water supply, the steering committee in the Mgeni Catchment, South Africa has representatives of all key stakeholders including conservationists present but serves only as a liaison forum with the developer through the planning and construction phases.

In the management of water resources, the only committees with any stakeholder involvement are those advising on commercial forestry and its effects on the catchment. The Afforestation Review Panel was set up after mistakes made in designating the areas planted with commercial forests caused changes in the catchment characteristics. The panel advises the Department of Water Affairs (DWA) on disputes and claims in the commercial forestry sector. Panel members include representatives from DWA, environmental lobby groups, forest and timber companies, research institutes, NGOs and organizations representing public interest. A similar Forestry Management Committee exists in Bilaspur, India.

### ***3.5.3 National or state level fora do not consult users in policy making***

At a national or state level the fora for advising and deciding on IWRM policy are often controlled by or made up entirely of government staff. The committees consist, at best, of representatives of monitoring and research institutions as well as regulatory and supply bodies. User groups do not even seem to be involved in consultation fora at a national level. In Maharashtra, India the State Water Resource Authority is said to represent all stakeholders but consists only of the relevant departmental secretaries in the Authority. A notable exception is in Ghana and is mainly due to the emphasis placed by the Ghanaian government on decentralisation. In the Ghanaian system stakeholder fora have wide ranging roles to play in IWRM at national, regional and local levels as shown in Box 13.

#### **Box 13: Multiple-level stakeholder fora, Volta, Ghana**

Nationally the Water Resources Commission regulates and manages water resources and coordinates policy. Stakeholders, representatives from the drinking water supply and irrigation agencies, the Water Resources Research Institute, Environmental Protection Agency and Forestry Commission are members of the Commission.

The District Management Committee represents women's groups, WATSANs, training institutions such as the School of Hygiene as well as other interested groups. It coordinates and monitors water supply, sanitation and health education activities and links these activities to the District Assemblies and Regional Management Committees.

At the village level, a WATSAN Committee is the forum for local stakeholders; the committee is elected by the community at a general meeting and is responsible for the management and maintenance of water and sanitation facilities.

### ***3.5.4 Mechanisms for conflict resolution are in place but not very effective***

An essential prerequisite for stakeholder involvement in IWRM is the existence of effective and transparent conflict resolution strategies. Only four of the case study projects outlined conflict resolution mechanisms, three of which were through existing lines of management as shown in Box 14.

#### **Box 14: Conflict resolution in Lumbini, Nepal**

Disputes are taken up by the Water Users Committee and discussed; recommendations are made to the Village Development Committee (VDC) and together a decision is made.

Most problems are solved this way but the dispute can be passed on to the District Development Committee (DDC) if necessary. The DDC will then send a team made up of members from the DDC, the Water Resources Management Committee, the line agency, VDC and user groups to investigate. While there they will organize meetings with the villagers to resolve the problem.

The district administration office can become involved if the dispute is not settled at this point. Disputes can last up to two years before full resolution.

In South Africa Water Courts have been operative since 1956 to resolve conflicts about water allocations amongst different sectors and water users. Their role was generally minor or ineffective as:

- they had no real power or criminal jurisdiction to deal with offenders or to review any administrative actions;

- they were not accessible to the general public, especially rural people, as they were based in major cities, placing them far from where the disputes took place;
- the judgements were not available to the public.

Generally disputes at rural level in South Africa are solved by the local water committee or if not, go to a steering committee for resolution. Water quality issues in South Africa are always settled in a court of law, which can be inefficient due to a lack of training, resources and information.

### ***3.5.5 Political or financial restrictions reduce the influence of stakeholders***

Regional fora in IWRM can be misguided by politics, and local or district fora often lack adequate financial capacity to ensure their operational status. Government in its role as regulator and facilitator has a clear duty to ensure equitable representation of all stakeholders, and in the absence of it fulfilling this role effective stakeholder involvement is likely to remain elusive.

In Mgeni Catchment, South Africa powerful stakeholders are well-represented on water boards at catchment level, whereas domestic users and conservation interest groups are often unable to make their views heard on allocation, pricing and environmental management issues. This translates into economic development often taking precedence over other aims such as environmental conservation, as large parts of the catchment have a low development status.

Entrepreneurs involved in water distribution in Battambang Town, Cambodia participate in water resource discussions with the town authorities but are not represented in decision-making meetings. The lack of consultation between the entrepreneurs and the local authorities has caused operational problems when an entrepreneur extends his network without the agreement of the authorities.

In Mbala, Zambia there are committees at village, district and provincial levels but members do not attend or are not active due to budgetary limitations. District level WASHEs exist on paper only, because staff lack the resources to attend village meetings or supervise work.

### ***3.5.6 Links between local, regional and national fora are rare but essential***

In the Mgeni Catchment, South Africa, Water Committees are set up to manage rural water supply schemes. The chair of each Local Water Committee is also a member of the Supra Executive Committee at catchment level which looks at broader issues WRM. This provides links between the two committees; it tends to produce a coherence in decision making at the two levels and ensures the voices of end users are also heard at catchment level.

Crucially none of the case studies have shown they have instigated successful stakeholder involvement at both regional/watershed and local levels. They have concentrated on the involvement of large users and pressure groups at a regional or watershed level or on the involvement of individuals and local user groups at a community level.

SEWA in Gujarat, India has concentrated on empowerment of the villagers, and especially women, sometimes giving them confidence to participate at a higher level with government officials. However, they have not shown that they have worked directly with larger stakeholders such as landowners and government departments to set up fora where the villagers are treated as equal stakeholders. While this is currently beyond the remit of many of

the operating agencies that work directly with communities in DWSS, it again underlines the importance of including DWSS in wider IWRM considerations.

Umgeni Water in South Africa works with stakeholders at a watershed level but has found a lack of interest from villagers involved in rural water supply and sanitation programmes even where a lengthy campaign of community mobilisation was carried out. They also found that the communities' interest in water resource issues was less pronounced than concerns about water supply. This is most likely because their stake in water resources is more difficult to quantify and their benefits are not as direct, and demonstrates the importance of clearly establishing a link between the two in the mind of a community if genuine stakeholder involvement in IWRM is to be achieved.

### ***3.5.7 Learning is needed about effective stakeholder involvement***

From this chapter we can conclude that for the equitable management and development of water resources stakeholders must have a part in the decision-making process. Sufficient data for informed discussions and decisions on the equitable use of water resources must be available in an accessible and appropriate form. It should include among others good quality physical catchment-level data and current and projected water demands. Two important suggestions to enhance IWRM are:

#### **Develop fora for stakeholder participation that cover all aspects of IWRM**

Decentralised IWRM institutions provide a vehicle for stakeholder consultation through access to required catchment-level information. DWSS must be fully integrated into wider IWRM, as must other aspect of water management currently dealt with on a sectoral basis. Mechanisms are needed to ensure fair participation and representation of all user groups, including environmental and domestic, while local government needs to be strengthened to play a supporting and facilitating role. The participation of local users through community groups requires a commitment to training and education, to ensure they have the ability to make their views heard. Methods to enhance links between committees at different levels through joint membership or other means need to be developed to ensure the compatibility of decisions by different groups and a "filtering up" of ideas from the grassroots.

#### **Improve the legislative underpinning of stakeholder involvement**

Real stakeholder control implies a legislative underpinning of the role and authority of user fora. Legal mechanisms are needed to guide fora at the various levels (regional, district, local) and internally resolve stakeholder conflict, possibly supported by an external regulatory agency. Local communities need to be given the ability to address water quality and quantity changes through formal by-laws or informal arrangements within current legislation.

## **3.6 Efficient water use is essential**

Wastage of water is seen by staff throughout the projects although it is not always recognised as an important issue by the users. All the projects have incorporated components that promote efficient water use whether through physical measures, education, by-laws or tariff structures. However, neglect of water supplies, not enough emphasis on the proper management and maintenance of the systems, and lack of feelings of ownership by the end users have caused water losses of up to 60 percent in some DWSS systems; greater than that in irrigation systems. Only three projects report systems of preventive maintenance, others carry out repairs when needed or maintenance on an ad hoc basis. In four projects, new initiatives are being implemented in training, tariff structuring, irrigation technologies and

overall specific guidelines in reducing losses. Some of these initiatives are project-led and some imposed by the governments.



*Efficient water use:  
rainwater harvesting, Cambodia*

Where people practice measures for efficient water use it is because they value water as it is scarce, because they have to pay for the water, or because they have been educated and motivated to use more efficient water practices.

Improvements in water supply and use are being made through education of users; through better management, operation and maintenance methods and training; through the use of better technology and through the introduction of a tariff system (see section 3.7.3).

As populations increase and the yield and quality of existing sources decrease, efficient use of water is becoming in itself a water source with the effect that additional users may be connected to existing schemes.

### ***3.6.1 Inefficiencies in water use may have several causes***

Investigations brought out three main causes of inefficiency: technical failings of either equipment or methods; poor management, especially in the maintenance of systems; and misuse, lack of care or poor methods of use by consumers. Often inefficiency can be traced to a combination of some or all of these.

Leakage in the three settlements in Maharashtra, India were reported as between 0.03 to 0.1 litre per second per standpoint connection (reported as extremely high in the case study). Defects were mainly due to poor construction methods and materials and poor maintenance.

Poor management and maintenance programmes in Cambodia have led to 36 percent of the 3,000 families connected to Battambang Town waterworks not having adequate water in the dry season. Urban areas in Cambodia suffer from an unreliable electricity supply, pipe leakage and illegal connections which result in frequent water shortages. Estimates of 60 percent losses in Phnom Penh's water supply were reported in 1996 by the town's water and sewerage authority.

Although the water supply systems inspected in the two communities in Volta, Ghana showed no signs of leakage, the overflows from spring catchments went to waste. This water might be able to serve other villages. However this was not considered because the villages were outside the administrative area targeted by the donor.

In San Felipe, Colombia, water supply was well over the treatment plant's designed capacity of 200 lpcd. In 1991 an inspection showed over 90 percent of users had leaks on their premises and provision levels in many households were over 350 lpcd and some even topped 1000 lpcd.

### ***3.6.2 People's view of wastage can sustain poor behavioural practice***

Many of the populations from the case studies do not see the value of water conservation. Although losses are seen, few people realise the cumulative effects of the small leaks they notice. People's often subjective views can reduce the effectiveness of campaigns for behavioural change as they see faults in others but not themselves. Furthermore as conditions improve they forget the previous hardships and the practices that went with them. Meanwhile single-sector focus projects and education campaigns can change attitudes and practices in some areas but wastage still occurs unnoticed in others.

In Tonga, Mpulamanga, South Africa, people could see that practices that encouraged wastage were widespread, they only did not consider them a problem as they failed to see the cumulative effects of these small losses. Only after lengthy discussions during workshops held for this review did they come to realise that efficient water use could be an important source of water.

People's subjectivity has allowed them to be critical of others yet lenient on themselves: in Gujarat, India although almost all the villagers saw themselves as careful and responsible users of water, over half complained that their neighbours were still wasting water. People complained their neighbours washed dishes, bathed and allowed their animals to drink from their water source.

