5 Integrated water resources management

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5.1 The concept of IWRM

To have a water supply system you first need a sustainable water source of sufficient quantity and quality. The inexorable increase in global population and use of water for economic purposes puts ever greater pressure on the world's water resources. Integrated water resources management (IWRM) recognises that there will always be more potential demand for water than there is supply, and that to deal with this there is a need for negotiation and compromise. While there is a desire to seek so-called "win-win" scenarios, these are often difficult to put into practice in real terms. The reality is that hard decisions need to be made, and that in allocating water among competing users there will be winners and losers. The aim must therefore be to develop institutions that have the respect and legitimacy to enforce their decisions even when these are unpopular. The core message for the drinking water and sanitation sector, voiced in Vision 21 (WSSCC, 2000), is that domestic water must come first. No other activity has equal importance, and there can be no "trading" of domestic water entitlements. Water use should be seen as a pyramid, with domestic use representing the smallest, but most important amount at the pyramid's apex.

IWRM is perhaps one of the most misunderstood and yet at the same time most important concepts in the water sector. It is misunderstood because most people within the important sub-sectors (irrigation, industry, water and sanitation) think of it as "someone else's business". Yet IWRM was developed as a philosophical structure to bring together the different sectors. It is important because in the many parts of the world where water quantity and quality are threatened by over-use and poor use it is an approach that offers a way out of the "zero-sum game" of competition between sectors.

The question that programme and project managers involved in community water supply should ask themselves is not "is IWRM relevant to me?" but rather "how can I apply the philosophy of IWRM to my project?". This chapter sets out to answer this question, through a brief introduction to the concepts and history of the philosophy of IWRM, and then by outlining a set of practical questions that can be posed at the project level to identify the necessary actions to approach best IWRM practice.

5.2 The complications that make IWRM necessary

Water is not a resource in the way that, say, land and minerals are. Both of these represent finite quantities of a given resource located at some fixed place in space and time. Water, by contrast, is a flux, constantly recycled through the hydrological cycle and biological processes in humans, animals and plants. Add man-made recycling and reuse,

and the balancing of "supply" and "demand" becomes a far from simple issue. A litre of water flowing from the source of the River Thames in England may be "consumed" as many as nine times before it finally flows out into the North Sea to rejoin the hydrological cycle of evaporation and precipitation.

Water's unique properties as a finite but renewable resource lie at the heart of many of the problems associated with its management. Essentially, it is the rate at which water is used in a particular place in comparison with the rate at which it is replenished that determines whether there is a scarcity or a surplus. In global terms and on a cumulative basis, there is no shortage of fresh water. The world's freshwater crisis is one of water resource distribution in space and time. The 400 cubic kilometres of water that falls on New Zealand each year (117 million litres for each inhabitant) cannot easily be used to supplement Egypt's one cubic kilometre per year (20 litres per inhabitant). Nor is the floodwater of the Ganges that inundates huge areas of Bangladesh in the monsoon season readily harnessable to meet that nation's irrigation and drinking water demands in the dry season.

Man's activities, too, prevent us from making optimum use of the water resources that are available. Water use in one location can affect the ability of others to use it in another location hundreds or thousands of kilometres away. Most of the world's international rivers have transboundary issues around high withdrawals or excessive pollution by upstream riparian states that in turn reduce the quantity or quality of water available to downstream countries. Though it may be less visible, the same problem applies to groundwater resources where "selfish" pumping rates by one aquifer user can dry up the wells of another, or injudicious fertiliser use can launch a nitrates time bomb to contaminate supplies for the next generation.

These large-scale examples of the misuse of water resources generally make headlines and there has been increasing political and scientific attention given to improved IWRM as a means of conflict resolution. This international "peacemaking" has deep resonance for the development of water resources at community level, for a key truth about water resources development and management is that in a large majority of cases it is an essentially local issue. While much of the literature on resource management concentrates on basin level and transboundary issues, the reality is that worldwide most day-to-day conflict over water resources occurs at the level of small rivers or localised aquifers (for an excellent overview of water resource problems at a variety of scales experienced in South Asia see Moench et al. (2002).

