3 Projects and communities

3.1 Introduction

The aim of this chapter is to review the wider context in which groundwater development for rural water supply fits. The discussion is pitched at the manager, or team leader, of a rural water supply project. The project manager has a vital role to play in ensuring the success of any rural water supply investment. While the manager may not be involved in the day-to-day detail of community–project interaction, s/he is responsible for setting the terms of reference for such interaction, within the broader framework of rural water supply objectives, standards and policies set by government.

More specifically, the aims of this chapter are to:

- Summarize **where we are now** in terms of approaches to rural water supply provision, highlighting some basic concepts and principles that underpin the design and implementation of projects. In particular, the need for community participation in decision-making about service provision and management is highlighted, reflecting a shift in emphasis away from top-down planning to a more **demand-responsive** approach.
- Locate groundwater development for rural water supply within the broader project cycle, recognizing that current approaches to service provision do not prescribe options and service levels for communities, but rather promote **informed choices**. In other words, groundwater supply from wells or boreholes may be one of a number of supply options that need to be discussed with communities, along with levels of service, the location of water points, management and cost-sharing arrangements. For this reason we do not limit discussion in this chapter to groundwater development only.
- Explore the role of the project manager in strategy development – a key management responsibility and an essential starting point for project design. By strategy development, we mean a strategy for the project. This will be guided by wider government policies but the project manager is likely to have some flexibility in deciding how a project is to be implemented according to local conditions, within the **enabling framework** set by government.

Discuss the implications of more participatory approaches to service provision for the project team, focusing particularly on the changing role of the project engineer, or technician.

Before proceeding, it is important to note that this chapter provides a **summary** of rural water supply issues and guidance for the project manager, rather than detailed insights or an implementation roadmap. A comprehensive discussion covering the topics raised here could easily run to several hundred pages, and is beyond the scope of this book. Suggestions for further reading are provided at the end of the chapter.

3.2 Basic principles and concepts in rural water supply

3.2.1 What is rural water supply?

Investment in rural water supply is about providing communities with access to clean, reliable water supplies. Water for drinking, cooking and basic hygiene is normally the top priority, though a household's 'domestic' needs may also include water for minor productive uses, such as brick-making, garden irrigation and livestock watering. A key objective is the provision of potable water on a **continuous** basis: security of supply across seasons, and between wet and dry years, is essential if health and wider poverty alleviation benefits are to be met and sustained. Most countries have developed water supply targets, based on coverage and quantity–quality norms. Most projects, operating within such guidelines, are tasked with meeting these targets.

3.2.2 The benefits of improved rural water supply

Rural communities typically place a high priority on improved water supply. This is because access to safe water is fundamental to health and poverty reduction.

The direct health benefits of improved rural water supply, especially when integrated with sanitation initiatives, are well known. They derive mainly from the safe disposal of human excreta, the effective use of water for hygiene purposes (washing, cleaning, etc.), and the satisfaction of basic drinking needs with clean water. However, the full range of health benefits may only be realized through intensive community sensitization campaigns around water, sanitation and health. Unlike demand for a better water supply, demand for improved sanitation facilities is often weak or non-existent. It may therefore need to be stimulated before it can be responded to.

More recently, greater attention has been paid to the broader **livelihood** benefits of rural water supply, looking beyond direct links between improved water supplies and public health (UNICEF 1999; Nicol 2000; Calow et al. 2002; Moriarty and Butterworth 2003). A focus on the multiple uses and benefits of domestic water supplies (see Box 3.1) has important implications for the way projects are conceived, designed and implemented. Water may

BOX 3.1 Beyond basic needs: the wider benefits of improved rural water supply

The benefits of improved water supplies can extend well beyond links with health. An impact assessment exercise carried out by the NGO WaterAid to establish the long-term effects of water supply interventions in Ghana, Ethiopia, Tanzania and India highlighted the following:

Direct benefits – relatively quick changes at individual-household level

- Time and energy savings, particularly for women and children. Savings can be 'invested' in new income-earning opportunities; school enrolment and attendance – particularly for girls – increases.
- Reduced sickness especially among children, reduced expenditure on medicines and care and increases in the number of working days.
- Expenditure savings – because of reduced expenditure on more expensive water from vendors, for example.