As there have been sufficient rains in the Mgeni Catchment in South Africa over the past 10 to 15 years, the memories of water shortages and the need for efficient water use have faded. Similarly in Mbala, Zambia, previously abundant supplies have meant that few see efficient water use as an important issue: water is a "gift from God". Even more serious was the view of some of the Mbala local council members that leaks were a sign of a sufficient water supply rather than of inefficiency and money wasting.

The people of Maharashtra, India did not regard inefficiency in water usage as a major problem partly because there is no metering of water consumed, which makes losses difficult to measure. They saw excessive water use in irrigation as a bigger problem due to the effects of increased soil salinity and resulting infertility that they experienced directly.

Similarly, where an education and mobilisation campaign concentrates only on one aspect of water losses, the effects are easily seen. In Bilaspur, India, a focused campaign on water conservation (especially by improving the infiltration of rainfall runoff) resulted in villagers seeing that they were inefficient in the harvesting of rainwater for irrigation. However other inefficiencies not targeted in the programme, such as losses in drinking water and irrigation schemes, were not considered important.

### **3.6.3 *Water is valued where it is scarce or because of tariff structures***

Where people expressed an awareness of the need for efficient water use it was generally due to their realisation of the value of water because of its scarcity, because they had been educated to understand its value or because a monetary value had been put on it by the suppliers.

Where the environmental conditions are a constraint, such as the arid lands of Gujarat, India, awareness of the need to conserve water was high in the communities questioned. Debaibhai, a local villager, was quoted in one of the workshops as saying:

*“Every drop of water has more value to us than a block of gold. We don’t waste it because we have none to waste.”*

People already reuse water in the communities studied in Gujarat: cooking and bathing water is used in vegetable gardens and clothes washing water is then used for dishes. Excess drinking water is auctioned off by the Panchayat for agricultural purposes. As SEWA continues its programme of water supply improvements it fears that the increased availability of water will reduce the villagers’ urges to use water efficiently.

### **3.6.4 *Measures to improve water efficiency are reported in all case studies***

The measures taken by the projects to reduce inefficiencies in water use are linked to the main causes of the inefficiency. They can be split into four areas: improvements in the management of the system; legal and regulatory measures; technological improvements and education of the water supply users, managers and caretakers. Table 5 details the measures taken by the projects that have been reported in the case studies.

It can be seen that generally the eight DWSS projects (the first eight in Table 5) implement wider-ranging measures for efficient water use than the three IWRM projects. Typical activities are the education of communities in less wasteful methods of water collection and use and the training of maintenance people in proper operation and maintenance practices. It is interesting to note that in Kalomo, Zambia the community seemed to have initiated practices themselves (Box 15).

The IWRM projects do not seem to implement such wide-ranging measures for a variety of reasons. Umgeni Water’s role has been as a bulk water supplier: it does not supply to the end user directly and is therefore less concerned with water conservation efforts by individual users. Its role is now changing to provision to end users as well as bulk provision and it is changing its operating procedures. A pilot scheme in leak detection in small bore pipes was to start in 1998. SEWA, in Gujarat, India carried out an awareness campaign for the value of water but saw that communities were already carrying out many water-efficient activities such as water reuse and auctioning off excess drinking water for agriculture. Although in Bilaspur, India Watershed Committees have been set up, their main role is specifically to improve water runoff infiltration through a programme of environmental measures.

**Table 5: Measures taken by the projects to improve water efficiency**

<b>Project</b>	<b>Reported project activities to improve water efficiency</b>
Cambodia	<u>Management:</u> Financial guidelines to reduce water losses, strengthening internal management and maintenance systems, increased personnel for meter inspection and tariff collection <u>Regulatory:</u> Warnings and fines for misuse
San Felipe, Colombia	<u>Management:</u> Tariff structures to promote efficient water use (see principle 8) <u>Technological:</u> Installation of meters alongside tariffs to reduce waste
Maharashtra, India	<u>Technological:</u> Drip and sprinkler irrigation to reduce irrigation losses, improved domestic fittings (taps, float valves, latrine design) <u>Educational:</u> Hygiene education: use and reuse of drinking water, animal water sources, reduction of vandalism, training of village water technicians
Volta, Ghana	<u>Management:</u> Leak reportage to water user committees, repairs and annual inspection by local contractors and preventive maintenance by caretakers. <u>Regulatory:</u> Rules regarding water use <u>Educational:</u> Training of water user committees, caretakers, local contractors in operation and maintenance of water supply
Lumbini, Nepal	<u>Management:</u> Preventive maintenance and repairs by VMWs <u>Regulatory:</u> Rules and fines to reduce misuse <u>Educational:</u> Education of users to prevent wastage and to report faults
Northern Province, Zambia	<u>Regulatory:</u> Prevention of use of well water for brick-making in dry season
Kalomo, Zambia	Although no measures were reported as directly initiated by the project, it seems villagers were able to carry out measures themselves (see box 12). It is not reported if the project staff were involved in facilitating or promoting these ideas as well.
Mpulamanga, South Africa	No specific activities mentioned although community management and ownership through payment was seen as important in efficient water use
Ungeni Water, South Africa <sup>1</sup>	<u>Management:</u> Tariff structures to promote efficient water use <u>Technological:</u> Leak detection and regular maintenance of bulk water supply pipes
Gujarat, India <sup>1</sup>	<u>Educational:</u> Awareness campaign for value of water
Bilaspur, India <sup>1</sup>	<u>Technological:</u> Runoff catchment through various methods

Notes:

1) IWRM projects

**Box 15: Village-initiated solutions to wastage in Kalomo, Zambia**

The villagers in Kalomo, Zambia have carried out many initiatives in improving water use efficiency that they had initiated themselves during village meetings:

- queuing at handpumps to allow an orderly collection of water during periods of shortage;
- the introduction of a funnel to reduce wastage when pumping water into narrow mouthed containers;
- the restriction of water use for domestic purposes and prevention of children from pumping water;
- the requirement of permission to use the water for vegetable gardens.

Some of the projects can be seen as pushing forward the limits of efficient water use within the country. In San Felipe, Colombia, tariffs were set to reduce the wastage by consumers (see

Box 17). In Volta, Ghana, trained water user committees, caretakers and especially local contractors were the backbone of a reliable fault reporting and repair network). In Maharashtra, India, new technologies such as drip and sprinkler irrigation have replaced more water-intensive irrigation methods that increased soil salinity levels. The project in Battambang, Cambodia set guidelines to limit water losses by the Finance Department in the government; these goals enabled them to plan specific targeted action (see next section for more details).

### ***3.6.5 There is a lack of guidance to enhance efficient water use***

National guidelines for water efficiency are in place in a few countries (particularly South Africa and Colombia) but elsewhere measures taken are often ad hoc or based on the priorities of donors or implementing agencies (as can be inferred in the single issue project in Bilaspur, India). There were no reported efficiency objectives at national level and only Cambodia specified efficiency objective figures at town level. It was not stated whether the objectives had been met, however.

In South Africa, the Department for Water Affairs establishes national policy guidelines and a national water development strategy. It also sets minimum service standards and regulates service provision. A law passed in 1997 in Colombia established the national programme for efficient use of water for the following five years. The programme is oriented around efficient water use and water savings to achieve annual goals in reductions of water losses and increased understanding of the need to save water by the public.

Urban water suppliers in Battambang, Cambodia had reported agreed efficiency objectives to keep losses in the distribution system down. The Finance Department set up guidelines for the Town Waterworks in Battambang to reduce losses: in 1994 and 1995 losses were 50 percent and in 1996 and 1997 they were to be reduced to 45 percent. Fifty percent of the town's network was repaired with the help of the European Union (EU), leading to a 50 percent increase in production capacity. Elsewhere in the country there is no systematic water resources management undertaken at national or provincial level. Only the intense intervention of the EU in a dire situation in Battambang brought about these efficiency measures.

### ***3.6.6 Water use is still far from efficient***

From this chapter we may conclude that the often extremely high losses in water supply systems for drinking and irrigation and the misuse of water through wasteful irrigation methods and user neglect necessitate a range of measures that are both encompassing (guidelines) and specific (tariffs, education and technology). Promising approaches include: the setting of specific loss reduction targets in Cambodia; tariff structures in Colombia that ensure water for the poorer sections of the community yet deter excessive use; comprehensive training of people involved in the community water sector, (local contractors in proper construction methods) in Volta, Ghana; and new irrigation technologies in Maharashtra, India. Specific recommendations to improve water use are:

- **Implement IWRM strategies.** Create a general awareness of water demand across whole catchments and adjust sectoral or geographic allocations to take account of “best practice” in terms of waste minimisation.
- **Create an enabling environment.** Include specific targets for water efficiency in distribution and use in national guidelines.

- **Develop managerial, economic and technical capacity to carry out efficiency improvements.** Capacity building has to include technology transfer of efficient water use practices, such as the expansion of pilot projects (Umgeni Water, South Africa) and the dissemination of good practice methodology to a wide audience, including the private sector (Volta, Ghana).
- **Adopt demand management policies.** Establish tariff structures that underpin the equitable distribution of water and sanction high water use.

### 3.7 Water has an economic and social value

The recognition of the economic and social value of water is growing. At national level, demand management policies are becoming prevalent as water becomes increasingly scarce and the use of water needs to be controlled. The concept of water as an economic good is generally being acknowledged in allocation and user efficiency measures. Water is also seen as a public or social good, essential to society at large and vital to a healthy living environment.

The economic value of water can be seen in all of the case studies as consumers are charged based on the recovery of at least part of the scheme costs. Six of the projects, though, charge users a flat rate which is not calculated on the actual O&M costs but rather seems to be based on the communities' willingness to pay. All but three projects subsidise the capital costs of the water supply by between 75 and 100 percent, part payment of the rest is often through community labour. Even so, nine of the eleven projects reported a reluctance by the community to pay for their water. Increased willingness to pay was, however, noted in projects where there was an improvement in service levels, where the water was seen as economically beneficial or where communities perceived an increased threat to the continuation of a reliable supply. Three projects set greater importance on the economic value of water by basing their tariff structure around the volume of water consumed by users rather than on a fixed charge.

All but two projects have set up some form of subsidy to ensure access to water for all, especially vulnerable groups. Subsidies are often based on the individual's or community's ability to pay. Communities have often allowed the poor to collect water freely while governments have subsidised, water provision to disadvantaged areas through grants. Two projects set differential volumetric rates for different users, based on incremental rates for increasing volumes consumed or based on the economic value each sector places on the water.

#### 3.7.1 *Willingness to pay depends on expected improvements*

Where there is an improvement to service, or threats are perceived to the existing service, the review shows people are willing to pay, or increase their payments, for water. When improvements to the water supply in San Felipe, Colombia were made, the Water Board argued that the installation of water meters and a tariff system were necessary to underpin the water quality improvements people wanted. The San Felipe study noted that people are willing to accept a tariff increase if it is explained to them and the accounting system is transparent. As the rural populations of Maharashtra, India increase and water resources become more scarce because of overuse, villagers are more willing to pay to secure their water supply.