At community level, integrated management of local water resources is intuitive. Water has to be found for domestic purposes, for horticulture and for small-scale agriculture. So individual householders recognise the need to conserve and protect available

supplies. What they may not realise so readily is the responsibility also to avoid degrading the river or groundwater so as to protect the resource for downstream communities. That is a matter for both education and regulation. It remains true that it is the enlightened self-interest of informed water users that provides the best basis for catchment protection, water conservation and demand management.

That is why the modern concept of IWRM puts so much emphasis on bottom-up development and management of water, and on management at the most appropriate level. Yes, it is essential to have a proper framework in place for management at the river basin level, but this must rest upon a solid foundation of local good practice.

5.3 A brief history of IWRM

Based on the emerging concept of a water crisis, IWRM was developed as a philosophical framework to look at the way in which water resources are developed and managed, and importantly, to keep in sight the vital links between water resources and land management. As such, IWRM is a relatively new concept. It was first discussed globally at the UN Water Conference at Mar del Plata, Argentina, in 1977, but not really put on the international agenda in any concrete form until the early 1990s. A number of significant meetings were held during this period including the 1990 New Delhi Global Consultation, the 1991 Nordic Freshwater Initiative in Copenhagen, the 1992 Dublin International Conference on Water and Environment (ICWE), the 1992 UN Conference on Environment and Development (The Earth Summit) in Rio de Janeiro (UNDP, 1992), the 1994 Ministerial Conference in Noordwijk (VROM, 1994) and the 1994 OECD/DAC meeting in Paris (OECD, 1994). These meetings challenged existing sector-oriented management practices for water resources as being unsustainable from an economic and environmental perspective, and set out a number of principles and recommendations for integrated water resources 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 summarised key issues in IWRM on which international agreement has been reached, and gave 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".

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 fresh water. Furthermore the UN Commission on Sustainable Development in April 1998 made recommendations on comprehensive strategic approaches to freshwater management. The 2002 Johannesburg World Summit on Sustainable Development Implementation Plan includes the welcome

commitment to halve the number of people without access to safe water and sanitation services by 2015. It also commits countries to "Develop integrated water resources management and water efficiency plans by 2005". (United Nations 2002). The challenge remains to transfer this high level political commitment into local 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.

At the heart of IWRM lie the four so-called Dublin principles, first set out in the 1992 Dublin meeting, and then ratified through inclusion in Chapter 18 of Agenda 21 at Rio. The four principles are reproduced in their complete form in box 5.1. Today, a wide range of international and national agencies support these principles.

Box 5.1 The Dublin Principles for Integrated Water resources management

Principle No. 1:
Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment
Since water sustains life, effective management of water resources demands a holistic approach, linking social and economic development with protection of natural ecosystems. Effective management links land and water uses across the whole of a catchment area or ground water aquifer.

Principle No. 2:
Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels
The participatory approach involves raising awareness of the importance of water among policy-makers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects.

Principle No. 3:
Women play a central part in the provision, management and safeguarding of water
This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources. Acceptance and implementation of this principle requires positive policies to address women's specific needs and to equip and empower women to participate at all levels in water resources programmes, including decision-making and implementation, in ways defined by them.

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Principle No. 4:

Water has an economic value in all its competing uses and should be recognised as an economic good

Within this principle, it is vital to recognise first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognise the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources.

(WMO, 1992)

5.4 IWRM – a framework for multiple systems, actors, sectors and scales

It is clear from its inclusion in the Agenda 21 and the Johannesburg Implementation Plan that IWRM is part of a wider effort to manage the world's resources in more sustainable manner. Because of this, IWRM differs from earlier engineering approaches to water management in that it attempts to work within a framework of the whole hydrological cycle, to see how water interacts with other elements of the ecology and how it is linked to land management. As such, IWRM includes all the different phases of the water flux, which are often referred to under different colours: blue water for surface and ground water resources; green water for the soil moisture used by plants; white water for atmospheric moisture; and brown and grey water for the effluents coming from sanitation and urban run-off.