Indirect benefits – longer term, more diffuse

- Development and diversification of the local economy as productive water use increases (e.g. for brick-making, tea shops), and money/ time is invested in industrial and service enterprises.
- Development of management and negotiation skills in village communities which can be deployed in other areas. Particularly important where decentralization policies are placing new demands on local institutions.
- Household and community empowerment through taking control of important decisions relating to the selection and management of water systems.
- Improved food security and greater resilience to shocks such as drought.

Source: WaterAid (2001); (2004)

be used in a variety of productive uses, generating important sources of income (cash and non-cash) for households. Productive uses may include cultivation (e.g. small garden irrigation of vegetables), livestock watering (chickens, goats, cattle), cottage industries (e.g. brewing, brick-making) and services (e.g. tea shops). Ignoring such uses during project design (by assuming demand is for basic needs only, for example) may result in the well or borehole being unable to meet demand in terms of the quantity, reliability and location of water needed for different uses. Exploring how water is used (or could be used) by the community, and by different households **within** the community, is therefore essential.

Of course an improved water supply does not automatically lead to poverty alleviation. In order to maximize water-related benefits, interventions in other areas or sectors may be required. For example, an improved water supply combined with microenterprise development may enable women to use time savings to their best advantage, creating new sources of income for the household. Conversely, projects in non-water sectors may only fulfil their objectives with complementary investment in rural water supply. Research on drought and water security in Ethiopia, for example, has shown how food and water security are intimately linked. Water supply interventions – rehabilitation, repair, well deepening and so on – coordinated with food security/asset rebuilding efforts, can help sustain income, production and consumption in the early stages of drought, or in the aftermath of a bad year (Calow et al. 1997; DFID 2001; Calow et al. 2002).

3.2.3 The need for multidisciplinary approaches

Successful and sustainable rural water supply projects require both good technical design and installation, **and** substantial investment in community sensitization, mobilization and participation. Ignoring either technical or social factors will compromise the sustainability of the water supply. If communities do not regard the system as theirs, and management and cost-sharing arrangements are not adequately dealt with, the system is more likely to fail. If a well or borehole is poorly constructed, or developed and sited with little regard to the geology beneath, the chances of mechanical breakdown or the source drying up will also increase.

Yet discussion around sustainability is often polarized. In the past it was often true that technical considerations dominated in many projects: engineers were trained to take important decisions on behalf of communities, using their knowledge to decide what was in a community's best interests. Consultation, if there was any, was often token – communities effectively rubber-stamped the decisions of sector professionals. A welcome retreat from this position, however, has not always led to more balanced approaches. Those who now maintain that technical and environmental issues are unimportant, and that sustainability is determined only by the quality of project 'software' are equally misguided. The key to good project design lies in recognizing the multiple dimensions of sustainability, not in engineering **or** social dogma. Box 3.2 gives examples of two projects where the environmental dimensions of sustainability were important.

3.2.4 From community participation to community management

The need for community participation in the planning and implementation of rural water supply projects became increasingly apparent in the 1980s. Governments and donors realized that that they could no longer afford centralized operation and maintenance systems, and that existing top-down approaches were not creating sustainable water supply systems. As a consequence, the idea that beneficiaries, or users, needed to be involved with

BOX 3.2 The technical and environmental dimensions of sustainability are important

In a project in West Africa, the water supply choices offered to communities by an international NGO were predetermined according to social criteria. Since the construction of shallow, hand-dug wells offered more scope for community involvement and payment in kind (labour and materials), only this option was pursued. By the dry season, however, most of the wells had dried up, leaving communities reliant on the distant, poorer-quality sources they used before.

Lessons? Shallow wells in this hydrogeological environment were inappropriate. By ignoring the technical and environmental dimension of sustainability, the programme failed to achieve its objectives and investment in community mobilization and participation was undermined. In these circumstances, it will be more difficult to win community support for follow-up projects based on community management and cost-sharing.

An international donor funded a major rural water supply programme aimed at bringing potable water to isolated rural communities in East Africa. Only one technical package was considered – hand-dug wells equipped with a certain type of handpump – and then implemented across a diverse range of hydrogeological environments. This was because of a decision taken centrally to promote the package on health grounds: sealed systems were thought to lower the risk of well-head contamination. Within a few years, however, most of the pumps had broken, and communities had become disillusioned with a cycle of breakage and temporary repair (see Figure 3.2).