People are also willing to pay for their water if they see it will improve their economic situation. The community around the Piprala check dam in Gujarat, India is more willing to

contribute to the upkeep of its supply as there is a sense that paying for agricultural water is fair as it serves as raw material for economic activity. Paying for drinking water, however, is seen as an infringement of a basic human right.

Many communities are willing to pay for the capital costs of their water supply but not the operation and maintenance costs, possibly because they see the construction of a new supply would improve their conditions while their expectations are that the government still has responsibility to maintain a basic the water supply. In Volta, Ghana, while communities are happy to contribute to the initial costs of a scheme, there is resistance towards paying for the operation and maintenance costs and few communities saved money to pay for repairs. Those communities that were able to pay their contributions and had money in their accounts for the operation and maintenance, generally had wealthy members living elsewhere, willing to support their villages. Similarly, communities working with SEWA in Gujarat, India are willing to contribute towards construction of new supplies but not towards their maintenance. Reasons given for non-payment include: a perception of water as a free resource; poor service levels; poor or unfair management and tariff systems with insufficient legal backup; poverty; and a lack of community ownership of the water supply. Even when communities have been sensitised as to the importance of clean water they are often unwilling to pay for it as they do not see it as an economic commodity as indicated in (Box 16).

SEWA’s work, which included increasing awareness at local level of water resources, use and management, did not change their belief that access to water was an “inalienable right” and not one that needed to be purchased, especially by those with few resources. The local Panchayats, who were responsible for monitoring payment, found that most people did not pay the full amount of the government water tax of Rs. 5/month and over 30 percent did not pay anything. Most thought that paying for water is unfair and only five percent said that “water is our life so we should pay for it”.

**Box 16: Reasons why people in Volta, Ghana do not want to pay for water**

Since 1986, Ghana’s Water and Sewerage Commission started to collect payment from rural households for water supply; previously the water was free. Most rural users, though, still did not understand the rationale for paying for their water, especially when their handpumps were often out of service. Consequently only 8 percent of costs were recovered in 1991. Sensitisation was then carried out by the District Extension Team to encourage the payment of water bills, but there are still defaulters. People’s reasons were:

- Defaulters are not punished so there is no deterrent
- A lack of regular accounting by WATSAN committee leads to mistrust
- Conflicts arise due to the absence of by-laws
- Conflicts between traditional leaders and WATSAN committees: some committees feel a lack of support from some chiefs and some chiefs feel the committees usurp their powers
- Limited income opportunities
- Some community members feel their initial contributions, especially in time and money, result in their exemption from further payments.

In Mbala, Zambia 60 percent of domestic users refuse to pay for the water service and some of these would rather collect it from unprotected sources. People do not pay as they feel it is the government’s responsibility to provide water, and their supply is intermittent. Similarly, in areas of South Africa, there is widespread resistance to payment linked to great expectations of the new government.

Of the eleven projects, nine presented a charging structure for the use of water (Table 6). The other two projects mentioned but did not detail their systems. All, then, treat water as an

economic commodity, but only three charge a rate for the water that reflects its actual cost. Two of these projects, Umgeni Water, South Africa and Battambang, Cambodia provided tariffs structures in both rural and urban areas, resulting in eleven tariff examples. Five of the nine rural projects ask the community for a contribution towards capital costs, typically 5 to 25 percent of the total capital cost. All but two of the projects in rural areas use a flat rate tariff system to help defray operation and maintenance costs; users pay the same no matter how much water they use. One project does not have a tariff structure: it uses the community's contributions towards the capital costs as the fund for operation and maintenance and does not demand any further contributions from users, which reduces the community's sense of ownership of the project. The project, in San Felipe, Colombia uses a progressive block tariff system that penalises excessive users with a heavier volumetric rate and encourages efficient use of water. The two examples in urban areas use similar volumetric tariff systems based on the amount of water used. The Umgeni Water urban project in South Africa includes capital and recurrent costs in the tariff; tariffs for Battambang, Cambodia include operation and maintenance costs as well as a cost for extension works to the system.

Most of the reviewed rural projects charge a household a fixed amount: this reflects water less as a true economic good but more as a service. Neither does it provide an incentive to use water more efficiently as the household will pay the same amount for whatever it consumes. Moreover, few of these projects seem to have based their rates on the calculated expected costs of operation and maintenance but rather on how much the communities are willing to pay. This led to problems in Santrokofi Bume, Volta, Ghana when the water and sanitation committee realised they did not have enough money to carry out an unexpected major repair. The repair was financed by a loan but this prompted a change in the tariff to account for future repairs and purchases of spares. Tariff structures impose a value on the water which users can easily recognise and they can adjust their water use habits accordingly as shown in Box 17.

**Box 17: Incremental block tariffs reduce wastage of water in San Felipe, Colombia**

After the initial inspection of households in San Felipe, Colombia in 1991 an agreement was reached with the community over new tariffs. A structure of incremental tariffs was put in place with the minimum consumption rate of 40m<sup>3</sup>/month per connection. Higher charges discouraged greater water usage. This helped to reduce the average consumption of 90 percent of the users to 200 lpcd. Sixty-one percent of users consumed less than 40m<sup>3</sup> per month but their share was only 25 percent of the total water supplied (see Figure 2). Only 12 percent of customers consumed over 100m<sup>3</sup> per month but they used over 45 percent of the total water supplied. These included commercial and agricultural users such as a small hotel and chicken and dairy farms.

The tariff system enabled the smallest consumers to maintain and even increase their service level and initial consumption reductions were seen at the highest levels. Since then tariffs have not been raised for four years, which has increased the general consumption though not to original levels. Subsequent inspection visits to properties showed only 2 out of 12 houses with leaks (compared with 90 percent in 1991).

**Table 6: Projects' tariff structures and subsidies**

<i>Project</i>	<i>Contributions by the Community</i>		<i>Subsidies (govt. or community)</i>
	<i>Capital Costs</i>	<i>Recurrent costs</i>	
Datrana Pond, Gujarat India	10% + unskilled labour	fixed annual charge per household + government; water tax Rs. 5/month	Charge is dependent on income of payee
Volta, Ghana	5% of capital costs	Nyagbo Emli Israel: fixed rate per household Santrokofi Bume: fixed rate per person Santrokofi Benua: annual levy at harvest and fund raising events	Disabled and very poor are exempt; poor communities subsidised by District Assembly for capital costs
Lumbini, Nepal		Annual rate per tap or well	
Panh Nha village, Cambodia	well construction: \$20 + labour for poorest, rising to \$35 + labour for wealthiest	monthly rate per family	Poorer members subsidised: PRA wealth ranking used to identify poorest
Maharashtra, India	fully funded by state government	fixed rate water tax levied per household based on calculated costs for connection and repairs: Panchayats decide rate for each village	Zilla Parishad (regional body) can contribute to major repair costs
Kalomo, Zambia	some 25% of capital costs through payment for cement and collection of local materials	household rate decided by community: can be payment in kind	Blind, lame, aged and mentally disabled are exempt
San Felipe, Colombia		O&M costs and future replacement costs covered by progressive block tariff	tariff structure subsidises lowest consumers by penalising bigger users with higher rates
Bilaspur, India		10% of capital costs is paid by community at project start and kept as a maintenance fund, O&M funds can also come from government	
Mgeni Catchment rural areas, South Africa	capital grant from government	O&M costs partly funded by the Reconstruction and Development Programme, partly paid for by consumers	Urban areas subsidise part of O&M costs of rural schemes
Mgeni Catchment urban areas, South Africa	capital costs covered in the tariff structure	houses: R 1.41 /m <sup>3</sup> (for first 5 m <sup>3</sup> ) R 2.62 /m <sup>3</sup> (for > 5 m <sup>3</sup> ) flats: R 2.44 /m <sup>3</sup> industries and commerce: R 2.73 /m <sup>3</sup> (also charged up to R 0.55/m <sup>3</sup> depending on the oxygen demand of their discharges)	Cross-subsidisation from industries and commerce reducing household bill
Battambang Town, Cambodia		domestic (supplied by waterworks): R 1200/m <sup>3</sup> wholesale to 2nd party: R 1100/m <sup>3</sup> domestic (supplied by 2nd party): R 1800/m <sup>3</sup>	Entrepreneurs (2nd party) are partly subsidised to encourage further extensions of distribution system

The benefits of a flat rate system is that it is easily administered and does not require costly water consumption meters. Where communal supplies such as wells, standposts and handpumps are used there is no need for a monitor at each outlet to record the amount of water each user collects. This makes a flat rate system more suitable to rural communities with low technology water and low volume supplies.

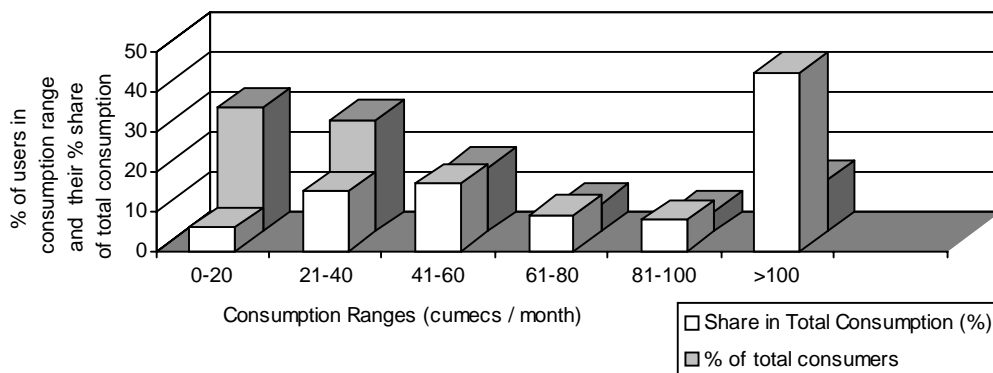


Figure 2: Relationship between number of consumers and amount consumed per month in San Felipe, Colombia

In Maharashtra, India, communities feel that free water provision is a right, so the authorities have based their charges on upkeep of the system rather than on the water resource. As people recognise they are paying for the upkeep of the system that provides clean water rather than the water itself they are more likely to pay. However this flat rate system still does not encourage communities to reduce the wasteful use of water.

By ensuring the community finds adequate funds to contribute towards the capital costs before commencing the project, a more demand-driven approach with positive consequences towards community ownership is engendered. This can be coupled with other measures such as payment-in-kind to ease the burden on the community as shown in Box 18.

**Box 18: Cost recovery through a demand-driven flexible payment system in Kalomo, Zambia**

Zambian National Water Policy requires a cost recovery component as part of its RWSS programme. Villages must find approximately 25 percent of the capital costs before construction starts. Their contribution is made up of paying for the cement for the handpumps' head works (apron, drainage and animal drinking troughs) and collection of local materials (stones and sand) for construction.

After project completion O&M fees are collected. The money is used for the purchase of spare parts, lubricants and payment for pump menders. Fees also cover transport costs for the district maintenance teams when the pump mender cannot repair the pump.