IWRM implies looking at the whole "system", social, political, and physical (hydrological); at integrating the needs of all users upstream, downstream; and at balancing these needs in a way that satisfies the needs of the greatest number possible in a sustainable way while maintaining a healthy environment.

The IWRM philosophy aims at involving all actors: individuals, companies, organisations, and governments; in all sectors: irrigation, domestic water supply, industry; at all scales: local, national, and transitional. This is not to say that it implies that all stakeholders should be involved in all decisions, rather that each problem is solved at the level and by the stakeholders most appropriate and able to do so. Neither does IWRM suggest that all water issues should involve unwieldy bodies on which representatives from each sector sit together to oversee each others' work. The question of scale, and the differentiation of roles and responsibilities according to scale are crucial to a proper understanding of IWRM.

While IWRM is now well-accepted at an international level, and while an increasing number of countries are adopting or adapting new water laws to address its basic principles, most concrete activity has been decidedly top-down. What is more, there has been little real movement towards better integration of IWRM philosophy into the day-to-day management of projects within water sub-sectors. 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 (Visscher et al., 1999). The next section therefore discusses practical approaches to the application of the IWRM philosophy in the drinking water and sanitation sector, and in community water supply in particular.

5.5 IWRM in community water supply

Before looking at how to implement IWRM for community-based water and sanitation projects, it is worth briefly considering in more detail the reasons for doing so. Developing community schemes is complicated enough, so why make it more so by adding an element of resource management? Many professionals within water sub-sectors think that IWRM has nothing to do with them. They think it is for high level "resource-managers", that it concerns only transnational or river basin level issues, or, most dangerously, that because of the small amounts of water involved (at least relative to the total water balance and water use from other sectors) that there is no need for community managed water projects to bother about IWRM.

However, there are compelling reasons for involvement, largely rooted in the growing water crisis and in existing and potential conflict over water. In this light, the approach to IWRM taken in Vision 21 is clear. The water supply and sanitation sector as a whole has a vital interest in involvement in IWRM to safeguard the right of people to access domestic water in the face of growing competition from other uses and sectors. While clear and compelling, this approach is also somewhat self-centred and does not really address the wider philosophy of IWRM in its more positive sense. It ignores the fact that the other uses of water often form vital parts of the livelihoods of the people whose rights are being protected. A broader interpretation is possible based on the holistic philosophy of IWRM and the interest in protecting the rights of the poor. This interpretation seeks to ensure the right of access of communities to a fair share of water resources for all their livelihood needs, domestic and productive, and seeks to make the use of this share as efficient, effective and sustainable as possible.

Domestic water use is often a relatively minor part of the total water demand, seldom exceeding 10% (although importantly this can often represent a far higher percentage of available water). In comparison, irrigation's share of worldwide freshwater resources is often placed at 70%. The simple, but wrong, conclusion drawn from this is that that

ensuring domestic water availability is not much of a problem. This is a serious and dangerous fallacy. The crucial point is that the 10% requirement for domestic water is the amount that must be safeguarded at all times and in the worst conditions.

Box 5.2 Acute water crisis in Kurnool

KURNOOL: Acute drinking water scarcity in this town has reached dangerous proportions with a man dying on Thursday evening in a stampede that began when a water tanker arrived.

The incident occurred in Joharapuram area on Thursday evening falling under the Kurnool Municipal Corporation Limits when a crowd of about 100 persons tried to be the first to get to the tanker. In the stampede that followed Mahboob Basha fell down and was crushed to deaths by others who trampled over the fallen man to collect water.

The situation in Kurnool is turning from bad to worse with more than 3 lakh people here receiving just 10 lakh gallons a day against the normal supply of 40 lakh gallons a day. The shortage has become very severe in the last six days due to the falling water levels in the Tungabhadra, the only drinking water source for the town that is built on the right bank of the river. This is the first time in 14 years that we are facing such an acute water shortage, a KMC official said adding that poor rains in the district as well as in the catchment areas of the river has led to it drying up.

It was only when dry river bed was noticed that the KMC began making efforts to draw water from other sources. District collector G Sai Prasad began monitoring the situation after asking municipal engineer Rammohan Reddy to go on leave holding him responsible for not taking steps to pre-empt the crisis.

Though the collector later ordered the irrigation department to divert about 60 cusecs of water from the Gajuladinne project to the Tungabhadra river, only about 10 cusecs reached the town as farmers en route diverted the water to their fields. It is with this limited water that the KMC is supplying 10 lakh gallons a day to the town. This is the second time that water was diverted to the town from Gajuladinne project, the first time being in 1988.

Meanwhile, Kurnool MLA TG Venkatesh is supplying drinking water to the most affected areas through 20 water tankers with the KMC chipping in with three tankers. However, these are not adequate to meet the demand with the result that private operators are making a killing supplying water at high cost.

Times of India – Friday, 13th July, 2001

It is therefore essential to have some concept of a drinking water reserve: that is an amount of water held in storage (artificial or natural) for domestic use, which can be relied on completely, and which is not allowed to be used for non-domestic purposes. The concept of a reserve is present in South African water law, where it is stipulated that a reserve for domestic and environmental needs should be calculated at a catchment level (RSA 1998). Though this is conceptually simple, in reality both estimating and then safeguarding a reserve is extremely complex. Nevertheless, introducing the concept to both communities and project personnel is essential. In addition, monitoring frameworks that can help them to estimate when the limits of the reserve are being approached are a crucial part of implementing community level IWRM. The second implication of the reserve concept is that once it has been established, non-domestic uses of water may need to be seriously reduced, and the mechanisms to allow this to happen developed and put in place. Much of this will be beyond the scope of the individual WSS project, but it is important to realise that where a reserve is not safeguarded, the sustainability of a system cannot be taken for granted.

A crucial point about IWRM is that it entails different activities at different scales. IWRM at a national level is mainly about developing policy and legislation, as well as encouraging better cooperation between national stakeholders. Catchment or river basin IWRM is about making allocation decisions, preferably with full involvement of catchment stakeholders. IWRM at local levels, while also often involving allocation decisions, is more about the optimal use of resources at the local level, and about ensuring that local activities do not adversely affect the quality or quantity of water available to downstream users.

From the point of view of drinking water supply projects or programmes, the ideal situation is found in countries where IWRM is fully mainstreamed in national strategy and an integrated set of activities can take place at all three scales. There will be supportive national legislation, devolved (preferably catchment level) decision-making, and active demand management at the local levels. There will be a monitoring framework that ensures that the information needed to make decisions at each level is available and there will be mechanisms to ensure that stakeholders' voices, including those of poor communities, are heard in decision-making about water resource allocation.

Where such a framework exists, the IWRM roles of the community water supply project will be relatively clear, as will the rights and responsibilities of the community level actors. The main work of the project agency in such a case will be to ensure that it complies with existing legislation, and that the community receives training and awareness-raising about their rights and responsibilities. These could include issues such as source registration and protection, quality monitoring, issuing of an abstraction permit, etc. It will also be important to check to what extent the framework recognises

the rights to water of non-formal users: poor people, and women who use wetlands, catchment areas and groundwater for water and other products vital to their livelihoods.

However, such situations are unfortunately still rare. Few countries have effective water resources management legislation, and fewer still the means to implement it. What can the water and sanitation supply project do in such situations to observe good IWRM practice? To start with, it must be recognised that it is not necessary to have such an ideal framework in place for a community water supply project to begin to implement IWRM. Ironically it is often in cases where there is no overall IWRM framework that such work is most essential. The next section deals with the application of the IWRM philosophy at a community level in the absence of clear national policy or implementation guidelines. It sets out a framework of key principles, adapted from the Dublin principles, which can act as a guide to ensuring that local level IWRM is being implemented.