O&M tariffs are decided by the community as a rate per household per year and are accepted as cash or goods-in-kind such as maize, which is later sold by the V-WASHE committee. Receipts are given to payees or fee payment books are used for accountability.

The D-WASHE plans to increase the 25 percent contribution of capital costs by the community to 100 percent. At a national level, the cost recovery approach was recommended but caution was advised in raising the user fees too quickly: rather the users should be educated to see the need and benefit of increasing fees.

Few projects have incorporated the replacement costs at the end of their design life. Where the technologies used are minimal, such as the wells in Panh Nha village, Cambodia, this is not so problematic. In Maharashtra State, even if villages pay the full cost of O&M the costs of replacing the equipment has not been factored in. Most schemes at village level can only meet their minor O&M costs, as tariffs and collection methods do not result in adequate funding. When major repairs or replacement of equipment need to be carried out they must approach

the regional Zilla Parishad for extra money. Only in San Felipe, Colombia and Mgeni Catchment, South Africa have projects stated that all capital costs or replacement costs are covered in the tariffs charged.

In Battambang, Cambodia, the project approach went furthest in terms of treating water as an economic commodity in that the water delivery is handed over to the private sector, who are charging on a volumetric basis. Entrepreneurs are able to provide water to where there is a willingness to pay. Government subsidies are also available to the private water supply entrepreneurs for investment to extend the supply networks to remote areas.

Improvements to the straight volumetric charges include progressive block tariffs and sectoral subsidisation, used by the projects in San Felipe, Colombia and Mgeni Catchment, South Africa respectively, which can increase water usage efficiency and reflect the economic, social, and environmental value of water.

### ***3.7.2 Projects promote water as a social good***

The subsidising of water supply to poorer communities or poorer members of the community allows them access to water, promoting water as a social good. Various subsidy methods are practised, based on different principles:

- Members of a community can be charged according to their ability to pay: in Panh Nha village, Cambodia participatory rural assessment (PRA) methods were used to rank the wealth of the village households and three bands of payment were set up based on the wealth rankings.
- Vulnerable groups in a community can be excluded from the tariff system: in Kalomo, Zambia the lame, blind, mentally disabled and aged do not have to pay to draw water.
- Cross subsidisation can allow poor communities access to a water supply through subsidising from richer communities, or communities that have a water supply system with lower operating costs. In Mgeni Catchment, South Africa, urban users subsidise the costs of water supply to the rural areas. Here people's ability to pay is lower whereas distribution costs are higher as communities are scattered.
- Governments can directly subsidise the costs of water supply as in Bilaspur, India where the state government does not charge for drinking water.
- The introduction of a water tariff based on increasing charges after a minimum consumption figure enables poorer households that do not use as much water to pay visibly less than better-off users. This system also reduced the amount of water supplied in San Felipe, Colombia mainly by encouraging the fixing of leaks and maintenance of domestic fixtures (see Box 17).
- Sectoral tariffs in the Mgeni Catchment, South Africa charge higher rates for industrial and commercial sectors as they place a higher economic value on the supply than householders: this industrial supplement subsidises the domestic supply (**Table 6**). Industries are also charged extra depending on the quality of their wastewater discharges and the increased load they put on treatment systems, taking into account the environmental cost of using and polluting the water.

### ***3.7.3 The economic and social value of water can be better recognised***

From this chapter we can conclude that increasingly a price is becoming attached to water supply services and that in most cases the systems introduced also ensure adequate access to the poor. Nevertheless, a lot of work remains to ensure that adequate policies are developed to allow pricing policies to become guided by criteria of economic efficiency whilst ensuring the

maintenance of an acceptable balance with social equity and environmental considerations. The economic criteria can be met through operation of a water market that adequately reflects the scarcity of water. The goal of ensuring the recognition of both the economic and the social value of water may be met through a regional public forum for allocation of rights, overseen by a regulating institution, as seen in Colombia (Box 17). This enables incentives to improve the efficiency of conservation measures, while social goals can still be addressed.

In general a more commercial approach to water supply and IWRM needs to be adopted whilst securing fair access for the poor. The following measures will contribute to that aim:

**Raise users awareness of investment costs and tariffs**

Project staff and district management committees need to sensitise communities to the economic value of water, in terms of costs to local authorities of water provision and informing users of the need for and benefit of contributions. In line with this, as communities become more involved in management of DWSS, there will be pressure for increased local authority and accountability in fee collection and service provision. In San Felipe, Colombia, users were very willing to accept an increase in water tariffs where tariff development was transparent and a high standard of service was provided.

**Enforce tariff policies through payment incentives/penalties**

Capacity building is required to implement tariff systems, through measures such as training in account keeping and refresher workshops. Enforcement is key to effective cost recovery (Box 19). The system will vary according to the context: financial and social sanctions may be more prevalent under local management, relying on community cohesion and self-regulation. On the other hand, enforceable penalties and legal sanctions are more applicable to urban contexts where the relevant legal mechanisms are in place. Local determination of tariffs, and informal mechanisms for enforcement and fee collection are more attuned to local conditions. As a result, clear policy guidelines are required to ensure that tariff setting and enforcement are carried out at the most appropriate level.

<b>Box 19: Methods of increasing local cost recovery</b>	
<i>Incentives</i>	Targeted at individual consumers or user associations, such as discounts for timely payments
<i>Financial sanctions</i>	set above the value of supplies, for improper water use or lack of payment; the system is still weak in pre-empting legitimate protests of service standards ( <i>Nepal, Gulmi District</i> )
<i>Social sanctions</i>	by local people, an informal mechanism encouraging collection through peer pressure
<i>Enforceable penalties</i>	for non-payment, such as water disconnection ( <i>Cambodia, Battambang Town; South Africa, Pietermaritzburg; Colombia, San Felipe</i> )
<i>Legal sanctions</i>	with the precondition of institutional mechanisms such as laws in place; limitations in the high transactions costs of court action and potential for inadequate fines ( <i>South Africa, Pietermaritzburg</i> )

**Apply progressive tariffs and water metering for consumption beyond essential uses**

Volumetric or progressive block tariffs discourage the excessive use of water and can subsidise poorer users that do not require large quantities. The sale of irrigation water using a

volumetric tariff system to small user groups who then distribute it among themselves encourages their self-regulation and more efficient irrigation techniques.

### **Adopt tariff variation for remote/poor areas or formerly subsidized users**

Essential levels of water supply and sanitation are often viewed as a basic human need. There may be considerable resistance to the imposition of tariffs for what is considered to be a right. Tariff structures need to reflect these realities by cross subsidisation, graded application, and respect of ability to pay guidelines. Equally, tariffs levied outside the DWSS sector, in agricultural irrigation for instance, need to consider the social costs to formerly subsidised users, and should be developed along similar ability-to-pay guidelines and cross-subsidisation guidelines.

### **Evaluate the effect of subsidies on cost recovery**

Subsidies on DWSS will limit cost recovery by supply agencies, increasing their dependency on higher levels for financing, and reducing the capacity for local financing of O&M costs. This may call for alternative methods of support that do not directly affect the water supply sector, e.g., specific welfare programmes to provide essential DWSS service levels to disadvantaged areas.

## **3.8 Striking a gender balance is essential**

Internationally, it is acknowledged that men and women have distinctive roles to play in the management of water resources. The changing of attitudes and long-held practices is understood to be a slow process but the establishment of an enabling environment and working with both men and women to create a gender balance are seen as two important factors in bringing about this change. Governments in all the reviewed project countries have started to introduce policies that help foster an enabling environment towards increased participation by women in managing water resources. Government guidelines often ensure a minimum level of women's participation in local management structures, but do not yet encourage the reviewing of the burdens and benefits of men and women separately.

Gender is increasingly accepted as being more than "women's rights". In this more inclusive form it should encompass the needs of other distinct and vulnerable groups, particularly the young and the poor (of whom women form a disproportionately high percentage). None of the projects adopted this wider view of gender, and actually reported more on the role of women. This implies that issues such as ensuring adequate representation of poor or marginalised groups still do not receive the attention deserved.

In all but three of the eleven projects, formal IWRM and DWSS management structures at all levels are dominated by men. All of the projects have guidelines that encourage or ensure that women are members of water user committees at a village level but almost all of the influential positions in the committees are held by men and most decisions are still made by them. Cultural and social pressures still prevent women from taking lead roles in decision making except in Gujarat, India where concerted efforts, aimed at the poorest of women but working with both men and women, have challenged and changed these. This has resulted in all water user committees having a large proportion of female members, and women in all positions of authority. Strongly imposed gender policies in the Northern Province of Zambia and in Maharashtra, India have also ensured a large proportion of women on water users committees (WUCs) and some women in lead roles. Three projects have made participation easier for women by ensuring that meetings are rescheduled, either in their timing, to fit in

with women's other duties or to more "gender neutral" places that are less intimidating to women. Only two projects reported working specifically with men and women to change their roles and attitudes: both produced encouraging results of behavioural and attitudinal changes.



*Gender neutral sharing of roles and tasks, Ghana*

Where reported, a gender balance is lacking in the projects' own staffing levels, which can influence the effectiveness of activities. This has meant that day-to-day decisions on the project implementation are made by people with little formal gender understanding.

### ***3.8.1 National policies gradually favour a better gender balance***

All governments of the reviewed projects' countries are addressing gender through changes in policies that indirectly and directly affect IWRM. Indirectly, in Cambodia, the changing of the Women's Association to a full Government Department of Women's Affairs gave a greater importance to gender-related matters. Similarly Indian government policies such as the Hindus Succession Act, where daughters now are entitled to an equal share of ancestral property, have indicated a significant enabling environment for creating gender balance. Maharashtra State policy requires local institutions to earmark 20 percent of funding for women's development.

More directly for water supply a devolution of responsibility for operation and maintenance and cost recovery for projects in Maharashtra, India has meant that 33 percent of water user committee members must be women; there are also quotas for minority castes and tribes. In South Africa, the Department of Water Affairs and Forestry's policy states that local water user committees should have at least 30 percent women's representation and 50 percent of those employed in construction of community water supply and sanitation should be women. A draft gender policy, the national Gender Policy for Water Affairs and Forestry, includes the following key objectives:

- Establishment of a Chief Directorate for Gender Equity
- Needs assessments are required for all water and sanitation systems; they should be based on gender-segregated data and should take account of the needs and perceptions of women
- The different roles of men and women should be clearly defined in planning for the supply of water, wood fuel and sanitation
- A minimum of 50 percent participation by women in planning, implementation and maintenance of systems at a community level

- Provision of technical training for women so that they can participate in programme planning and implementation

### 3.8.2 An enabling environment for gender is promoted at local level

All water user committees, or similar local water source decision-making bodies have been encouraged to increase the participation of women through their increased membership of the committees. Many have also changed physical parameters (meeting times and places) to encourage greater women's participation. Nevertheless, in almost all of the projects, men still dominate the committees and control the decision-making process at the community level.