5.6 A practical approach to implementing IWRM within water supply and sanitation projects and programmes

The six key principles set out in box 5.3 below and discussed in more detail in the remains of this chapter can, where properly internalised within a project or programme monitoring structure, ensure that IWRM principles are met. The list is specifically focused on the water and sanitation sector, and at the project and system level. It aims to help staff of WSS organisations to identify how they can best incorporate the relevant IWRM principles into their own projects and systems, rather than worrying about more abstract policy or regulatory matters that are outside their sphere of influence.

Box 5.3 Six IWRM principles for the drinking water supply sector

1. Catchment management and source protection are essential to ensuring sustainability of supply
2. Water use efficiency and demand management must be addressed to minimise the need for new source development
3. Multiple uses of water by women and men in differing social strata should be acknowledged and encouraged
4. All stakeholders should be involved in decision making, but particular emphasis should be put on the active participation of users
5. Gender and equity issues must be addressed throughout the project cycle
6. Water provision should be priced so as to discourage wasteful use, while ensuring the right to access of a necessary minimum for all for domestic and small scale productive uses by the whole family

(Adapted from Moriarty et al., 2000)

Principles one and two deal with resource availability, three deals with how to maximise the impact of water in people's livelihoods, four and five deal with the 'social' aspects of implementing IWRM, and six deals with the economic principles.

The starting point for any water and sanitation project must be the availability of a suitable resource: that is a sufficient quantity of water available at all times and in all conditions, and of suitable quality. This is covered by the application of principles one and two. What these principles mean in practical terms of project implementation is that, before embarking on a drinking water supply scheme, a thorough assessment must be carried out of the current and likely future domestic water needs of the community (including for small-scale productive uses), the realistic possibilities of minimising these through demand management, and the long-term sustainable availability of water from all sources to which the community has access. Only where a match between estimates of total supply and demand is made can a sustainable water service be embarked upon. Where the figures do not match up, alternative sources will need to be investigated and identified. Two linked approaches to assessing available water resources are given in box 5.4.

Box 5.4 Water budgets and participatory resource inventories

Two of the practical tools that will help most in assuring the sustainability of a water resource are a water budget and a water resource inventory.

A **water budget** should try to estimate all inflows and outflows to the source or catchment, both natural and man-made, and ensure that these balance. A water budget should be done by a professional hydrologist. However, a water resource audit carried out by a multi-disciplinary team can contribute considerably to the accuracy and usefulness of a water budget.

A **water resource audit**, carried out in collaboration with the community, can help in preparing the water budget by identifying all current sources and uses of water within the area, and by identifying trends in use and thus possible future demands. To be of any use, all water use within a community must be assessed, even if the project is interested purely in domestic supply. A resource inventory can also serve as a useful starting point to working with communities on wider IWRM issues (for an example of the practical implementation of a water resource audit see KAWAD, 2001).

A crucial issue in carrying out the water budget and resource inventory is whether to work at the source, or catchment scale: whether to deal with one or multiple sources. Only in the rare instance where the source being used is demonstrably not affected by other water uses from different sources can it be considered in isolation. Wherever

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there are known or suspected linkages between different sources, all uses and all sources must be included. It must be emphasised that to carry out an effective water budget, expert hydrological knowledge must be sought in addition to local information gathered through resource audits. Ideally the two should be fully integrated with a hydrologist taking part in the resource audits.

Where the main source is shared on a large scale, as is the case where domestic water is drawn from a river, it may be difficult to get any but the broad outlines of a water budget in the absence of a larger scale IWRM framework. However, even here, local knowledge and past records can still provide indicators as to potential problems such as seasonal or occasional scarcity. In many cases, though, the resource being used will be essentially local, and here the main criteria will be climate, physical conditions and different uses.

A warning

It is essential that a proper hydrological assessment, based where possible on long-term data, is used to back up direct evidence from the field such as resource audits and direct measures such as pumping tests. In particular traditional WSS approaches such as pumping tests of new boreholes provide a "snapshot", which can be highly misleading, as they give no idea of the likely behaviour of the water resource before or after the test is made.