Throughout the rural areas, implementing agencies have insisted on the inclusion of a certain percentage, usually between 30 and 50 percent, of women members of water user committees. Almost without exception the water committees fulfilled this obligation and two committees in Maharashtra, India had 70 percent or more female members while most committees in Gujarat, India were made up completely of women, as shown in

Table 7. This is due to the fact that SEWA, the implementing agency, is a women's trade union.

However, almost all of the case studies reported that decisions were still being made substantively or wholly by the male members of the committees and that men held all or most of the influential positions (see Table 7). A notable exception from Zambia is illustrated in Box 20.

**Table 7: Percentage of women in water user committees**

<i>Project</i>	<i>Number of water user committees surveyed</i>	<i>% of water user committees with female membership of:</i>			<i>% of committees with women in influential position (chair, secretary or treasurer)</i>
		<i>&lt; 30%</i>	<i>30% to 50%</i>	<i>&gt; 50%</i>	
Maharashtra, India	41		35%	65%	10%
Panh Nha, Cambodia	1		100%		0%
Bilaspur, India	2		50%	50%	0%
Mpulamanga, South Africa	3	33%	67%		0%
Lumbini, Nepal	2	100%			0%
Kalomo, Zambia	3		33%	67%	0%
Volta, Ghana	4		100%		25%
Gujarat, India	4			100%	100%

**Box 20 A consistent involvement of women in Northern Province, Zambia has produced positive results in community motivation**

The imposition of the involvement of women by Irish Aid, the implementing agency, meant that even people who did not consider gender a worthwhile issue had to consider how it would affect their actions. Where previously women who spoke out were branded "big mouths" and ostracised, now community motivation towards well building and maintenance improved in some villages as a result of their involvement. All of the committees set up by Irish Aid have at least a 50 percent female membership and in some, women have taken up one or more of the roles of chair, secretary and treasurer. The involvement of women in the committees has resulted in greater community involvement in some villages in the siting and construction of wells and in contributions towards their upkeep.

To counter the over-arching male predominance in local committees, many projects are starting to promote an environment that supports the participation of women in decision-making. In Maharashtra, India meetings are rescheduled if half of the participants are not women and committees are reconstituted where 50 percent of members are not women. Projects are putting in place simple measures that ease the other burdens that women have, or at least allow them to take part in committee activities without conflicting with their other duties. Simple but effective examples are common in many of the case studies: committee meetings have often been rescheduled to allow women to participate in the meetings and still carry out their other duties such as water collection, cooking, working in the fields or going to the market (Volta, Ghana; Bilaspur, India). In Maharashtra, India culturally appropriate and 'gender neutral' venues were selected for committee meetings: the local temple was used until women felt more sure of their environment, as the Panchayat's office was seen as male-dominated.

### 3.8.3 *Social pressure prevents women from fully participating in decision making*

The pressures on women in the committees inhibiting them from taking more decisive roles are substantial. Box 21 illustrates examples of social and cultural pressures from many of the case studies.

**Box 21: Pressures put on women attending water user committees by the community**

Volta, Ghana -

"You are envied and insulted by other community members in the course of your duty," and "You or members of your family are attacked spiritually (juju) if you are vocal and try to enforce by-laws."

Lumbini, Nepal -

Women feel discomfort in becoming involved with the elders in decision making.

Mpulamanga, South Africa -

Women are not supposed to talk in public, especially in the presence of men and about issues of public interest. Husbands become jealous when women are talking to other men.

Mbala, Zambia -

Women are customarily quiet in meetings as they risk a beating or divorce by their husbands or if unmarried are branded a 'loud mouth' and risk staying single.

The caste system as well as class, religion, age and marital status all complicate the situation of rural India. A poor landless widow from a minority religion or lower Hindu caste is among the most severely disadvantaged groups in rural India. Married women from landed families do not necessarily have more rights and entitlements, though. Despite heavy investment in time and money, women's participation continues to be constrained by their work burden, poor access to information and lack of credible local representation.

Only in Maharashtra and Gujarat in India, and in Northern Province, Zambia can it be said that the projects are in line with international thinking by promoting measures that have resulted in women's participation in committee decision making and not just as ordinary members (see Table 7 and Box 20). In Gujarat, SEWA's members are mostly poor women who work as field labourers and are illiterate but despite their class, caste, gender and education hold top positions in local management through encouragement and training from SEWA. Women are chairs, secretaries and treasurers of local committees. They have gained confidence and now insist that they are heard:

*“ When I go to see the Taluka District Officer, sometimes they don’t let me in and they make me sit outside on the ground. I used to be scared and do as they said, but now I refuse to be ignored and I don’t leave till the officer sees me and listens to me. Then I return over and over again till he does something to help my village.”*

#### **3.8.4 A focus on the different roles of women and men proves positive**

Few projects are seen to have the underlying premise to their work that gender differentiation is described by socially constructed roles, identity and power relationships between men and women. By targeting only women in sensitisation programmes, only half the problem is addressed; by working with both men and women, often separately, and by addressing different issues relevant to the different sexes, changes on both sides of the gender balance can be wrought. Box 22 highlights the successes that were achieved by involving men in a programme with the empowerment of women as its overriding goal.

By targeting both men’s and women’s groups with hygiene education in Volta, Ghana, behavioural changes are now being noticed: men are collecting water, which was previously considered a woman’s duty. Women are also encouraged to take up positions generally thought of as male-oriented such as latrine artisans, area mechanics, suppliers and consultants. A similar programme in Maharashtra, India to train women in stone masonry failed due to a lack of paid opportunities for them to practice their newly-acquired skills.

#### **Box 22: Successful involvement of both men and women in Gujarat, India**

SEWA’s members often confront vicious opposition from men and also sometimes women. SEWA realised that in empowering women they are challenging gender roles that had governed Indian communities for centuries. Sensitivity is needed to bring about these changes. To reduce suspicion, all activities are open to men and women: women make up the majority of members and leaders but some men sit on management committees and many husbands are actively involved in projects. Typically once initial suspicion dies, men are happy with the extra income from the women’s activities. Villagers are willing to accept and even promote the leadership of women when the leadership brings about economic and social gains for the household.

The recognition of the distinctive strengths of women is only seen to be put to use in one project. In the Mgeni Catchment, South Africa designers of new dams talk to women’s groups when it comes to the requirements for water quality, flow requirements and social uses of water (baptisms, washing, drinking etc.) as they see that women have the traditional knowledge of the water resources of the area. Contractors make an effort to employ women on contracts as they found them more efficient and reliable and more likely to use the money for the whole household. Similarly women representatives on water committees tend to want to resolve disputes more rapidly than the men as they see these as delays to water delivery. Rural planning officers in the Mgeni Catchment are women as it is felt they can approach controversial subjects in a less threatening manner.

#### **3.8.5 Gender equality is rarely achieved within the implementing agency**

Although there is an enabling environment in many project countries, few projects themselves have a well-established gender approach. The number of female staff employed by DWSS or IWRM institutions and the proportion of women managers are extremely limited. Management at a day-to-day level is typically carried out by men with little gender training and whose attitudes do little to change the status quo.

No case study that presented figures for the breakdown of staff gender at national or regional level showed that the IWRM organizations had anything like a gender ballance in their own staffing levels. The proportions of female staff in the organizations were extremely low; they decreased further when management was singled out and there were almost no senior management positions filled by women. Table 8 details the percentage of females in the workforce in various IWRM organizations.

There is little hope in the near future that this will change as there is an underlying culture of prioritising education towards men. Even where women graduates are in the majority, male domination is still present.

**Table 8: Percentage and position of female staff in IWRM organizations**

<i>IWRM organization</i>	<i>female % of total workforce</i>	<i>Breakdown of % of female staff into typical positions</i>			
		<i>senior management</i>	<i>middle management</i>	<i>technical/ specialist</i>	<i>admin. and other</i>
Regional Project Office, Volta Ghana	17%	0%	0%	40%	10%
District Offices, Volta, Ghana	20%	0%	0%	15%	26%
Water Department Battambang, Cambodia	10%	-	-	-	-
Department of Water Affairs and Forestry, South Africa	10%	0%	29%	8%	62%
Umgeni Water, South Africa	22%	2%	13%	23%	26%
Durban Metro (water section), South Africa	5%	0%	6%	5%	19%

Gender sensitisation programmes typically occur at two distinct levels: at a national and senior management level where policy guidelines are formulated, and at a local level where community development workers (CDWs) put these guidelines into practice with the villagers. The hierarchical position of these CDWs is below middle management and often below most professional technical staff so the influence the CDWs have on them is limited. In South Africa, senior staff, who are almost totally male, attend professional conferences and seminars, so that new ideas are owned by them rather than lower levels of management and by women. Middle management and professional technical staff, again mostly male, have little access to gender sensitisation programmes, while they often are very important in laying the ground rules for development programmes.

Internal gender sensitisation programmes and guidelines are present in all IWRM bodies in South Africa. Stumbling blocks to their application noted by Umgeni Water include:

- lack of corporate will
- insufficient female graduates
- lack of opportunities for sensitising technical staff to gender issues
- a patriarchal society where the roles of women and men are rigidly defined
- a cultural mindset where women are intimidated by the emotional and physical force of men
- a lack of facilities to enable women’s increased involvement (such as child-care)

### ***3.8.6 Recognition is growing that a gender balance is needed***

From this chapter it can be seen that in most projects women still need to be more involved in all aspects of the project cycle, from project design and planning through to management and decision making on operation and maintenance. A more balanced contribution by both genders is required to address their different needs and roles. A starting point is to review the roles of women and men which can then lead to the more equal sharing of burdens and benefits of water resources management. The traditional role of women as users and managers of local water resources is an important catalyst for women's involvement in DWSS projects and wider IWRM issues. The role of women as managers is more advanced in DWSS project management than in IWRM except in Gujarat, India, where the whole emphasis of the project is women's empowerment. Key issues to take into account to enhance the gender balance include:

#### **Building capacity to sensitize organizations**

Gender sensitisation programmes need to be promoted at all institutional levels early in the project cycle, from the design stage through to monitoring and evaluation, for effective and sustainable projects. In particular, sensitisation needs to target both men and women at the village level so that women are able to take on new responsibilities with the support of the men. Similarly it is important that those in technical and middle management positions, who are often left out of sensitisation programmes, are targeted so that their decisions and actions promote a more balanced IWRM programme.

#### **Building capacity to enable women to adjust and develop**

Capacity building needs to address the stumbling blocks to women's greater involvement. These could well include literacy and awareness-creating programmes in certain cultural contexts; separate fora for women to participate; the enabling environment (through measures such as child-care facilities as well as sensitisation); and provision of paid opportunities for women to apply their knowledge. Measures that place women into new areas of income generation might well need to include economic empowerment for their sustainability and replication in the marketplace.

#### **Developing gender-specific legislation to promote equal opportunities**

Increasing the role of women in management, particularly at higher levels, may require legislative changes regarding equal opportunities in the workplace, where women are often under-represented. The implementation of these changes may require a coordinating body such as the Department of Women's Affairs in Cambodia that has powers to ensure compliance.