Principle one – Catchment management and source protection are essential to ensuring sustainability of supply

The starting point from an IWRM point of view must be to assure the sustainability of the source(s) used. The following questions cover the core aspects, and should be addressed in the resource inventory and water budget.

- Are sources adequate for both current and projected domestic use (including small-scale productive uses)?
- Are they reliable throughout the year and over the years? Many sources suffer from seasonal or periodic failure.
- Is ownership of the source controlled by the community? Are there competing claims to it by other users or uses?

If, given the relevant data, the answer to any of the questions is no, then action will need to be taken to ensure that an adequate supply can be assured. These actions can be either demand reduction (see next principle) or supply augmentation. Activities that can augment supply include watershed management and groundwater recharge (see next chapter).

Involvement of the community in watershed management activities, particularly where these are small scale, can be highly beneficial. In many Latin American countries a key part of any community management scheme is the buying of the source and its surrounding catchment area. Often this is accompanied by catchment improvement activities such as planting trees and regulating or banning farming activities within the catchment area.

Ensuring the sustainability of the source may be something for a community to do on its own, or may alternatively be something that is too large scale for much meaningful action. There is also an intermediate level, which occurs particularly with multi-community schemes, where a common source is shared and where it is necessary to work in collaboration with other communities. Here a framework for deciding on allocation issues may need to be developed between communities.

A crucial adjunct to source protection is effective monitoring, to know how much water is available and when, for example, some uses must be stopped to ensure that the reserve isn't eaten into. Setting up a resource-monitoring framework with communities is a core activity.

Principle two – Water use efficiency and demand management must be addressed to minimise the need for new source development

In addition to the physical activities to augment quantity and preserve quality mentioned above, there may be a need for local level management between competing resources, and effective demand management of all water uses. This can take the form of simple rationing, or banning of certain activities, but is more likely to be successful where efforts are made to involve communities (and important sub-groups within them) in the monitoring and regulation of their own water use.

Demand management in traditional water and sanitation thinking tends to be linked mainly to improved efficiencies in transmission systems. Poorly maintained systems can have losses of 50% or higher, and dealing with these clearly provides an important area for creating 'extra' supply. However, given the reality of competing uses at a local level, it is also necessary, in collaboration with the community, to identify all the uses to which water is put, and all the potential actions that can limit excess water consumption within these various uses. While simple rationing may be sufficient, aspects such as improved irrigation efficiency may be more productive in terms of overall impact of water on people's livelihoods. Such activities fall well beyond the scope of individual community water projects and call for close collaboration with other specialists and institutions.

An important element of demand management within this holistic framework is water re-use, and multiple uses of water. So, for instance, wastewater can be used for irrigation, or small dams can be used for irrigation, fish production and domestic water supply.

Both principles two and three have important implications in terms of strengthening community capacity and developing new institutions (or strengthening existing ones). How this can be done is dealt with briefly under principle four.

Principle three – Multiple uses of water should be acknowledged and encouraged

Another aspect of dealing with IWRM in water supply projects is the need to reassess the role of the community water supply project itself. Traditionally the role has been to provide water for drinking and associated domestic needs – washing, food preparation, etc. However, it is increasingly recognised that this approach itself is guilty of failing to be truly participatory, by imposing an alien representation of water on communities.

Communities seldom differentiate between water for domestic and non-domestic uses. Water, particularly in areas where it is scarce, represents a vital productive resource. It is needed to carry out many activities essential to livelihoods other than drinking. A recent FAO publication estimates that, even in urban areas, 40% of land is dedicated to food production, much of it irrigated using "domestic water" (FAO, 2000). Market gardening, domestic livestock, laundry services and micro-industry are all potential productive uses that will typically compete for some of the resource (Lovell, 2000). Addressing this issue means designing supplies with multiple uses in mind, and also identifying potential alternative sources (rainwater harvesting, wastewater reuse, etc.).

A livelihoods-based approach to developing water supplies is more likely to achieve a measurable impact on people's well-being and is also more in tune with IWRM principles. Such an approach to water supply takes as its starting point an analysis of the different ways in which water is used within people's livelihoods. Once these have been understood a water supply system is designed that meets as many of these needs as possible. The system may actually be a mixture of systems and sources all managed within a single framework. It may also be a single system with multiple uses for the water it provides. In some ways this latter case is the most challenging to the drinking water and sanitation sector, as in the past projects have often actively sought to discourage people from using their community water supply systems for non-domestic purposes.

It is important to note that a livelihoods-based approach does not mean that the WSS sector should become involved directly in clearly non-domestic issues such as irrigation. What it does mean is that it should try to address all household level activities, including productive ones.

The livelihoods-based approach not only greatly increases the impact of water on people's well- being but also, by directly linking water supply to economic activity, greatly increases willingness and ability to pay for water and maintain water supply systems. (James et al., 2001; Waughray, 1998)

Principle four – All stakeholders should be involved in decision-making, but particular emphasis should be put on the active participation of users

Principles four and five lie at the heart of the social dimension of IWRM. They cover the issues of both how water is controlled and in whose interests. Principle four starts from the Dublin principle of subsidiarity in decision-making. The focus in this case, however, is on decision making at the community level, and hence on the involvement of the key stakeholder groups at this level, the community, or more specifically the users of the WSS service. The statement emphasises an involvement in, rather than control over decision-making. This reflects the fact that IWRM decision-making is complex and involves multiple stakeholders at multiple scales. To suggest that one group of stakeholders should 'control' the process is both unrealistic and undesirable.

Where a fully developed national IWRM framework exists, the main activity for a water supply project will be in ensuring representation of the water committee on water management bodies at local and regional/catchment levels. One of the main activities in such a system will be the negotiation of a water right, to ensure adequate supply for the planned system. This means in particular ensuring that the voices of women and the poorest are heard and that they have the opportunity to make known their requirement for an equitable share of available water resources. Internationally, the paradigm of catchment management is rapidly gaining acceptance as the model for devolved management of water resources, and where such a system exists (such as in South Africa, Zimbabwe and a growing number of other states) it is clear that domestic water supply initiatives should seek ways to be actively involved. However, as already explained, their principle focus and main area for activity must continue to be in ensuring fair allocation at the local level.

Where there is no national framework, the problem is more complex, as the project may need to develop new institutions to deal with the management of water. This will be a complicated process with the need to involve all user groups within a community. The process may involve setting up water resources management committees, or integrating domestic water supply concerns into existing bodies, such as the watershed management committees of India. Those on the committee will need support and training in monitoring and decision-making about issues such as allocation of water rights, demand management, and source protection, as well as in using monitoring to ensure that a domestic reserve is maintained and protected.

Care must also be taken to ensure that the decision-making role of the community is tailored to what can realistically be undertaken at their level. There is no point in making a village water committee responsible for river basin level allocation decisions. Where a shared surface water source is being used, such as a river, a village level water committee will be responsible for allocation and management of the water right within the village, and should also be encouraged to join with other village committees to ensure representation in catchment-level bodies.

Principle five – Gender and equity issues must be addressed throughout the project cycle

If principle four represents the *how*, then principle five deals with the *why*, or more specifically the *for whom*, of better linking between community water supply and IWRM. The principle represents the change in emphasis and broadening of interest from the original Dublin declaration, with its focus on the role of women, to a wider gender focus that seeks to identify and cater for the different needs of men and women, and in particular of poor men and women. It emphasises that burdens and benefits are shared equally between men and women, necessitating particular efforts to enable women to claim their right in decision-making. Men and women use water for different activities – for example women are almost universally responsible for domestic water, but a much more mixed picture exists in irrigation. For example it is often also women who do vegetable gardening, but once irrigation becomes involved and the cash-raising potential of marketing vegetables becomes greater, men can become more involved. In general women and men have different as well as common interests in water and therefore both need to be included in water-based decision-making.