## 4 *Conclusions and Recommendations*

While based entirely on the results of eleven case studies from around the world, this review has identified a number of important issues in drinking water and sanitation supply, and integrated water resource management. The case studies represent a number of approaches, scales, and philosophies for DWSS and IWRM and come from widely differing socio-economic, natural, and cultural environments. Together they present many of the issues and constraints faced in applying IWRM principles to DWSS, and in starting to integrate DWSS into IWRM strategies.

The review highlighted the ongoing successes in the implementation of DWSS projects at the grassroots level, and how these are bringing about genuine community empowerment through the development of feelings of ownership and responsibility. However, it also highlighted how this success at the grassroots level is failing to be built upon at the district/regional/catchment level, with the result that genuine stakeholder involvement in IWRM remains elusive. This is partly due to the fact that while the ideas underlying involvement and empowerment of communities have been current for some time, IWRM is still a fairly recent concept and much remains to be done in terms of developing methodologies for its practical implementation. In many places IWRM is (of necessity) attached to a process of decentralization requiring governing structures that are slowly developing.

Technical (and particularly hydrological) aspects of IWRM did not receive a lot of attention within the review, yet are among the most important areas underpinning IWRM. Without reliable data informed decision making is impossible. The lack of comment on this aspect reflects the localised DWSS focus of most of the projects as well perhaps, as the make-up of the review participants. Given in particular the interdisciplinary nature of IWRM, this important aspect should have received more attention.

### 4.1 **Overall conclusion**

#### **IWRM principles are internationally accepted but not yet truly applied in DWSS**

- There is general international acceptance of the IWRM principles discussed in this review, and these are being addressed by many national governments through the development of legislative frameworks. Awareness that water is a limited resource is now high at all levels (national, regional, local). However, movement from acceptance and enshrining of principles to practical application of IWRM strategies remains poor. Few countries have implemented enabling legislation, and even fewer have started the necessary work of internal institutional reorganization and capacity building.
- DWSS continues to be poorly integrated into wider IWRM strategies, while the principles of IWRM are only partially present in DWSS programmes. Principles that are widely practised revolve around aspects such as stakeholder involvement in project management, issues not specific to the IWRM arena.
- DWSS continues to take the supply of water at a local scale as a given, and to concentrate on distribution to, and management of the distribution system by a community. Until it takes cognisance of the need to address the larger problems of supply to and allocation between communities the sector will continue to operate in isolation.

### 4.2 **Conclusions specific to the eight principles of IWRM**

The following section presents the main conclusions from the review of the case studies in light of the eight principles selected for the analysis.

### **Water source and catchment conservation gains recognition but requires further work**

- Water source and catchment conservation is increasing. However, national frameworks to ensure the necessary degree of communication and cooperation between sectors and levels are often lacking.
- Physical protection measures in DWSS projects frequently remain limited to the water source and its immediate surroundings. For communities to become involved in catchment conservation activities the link between the deterioration of the water source and its causes must be plainly visible. Best results are achieved by actively involving communities in both problem and solution identification. Interventions should where possible harness existing beliefs, custom, and practice.

### **True stakeholder involvement in water allocation decision making remains limited**

- While the concept of stakeholder involvement is generally accepted in theory, the reality of different (and conflicting) interest groups is often overlooked. Different interpretations exist of who is a stakeholder, sometimes to the exclusion of communities. Where stakeholders are involved in IWRM it often continues to be at an information and not a decision-making level. Where stakeholders are involved in decision making poor and diffuse users are often at the mercy of large, well organized lobbies. Links between local, regional and national fora are rare but essential for IWRM.
- What comes through strongly from the two case studies that mentioned the technical aspects of IWRM is that detailed and accurate hydrological information is crucial for making allocation decisions that will be accepted by stakeholders (particularly where there are conflicting claims to the resource).

### **The framework to allow management at the lowest appropriate level is often not available**

- In general governments are promoting the concept of decentralisation. However, the lack of clear legal frameworks enshrining rights and responsibilities often causes confusion. The decentralisation of responsibility is too often not accompanied by the decentralisation of power, leading to people becoming disenchanted and refusing to become involved.
- While community-based approaches are now accepted as the norm, the necessary capacity to support them does not generally exist at the higher levels (district, regional and catchment).

### **Capacity building is promoted but not at all levels and its effectiveness is not monitored**

- Most governments officially promote capacity building, often through legislation aimed at decentralisation or community management. However, the major emphasis tends to be at the community or national level, frequently leaving out the intermediate levels of local government and regional sector agencies. In addition, the effectiveness of capacity building elements within programmes is not monitored, leading to variable effectiveness.
- Too little emphasis is placed on providing an enabling institutional environment for individuals to whom new tasks and responsibilities are given. This means trained people often cannot fully apply what they have learned.
- Local authorities require much more support to be able to properly cope with their new roles in a decentralised structure. Capacity building, especially at this level, needs to be made a central focus of IWRM and DWSS programmes.

### **Stakeholder involvement is growing but is still too limited and too narrow in focus**

- Community involvement in the operation and management of DWSS schemes continues to show encouraging results, with all projects subscribing to the principles of participation

and empowerment. However, where communities find the promised empowerment to be illusory they will quickly cease their involvement.

- Communities currently remain uninterested in taking part in wider IWRM for a number of reasons, including lack of ownership or control over decisions; lack of real power to make allocation and use decisions; high transaction costs of involvement; and poorly developed frameworks by which the views of large communities can be represented at stakeholder fora.
- National and regional level fora frequently use community involvement in a purely consultative or “window dressing” role, leading to disillusionment and withdrawal of collaboration. In addition, even where involvement is more meaningful decision-making processes frequently lack the transparency to engender trust.
- Stakeholders have multiple perspectives and interests. The skills needed to reconcile these interests are lacking, and where mechanisms for conflict resolution are in place they are ineffective. Stakeholder conflict is a major obstacle to the uptake of IWRM, making stakeholder analysis a necessity.

### **Efficient water use is gaining attention but requires much more emphasis**

- Water use efficiency (and demand management) is gaining attention, particularly where water is seen as a scarce resource. However it remains clear that much more guidance is needed to ensure that efficient use becomes centre stage.
- There is often a lack of guidance on water use efficiency at a national level, with the result that local initiatives are ad-hoc and unenforceable. Losses remain unacceptably high, and a general culture of efficiency and demand management has yet to be developed.
- Inefficient water use is frequently linked to an exclusively individual or local focus, which ignores the cumulative effect of “small” losses; people concentrate solely on their own tap or standpipe and see only a small “insignificant” leak. Because their point of view is local they do not see the effects of all the small leaks taken together. As a result poor behavioural practices are allowed to continue unchallenged.
- Water is generally valued more where it is scarce, or where tariff structures make waste expensive. Tariff structures can be developed to ensure positive enforcement of resource conservation and demand management objectives. While bearing in mind the need to ensure adequate provision to cover basic human needs, excessive use and wastage can be penalised, and efficient sectoral allocation encouraged.

### **Water is increasingly viewed as having an economic and social value**

- Increased emphasis is placed on water having an economic value. In many programmes discussions are underway on the modalities of charging for water use. However, it remains critical to ensure that in the rush to introduce cost recovery and community O&M the nature of water as a social good is not overlooked, and that tariff structures are so developed as to ensure protection of people's fundamental rights.
- Revenue raising by incremental tariffs is a promising approach which not only raises money for O&M, but also helps to encourage more efficient use while protecting the rights of the poor.

### **Striking a gender balance often is taken as enhancing women's involvement**

- The case studies show a narrow view of gender. The focus is primarily on the role of women, with few addressing the roles of men and women separately. Other equally important aspects of community dynamics such as wealth, age, class, etc. are not included in project strategies. While the original reference to gender in the Dublin statement had a similarly narrow focus, since then it has become widely accepted that “gender” should

consider all the aspects that make a community heterogeneous. This broader understanding was reflected in the definition adopted for this review (see Chapter 2). The fact that it failed to come through in the individual case studies reflects the gap that exists between the “international policy level” and daily routine where people have absorbed the concept.

### **4.3 Change is needed**

While progress has been made in implementing IWRM principles in DWSS programmes, this remains mainly at the local level and reflects general principals of community and stakeholder involvement that are not particular to IWRM. The key conclusion must be that the general view of DWSS by both practitioners and recipients is of a sector in its own right, in which wider IWRM has almost no visible presence. DWSS and IWRM projects continue to develop in isolation from each other in many countries, with IWRM programmes largely focussing on the development of legislative frameworks and carrying out of resource inventories.

Change is needed in integrating DWSS into IWRM, with the key focus being the intermediate levels between the national and the local, this being the major area where the allocation and use decisions that underlie IWRM are made. As one of the most politically important areas of water resource management, and one where the most funding is currently available, DWSS offers an ideal entry point for building IWRM. Particularly at the community and intermediate levels DWSS programmes can provide an arena in which to put into practice the participatory, stakeholder focussed ideals of IWRM while providing the capacity building in regional and sectoral support agencies that this review highlights as being essential to successful IWRM.

Participants in the case studies and in the concluding workshop presented a number of ideas for follow-up activities. In view of the gap between policy and practice, prime emphasis in these suggestions was on awareness raising and advocacy. These suggestions include:

- Organizing a number of participatory case studies to review different projects within the same country and discuss these in a national workshop with the “stakeholders”;
- Establishing national or regional workshops to enhance stakeholder analysis and explore IWRM issues with the stakeholders;
- Including IWRM better in existing training activities to encourage projects and programmes to adapt their practices, and particularly include training at the level above the community;
- Re-visiting the participating projects in one or two year’s time to explore the effect of the participatory review and the new experience in applying IWRM recommendations;
- Including monitoring of IWRM principles in ongoing programmes.

Taking these ideas a step further we have identified some key areas for the development of programme activities that can help to close the gap between policy and practice.

#### **Matching DWSS and IWRM at the intermediate level**

The review clearly indicated the need to strengthen the intermediate level between the national and the local. IRC is now in the process of developing a participatory action research project together with partners that will take place within the framework of ongoing and well-established community DWSS projects. The project will adopt a learning approach and work with both communities and support agencies in identifying and overcoming the barriers that prevent active participation at higher levels of decision making. It will aims at developing and testing tools and approaches that enable communities to interact with a wide cross section of user and interest groups and to solve conflicts related to IWRM.

Two specific areas that will be addressed concern:

- **Management, sharing and use of hydrological data and knowledge**

Informed decision making for IWRM relies on access to appropriate and reliable data and knowledge about the hydrological system. The research programme would focus on the development of an integrated knowledge management system for IWRM, based on monitoring, analysis, and dissemination tools appropriate to each level of decision making. Particular emphasis will be placed on the provision of adequate and understandable data for the communities.

- **Stakeholder analysis and the mainstreaming of gender and equity considerations**

There is a clear need to develop the necessary skills to undertake stakeholder analysis and conflict resolution, both by support agencies and by stakeholders themselves. In particular support agencies need the necessary facilitation and advocacy skills to support participation by weaker and more marginalised groups. An important aspect that will be covered in this respect concerns equitable tariff setting. Equally the means by which large diffuse user groups can be satisfactorily and realistically represented at regional/catchment level fora will be further developed.

To further develop this programme IRC is interested in identifying additional partners and support agencies. If you are interested you are invited to contact Patrick Moriarty at IRC (moriarty@irc.nl), P.O. Box 2869, 2601 CW, Delft, The Netherlands.  
Tel: +31 (0)15 2192944; Fax: +31 (0)15 2190955.

## References and Bibliography

Alaerts, G.J.; Blair T.L. and Hartvelt, F.J.A. (ed.) (1991). *A strategy for water sector capacity building : proceedings of the UNDP Symposium, Delft, 3-5 June, 1991*. New York, NY, USA, UNDP and IHE.

Danida (1991). *Copenhagen report : implementation mechanisms for integrated water resources development and management*. Nordic Freshwater Initiative for the UN Conference on Environment and Development (Rio), 1992 and the International Conference on Water and the Environment (Dublin), 1992. Report from Copenhagen Informal Consultation, November 11-14, 1991. Danida Ministry of Foreign Affairs, Copenhagen, Denmark.

Hindustan Times (1998). 'Central ground water authority, Ministry of Water Resources: notice.' In: *The Hindustan Times*, October 17.

IRC International Water and Sanitation Centre (1994). *Ministerial Conference on Drinking Water and Environmental Sanitation : Implementing UNCED Agenda 21. 22-23 March 1994. Political statement and action programme. Noordwijk, The Netherlands*. The Hague, The Netherlands, IRC International Water and Sanitation Centre.

IRC International Water and Sanitation Centre (1996) *Project Report on Preparatory Workshop 20 - 29 November 1996*, Project 'Promising Water Resources Management Approaches in the Drinking Water Supply and Sanitation Sector'. The Hague, The Netherlands, IRC International Water and Sanitation Centre (unpublished).

IRC International Water and Sanitation Centre (1996). *Workshop Report -Preparatory Workshop 20-29 November 1996*, Project 'Promising Water Resources Management Approaches in the Drinking Water Supply and Sanitation Sector', The Hague, The Netherlands, IRC International Water and Sanitation Centre (unpublished).

IRC International Water and Sanitation Centre (1997). *Report on assessments and synthesis Workshop 3-10 September 1997*, Project 'Promising Water Resources Management Approaches in the Drinking Water Supply and Sanitation Sector', The Hague (unpublished).

Netherlands Development Assistance (NEDA) (1998), *Water for the future – Integrated water resources management, 2 Policy priorities for Netherlands development assistance*. The Hague, The Netherlands, NEDA.

OECD/DAC (1994). *Meeting on water resources management, 10-11 May 1994 : conclusions*. Paris, France, OECD/DAC.

Serageldin, Ismail (1995a). 'Water resources management : a new policy for a sustainable future'. In: *Water International*, vol. 20, p 15-21.

Serageldin, Ismail (1995b). *Toward sustainable management of water resources*. Washington DC, USA, World Bank.

United Nations (1977). *Report of the United Nations Water Conference ; Mar del Plata, 14-25 March 1977*. New York, NY, USA, United Nations.

UNDP (1991). *Report of the Global Consultation on Safe Water and Sanitation for the 1990s, Safe Water 2000, 10 - 14 September, 1990. New Delhi, India*. New York, NY, USA, UNDP.

UNDP (1992). *United Nations Conference on Environment and Development, Rio de Janeiro: Agenda 21, Chapter 18 : Protection of the quality and supply of freshwater resources: application of integrated approaches to the development, management and use of water resources*. New York, NY, USA, UNDP.

Visscher, J.T. and Sörensson, M. (1994). *Towards better water resources management, a catalogue of policies and strategies of external support agencies*. (Reference Series ; no. 10). The Hague, The Netherlands, IRC International Water and Sanitation Centre.

Winpeny, J. (1997) *Water Policy issues*. (Water Resource Occasional Papers – DFID, No. 2). London, UK, Department for International Development.

WMO (1992). *International Conference on Water and the Environment (ICWE): Development issues for the 21st century. 26-31 January 1992: The Dublin Statement and report of the conference*. Geneva Switzerland, World Meteorological Organization, Hydrology and Water Resources Department.

World Bank (1993). *Water resources management : a World Bank policy paper*. Washington, DC. USA, World Bank.

### **Bibliography of the eleven projects**

Agarwala, R. (1997). *Managing water for the people by the people : a participatory assessment on SEWA's experiences with rural water resources management in Gujarat, Ahmedabad, India. The Self-Employed Women's Association* (unpublished).

Bohara, R.C. (1997). *Promising approaches in water resources management : case studies*. (Draft). Butwal, Nepal. Rural Water Supply and Sanitation Project (RWSSP) Lumbini Zone, Nepal.

Jeenes, K.A. (1997). *Assessment of water resources management principles : study of two Mvula Trust projects in Mpumalanga, South Africa*. Nelspruit, South Africa, The Mvula Trust (unpublished)

Jhalani, M. (1997). *Integrated watershed development project : assessment report for synthesis workshop, Bilaspur District, Madhya Pradesh, India*

Karar, E. et al (1997). *Promising approaches to water resources management in the rural water supply and sanitation sector : evaluation document for the Mgeni Catchment Management Plan Umgeni Water, South Africa* (unpublished).

Muselepete, H.S. (1997). *Promising water resources management approaches in the drinking water supply and sanitation Sector northern province development programme, Mbala, Zambia* (unpublished).

Ngeth, K. and C. Sam An (1997). *An assessment of promising water resources management approaches in the drinking water and sanitation sector. Cambodian Area Rehabilitation and Regeneration* (unpublished).

Nyavor, E.T. (1997). *Assessment of promising approaches to water resources management Volta Rural Water Supply and Sanitation Project, Ghana* (unpublished).

Quiroga, E.R. et al. (1997). *Rural water distribution and management : the case of San Felipe water supply utility* Universidad del Valle-Institute Cinara, Cali, Colombia (unpublished).

Shisala, S.F. (1997). *Promising water resources management approaches in the drinking water supply and sanitation sector : a case study in Kalomo District, Southern Province, Zambia* Department of Water Affairs, Government of Zambia, Lusaka (unpublished).

Ubale, S. (1997). *Rural water supply and environmental sanitation project assessment study water and sanitation department, Government of Maharashtra* (unpublished).

*List of participants in the project*

Advisory Group		
Ms. Mary Boesveld IRC Consultant	P.O. Box 65 Massa Martana Umbria, Italy	tel./fax +39-75 8994 7855
Dr. Jan Lundqvist	Dept. of Water and Environmental Studies Univ. of Linköping S-58183 Linköping, Sweden	tel. +46-1328 2272 fax +46-1313 3630 e-mail: janlu@tema.liu.se
Mr. Dinesh C. Pyakural Dir. General	Dept. Water Supply and Sewerage Kathmandu, Nepal	tel. +977-1-413744 fax +977-1-419802 e-mail: cpmo@dwss.mos.com.np
Mr. Gerrit van Vuren	Dept. of Irrigation and Soil & Water Conservation, University of Agriculture Nieuwe Kanaal 11 6709 PA Wageningen, The Netherlands	tel. +31-317-484195 fax +31-317-484759 e-mail: gerrit.vanVuren@users.tct.wau.nl
Participants : Africa		
Mr. E.T. Nyavor Hygiene Education Officer	Volta RWSS Project GWSC/DANIDA P.O. Box 508 Ho, Ghana	tel. +233-91-8186 fax +233-91-8266/8147
Mr. Cosmas Chizongo Manager - Coordination	Irish Aid Zambia Northern Province Development Programme Box 410221 Kasama, Zambia	tel. +260-4-221 530 fax +260-4-222 095 e-mail: iakas@zamnet.zm
Mr. Henry Muselpete Environmental Health Technician	Irish Aid Zambia, Northern Province Development Programme Box 410221 Kasama, Zambia	tel. +260-4-221 530 fax +260-4-450-058
Mr. Stan F. Shisala Senior Water Engineer	Department of Water Affairs - Headquarters c/o UNICEF Zambia P.O. Box 50288 Lusaka, Zambia	tel. +260-1-254519 home: 252304 fax +260-1-250 721/252 584 e-mail: hydro@zamnet.zm
Mr. Cecil Chibi/Mr Ken Jeenes Technical Manager Water	Mvula Trust P.O. Box 32351 Braamfontein 2017 South Africa	tel. +27-11-403 3425 fax +27-11-403 1260 e-mail: cecil@mvula.co.za
Dr. John Howard Water Quality Manager	Mgeni Catchment Management Plan Umgeni Water P.O. Box 9 Pietermaritzburg 3200, South Africa	tel. +27-331-411 118 fax +27-331-411 349 e-mail: johnh@umgeni.co.za
Ms. Eiman Karar Catchment Officer	Water Quality Dept. Scientific Division Umgeni Water P.O. Box 9 Pietermaritzburg 3200, South Africa	tel. +27-331-411 118 fax +27-331-411 349 e-mail eimannk@umgeni.co.za

Asia		
Mr. Ramesh Chandra Bohara District Development Planning Adviser	RWSSP, HMG/FINNIDA P.O. Box 12 Butwal, Rupandehi, Nepal	tel. +977-71-40782 fax. +977-71-40842 e-mail: rwsspbtw@wlink.com.np
Mr. Manoj Jhalani District Collector	Bilaspur Madhya Pradesh India, Pin - 457661	tel. +91 07752-23344/23322 fax +91 07752-22877/23532 e-mail: mp-bispr@x400.nicgw.nic.in
Ms. Reema Nanavaty , Director	Banaskantha Women's Rural Development Project Self Employed Women's Association (SEWA) Sewa Reception Centre/Opp- Lokmanya Tilak Baug Bhadra Ahmedabad-380001, Gujarat India	tel. +91-79-550 6477/6444 fax +91-79-550 6446 e-mail: Sewa.mahila@access.net.in
Dr. Khung Ngeth Deputy Director General	Ministry of Rural Development Phnom Penh, Cambodia	tel. +855 15-917 437 (mobile) fax +855 23 801164
Mr. Cheap Sam An Assistant Programme Officer Water and Sanitation	CARERE UNDP/UNDPS Battambang via: House 2e, Street 352 P.O. Box 877 Phnom Penh, Cambodia	tel. +855-23-362175/428371 fax +855-53-370 062 e-mail: carere@forum.org.kh
Mr. M.S. Patel Member Secretary	Gujarat Water Supply and Sewerage Board (GWSSB) Sector-16 Gandhinagar (Gujarat), India	tel. +91- 22417/22423 fax +91-02712 22684
Mrs. Malini V. Shankar, Director	Project Planning & Monitoring Unit Govt. of Maharashtra, Water and Sanitation Department Room 159, Mantralya Mumbai 400 032, India	tel. +91-22-202 3338 fax +91-22-202 9348
Mr. Sanjay Ubale Project Director	Govt. of Maharashtra, Water and Sanitation Department Room 159, Mantralya Mumbai 400 032, India	tel. +91-22-202 3338 fax +91-22-282 8129/284 5502 e-mail: ubalesg@bom3.vsnl.net.in
Latin America		
Ms. Marta Maria Bianchi Journalist	UNICEF Apostal 525 01901 Guatemala C.A., Guatemala	tel. +502-2-336373 fax +502-2-336371 e-mail: hsprijt@unicef.org
Ms. Mariela Garcia	Cinara Universidad del Valle Apartado Aereo 25360 Cali, Colombia	tel. +92 - 339 2345 fax +92 - 339 3289 e-mail: magarcia@cinara.univalle.edu.co

Participants IRC		
IRC International Water and Sanitation Centre	P.O. Box 2869 2601 CW Delft The Netherlands	tel. +31 15 2192939 fax. +31 15 2190955 e-mail: general@irc.nl
Jan Teun Visscher		e-mail: visscher@irc.nl
Peter Bury		e-mail: bury@irc.nl
David Saunders		e-mail: saunders@irc.nl
Elizabeth Lucas		email: lucas@irc.nl



## *Summary Description of Participating Projects and Case Studies Reviewed*

### ***Volta Rural Water Supply and Sanitation Project Volta Region, Ghana (Danida) – Assessment in Adidome and Hohoe districts (20,330km<sup>2</sup>, 2 million people)***

Volta region forms the south-eastern boundary of Ghana, extending across three distinct ecological zones: a generally dry coastal belt, a middle belt of wet semi-equatorial forest and a northern dry, savannah belt. It is bound to the west by Volta Lake and the Oti River to the north, both sources of water-borne diseases.