The issue of socio-economic equity in allocation of water resources is of central concern to practitioners in community water projects. Whether the poor use water exclusively for drinking, or for a range of small-scale productive activities, they tend to lack the political strength to make their voice heard in official water allocation bodies. Where such bodies exist, advocating for a sufficient and fair "water right" within such bodies can be an important aspect of a community water supply programme.

Principle six – Water provision should be priced so as to discourage wasteful use, while ensuring the right to access of a necessary minimum for all

The sixth and last principle deals with the economic aspects of IWRM. It is concerned with the pricing of water to ensure waste minimisation and a most effective use of limited resources. It should not be confused with the current emphasis in community water supply on cost recovery. Clearly money paid for water can be used for cost recovery and for operation and maintenance, but the underlying principles are very different. In addition, given the relatively price inelastic nature of demand for domestic water, and the widely held belief that access to domestic water is a right, there are good

reasons for not trying to price domestic water at a level that assures anything other than basic system maintenance.

While a number of existing economic tools for domestic water services, such as stepped tariffs, may seem initially promising also for IWRM purposes, they should be used with care. Stepped tariffs for instance have the problem that where supply is met in part by water vending, the high tariffs charged to vendors will be passed on to their (largely poor) customers. A second, more general argument against trying to use user charges to minimise waste is that on their own they do nothing to encourage service providers to improve system efficiency.

Given these concerns, and the previously mentioned fact that domestic use is typically small, it is questionable whether in the domestic water sector pricing should be used as an economic measure to limit domestic water consumption. Where the sector can play an important role is in ensuring that other, non-domestic uses such as water used for irrigation are charged at a realistic rate. Equally, where private sector providers are involved, charging of high bulk purchase prices for water rights, while capping volumetric charges to individual households, may provide a powerful incentive to maintain systems adequately. The same thinking can be applied to charging a community on two levels, firstly as a community for its water right, and secondly as individuals for actual water used. However, this is a complex issue that will not be gone into in more detail here.

5.7 Conclusions

While an effort has been made to suggest some practical implications of applying the six principles within a community water supply programme or project, the reality of both community water supply and IWRM is that blueprints cannot work. Each community (or at least district or region) must be dealt with in a manner tailored to its own social, economic, and physical reality.

The principles can be used as the basis for an assessment of an individual project's success in achieving best IWRM practice. The principles presented here were developed from a project carried out by IRC and partners in six countries in Africa, Asia, and Latin America (Visscher et al., 1999). In that experience, a slightly different set of principles provided a framework to which were added leading questions and key indicators relevant to country and local specificities. The questions and indicators were established and agreed upon by all stakeholders in a participatory manner as part of the IWRM learning process.

It was the complete list of questions and indicators that then became the monitoring or benchmarking tool, through which the projects started to take account of IWRM principles. The European Commissions "Strategic Approach" which adopts a similar approach, provides fully worked out lists of questions and indicators for all stages of project and programme development for, among others, domestic and municipal water supplies (EC 1998).

A final note on the development of an IWRM approach within community water supply projects is on the need to work more effectively with other sectors. At the scale of the community water supply project, the other sector most likely to be involved is the irrigation sector, although increasingly IWRM also involves industry and mining. Breaking down sectoral barriers isn't easy, particularly at the local level, where line management can often make people slow to make decisions on their own initiative. Knowing what other water development activities are planned for an area is the minimum that is necessary in assuring the sustainability of the resource. Active collaboration with the *water for food* sector can lead to greatly improved impact on livelihoods.

Water resources management, whether governed by a well-developed national framework or implemented internally within a project, is an essential part of any community water supply scheme. Without ensuring the sustainability of the resource, it is meaningless to talk about the sustainability of the scheme. By starting at the level of the individual project, and using the framework of six key issues set out in this chapter, an approach to IWRM is achieved that is practical and implementable.

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