The Volta project addresses improvement of drinking water supply and sanitation (DWSS) through local technologies, integrated with hygiene education and community management. The project targets 50 percent of the rural communities in Volta region to improve social and economic conditions, with an emphasis on the incidence of water-borne disease. The assessment involved three communities with distinctive water resource characteristics. Mafi Dekpoe/Tedeapenu dam, Adidome district is distinctive for inter-sectoral water allocation from the primary water resource, a dam impoundment reservoir. Nyagbo Emli Israel and Santrokofi Bume communities, Hohoe district focus on community management of gravity-fed springs and standpipe supply.

### ***Northern Province Development Programme, Northern Province, Zambia (Irish Aid) Assessment in Kasama and Mbala districts***

The setting for the Irish Aid project is a formerly water-abundant upland area, where in the last decade changing rainfall patterns and unregulated water diversions have increased the pressure for IWRM. The main emphasis is provision of DWS to rural areas targeted for a high incidence of drought and water-borne disease. The project began in Kasama District in 1983, supporting development and rehabilitation of village wells with community input; this extended to a sanitation project in 1992 involving pit latrine construction. The assessment involved six communities from Rural Health Centre catchment areas in Kasama and Mbala districts.

### ***Support for Water, Sanitation and Hygiene Education Projects in Drought-Affected Areas Southern Province, Zambia (UNICEF) Assessment in Kalomo district (3-4,000 people)***

The project area is severely affected by drought and characterised by a short wet season in which groundwater recharge is only partial, so that surface water is present only during the wet season. As a consequence, communities rely on groundwater as the only reliable source of DWS.

In 1994/5 a project was initiated to mitigate the effects of drought and provide accessible, reliable DWS and sanitation with the construction of water points and pit latrines. The case study for the assessment comprised the three villages of Chiyoka, Mazambani and Simalele located in a catchment stretching across two provinces of Kalomo district. The three villages are representative of the water supply system of wells and boreholes.

***Tonga and Mohlala Water Supply and Sanitation Projects, South Africa (Mvula Trust) Assessment in Mpumalanga province (120,000 people and 8,000km<sup>2</sup>)***

The project study was carried out in Mpumalanga province, which comprised homelands (the Eastern Transvaal) and a single 'white' province under the South African apartheid state. The former province is characterised by reliable, bulk water supply, while the former homelands, located in drought-prone regions are characterized by poorly-operated small/medium-sized bulk schemes or groundwater supplies. The Mvula<sup>1</sup> Trust-funded Tonga and Mohlala Water Projects are located in former homeland areas. The Tonga Water Project involves an extension of the distribution network to two villages, and a parallel study of the supply and distribution network by DWAF investigating the widespread problem of uncontrolled, informal connections. The Mohlala Water Project concerns reticulation from boreholes to standpipes in the village of Mohlala.

***Mgeni Catchment Management Plan, Natal Province, South Africa (Umgeni Water) Assessment in Mgeni Catchment (4,300km<sup>2</sup>, 1.5 million people)***

The Mgeni Catchment is characterised by an interaction of competing land uses: modification and pollution of riparian environments in urban areas; and encroachment by crop cultivation, timber plantations, invasive vegetation species and livestock in rural areas of the catchment areas, affecting water quality and the flow regime of the aquatic environment.

Umgeni Water<sup>2</sup> is responsible for rural and peri-urban DWSS within a broader catchment management context. The assessment emphasised integrated water resources management (IWRM) formulated under the Mgeni Catchment Management Plan (1993). The plan addresses key components of IWRM such as monitoring of water resources and land use activities; identification of stakeholders in the catchment; and definition of appropriate management strategies, including community-level participation. The case study assessment comprised consultation with key stakeholders in the catchment, such as agriculture and forestry agencies or conservation groups, including departments within Umgeni Water with fragmented and overlapping responsibilities regarding IWRM.

***Rural Water Supply and Sanitation Project Lumbini Zone, Nepal (FINNIDA) Assessment in Gulmi and Kapilvastu districts (9,000km<sup>2</sup>, 2 million people)***

Lumbini Zone is located in the Western Development Region of Nepal. Since 1990 the Rural Water Supply and Sanitation Project (RWSSP) has assisted rural communities in improving rural water supply, sanitation, hygiene education and irrigation activities. The project works with village development committees (VDCs) in promoting water user committees to operate and maintain drinking water and irrigation schemes and implement small-scale schemes.

The assessment was conducted in two areas that represent the breadth of RWSSP activities in Lumbini Zone, each with a distinctive geography and ethnic composition. Kharjyang VDC, Gulmi district, lies in the hill region where improvement of DWSS is prioritised due to supply shortages. Banganga VDC in Kapilvastu district lies in the valley (terai) area where irrigation systems have priority due to an abundance of groundwater available for DWS.

---

<sup>1</sup> *Mvula Trust* is an independent funding agency operating a demand-responsive fund for community-managed water and sanitation projects in disadvantaged rural areas of South Africa. It works in close cooperation with government and non-government agencies in South Africa.

<sup>2</sup> *Umgeni Water* is the largest water board in the province of Natal, with a mandate to support rural and peri-urban water supply and sanitation, primarily through bulk supply.

***Integrated Watershed Development Project, Bilaspur District, Madhya Pradesh, India  
Assessment in Tilaikundi and Gahania villages (900ha. 700 people)***

The Integrated Watershed Management Project is being implemented under the Rajiv Gandhi Watershed Mission Guidelines. Under the guidelines, micro-watersheds form the unit of development, that approximate the size of a village. Attention is focused on water conservation due to declining water tables, safeguarding water quality, and improvement of livelihoods, using local-scale technologies and management capacities.

Two villages were chosen for the assessment based on the micro-catchment scale of the development units. Tilaikundi and Gahania villages are characterised by low levels of socio-economic development; irrigation of paddy crops is the dominant water use and DWSS projects involve simple water supply techniques (handpumps and wells). Due to the micro-scale of the assessments interactions with competing users was not a feature of the assessment.

***Cambodia Water and Sanitation Programme, Cambodia (CARERE)  
Assessment in Battambang province***

The project, initiated in 1992, aimed to provide basic services to returnees who had fled during the Khmer Rouge rule in the 1970s. In 1996 the second phase of the project stressed the need to develop the government's capacity to assist villages in identifying and solving their own water and sanitation problems. The programme focus is rural areas of four provinces in the north of Cambodia.

The assessment concentrated on activities at three levels : Phnom Penh Waterworks at the national level; Battambang Waterworks at the provincial level; and Panh Nha village (pop. 1,608). The primary source of water for Battambang Town is the Sangke River, threatened by water quality problems due to sediment loading. In Panh Nha, water sources comprise local family or communal ponds, lacking the complex water use issues at the catchment scale. The assessment focuses on capacity building of government institutions to decentralise DWSS management such as well rehabilitation, to the village level.

***Rural Water Supply and Environmental Sanitation Project Maharashtra, India (DFID)  
Assessment study in Jalgaon and Nashik districts (approx. 180 villages)***

Three DWS schemes to rural households are being implemented under the project : two schemes in Jalgaon district and one in Nashik district. The principal water source in Nashik district is Girna Dam, whereas the source in Jalgaon district is the Hatnur Dam and the River Tapi. The primary water supply sector is irrigation, with DWS forming only a fraction of the supply. The major dams are under control of the irrigation sector. Water supply activities are undergoing a process of decentralisation, to Zilla Parishads at the district level, Panchayat Samiti at the block level, and Gram Panchayat at the village level. The various levels of management correspond to water sources, from dams and rivers to village ponds, and groundwater sources such as tubewells. The assessment focused on analyses reflecting these institutional levels, with discussions and interviews with stakeholders in selected project villages, associated institutions and government agencies.

***Community Drinking Water Treatment Project Tolima Department, Colombia (Cinara)  
Assessment in San Felipe (650 people)***

A Surveillance and Control Project targeting environmental health was developed in the wake of the Nevado del Ruiz volcano disaster with the assistance of Cinara. The project involved sanitation and water quality monitoring in a catchment context of multiple water uses. A recent phase focuses on piloting water supply using unconventional treatment methods. The project involved construction of a multi-stage filtration plant for water treatment, appropriate for small and medium-sized communities particularly in rural areas with poor infrastructure.

The assessment comprised the evaluation of a community where the drinking water treatment project was applied. San Felipe was selected as a model community, with local knowledge of its water quality problems, local institutional capacity for water supply improvements and accessibility for replication in adjacent communities. The assessment focused on a workshop for water resource institutions at multiple levels. This was supported by a field survey of residents within the water distribution network.

***Rural Water Resources Management, Gujarat, India (SEWA/DGIS)  
Assessment in Banaskantha district (2 million people) and wider Gujarat***

Acute water shortages in Gujarat affect more than 70 percent of villages each year. This regional disparity in endowment, combined with a top-down water supply approach have led to an uneven distribution of water resources state-wide. Deep tubewell irrigation threatens water quality as well as water table levels. SEWA activities in rural IWRM stem from its mandate of improving the economic and social conditions of the poorest communities in Gujarat, particularly women. The central focus of the SEWA approach is building local management capacities through involvement at every stage of the project cycle. SEWA initiatives are in collaboration with the Gujarat Water Supply and Sewerage Board that manages state DWS programmes.

The assessment covered three SEWA water projects in Gujarat : the Water Campaign that spanned nine districts; a pond project in Datrana village, Banaskantha; and a checkdam project in Piprala village, Banaskantha. Information gathering took the form of informal discussions in the villages, and local committee meetings and workshops.