Lessons? In this case an option was fixed centrally and implemented according to a standard design across different geological areas. These particular pumps broke because they were inappropriate for the shallow lift required from the hand-dug well. By not allowing flexibility in design related to local hydrogeology, people living in a drought-prone area were left with no improved water supplies at all, and a wider legacy of frustration with community-based management.

the ongoing **maintenance** of systems began to be more widely discussed. Hence, ideas about community participation were initially fairly restricted: most attention was focused on trying to get communities to raise funds to help with the upkeep of their water systems.

Community **management** in rural water supply, however, goes some way beyond participation (see Box 3.3). There is no fixed definition or simple formula, but a key feature is the nature and breadth of decision-making, and the responsibility for executing those decisions being more with the community. Community management, as opposed to **participation**, therefore implies (after UNICEF 1999):

- The community has legitimate authority and effective control over management of the water supply system and over the use of water.

Figure 3.1 Women and girls bear the brunt of water carrying in Africa and Asia.
Photo: © Selina Sugden.

- The community commits resources towards both the implementation and upkeep of the system(s).
- Supporting agencies provide advice and technical support, but key decisions about participation in a project, and about the type, level and location of services, are made **with** the community – i.e. with the community rather than by the community or project team alone. Decisions need to be informed by an understanding of technical, environmental and other constraints. Projects and other supporting agencies have a vital role to play in this respect, providing information and screening options.
- Development of people – individual and community empowerment – is a parallel goal. Community management is people-centred: the principal concern is with people's livelihoods, not the resources they use or the technologies employed.

Despite its obvious appeal, however, community management is more complex than might first appear. Community decision-making, for example, does not always reflect the interests of poorer, more marginalized groups; hence community management does not, in itself, guarantee that the needs of all households are met. Why is this so? A key point is that communities

Figure 3.2 Collecting water from the side of a hand-dug well because the sealed pump is broken. Photo: BGS, © NERC 1999.

BOX 3.3 Lessons from successful community management

A study of 122 completed rural water supply projects from around the developing world studied the factors within projects that helped successfully increase the level of participation and community management. These are the factors they found most important:

- The development of clear project goals, strategies and rules, based on a consensus of agency (government, NGO) and community views.
- The development of flexible project strategies, with a high degree of decentralized control and decision-making powers.
- Strong commitment by project managers to a more participatory planning process, and willingness to respond positively to both community views, and the views of field staff.
- Extensive use of local knowledge, and extensive forms of local organization.
- Project approaches which fit comfortably into existing social and cultural contexts.
- A wider (higher level) framework of policies, institutions and laws that promotes popular participation and control.

Sources: Evans and Appleton (1993); UNICEF (1999) are not homogeneous, in terms of the interests, expectations and power of different individuals to influence community decisions. Care therefore needs to be taken to ensure that the needs of all groups – especially women, children and the poor who may have little or no community voice – are factored into decisions on service provision. A project has an important role to play here in making sure that these voices are heard.

3.2.5 Decentralization and service delivery

The reliability and sustainability of community-based systems depends on a series of technical, financial and management support networks, all of which operate within a policy and legal framework. Understanding this framework, and the roles and responsibilities of different stakeholders in the delivery of rural water supply, will help the project manager design and oversee interventions that have the greatest chance of sustainable service delivery.

In many countries this framework has undergone, or is undergoing, major change. In particular, decentralization policies have devolved decision-making powers to lower levels of administration and the state has shed some of its responsibilities. In the rural water sector, partnership arrangements between government departments, the private sector, community-based organizations and NGOs have become common. The precise nature of these arrangements, and the responsibilities of different groups, are not always clear. However, some general trends and relationships can be identified (World Bank-BNWP 2002):

- **National agencies**, such as government ministries, are increasingly acting as advisers, facilitators and trainers to local governments and, sometimes, communities themselves. In addition, national agencies are generally responsible for devising the broad policy framework for rural water supply, defining targets, the process for reaching them, and the roles and responsibilities of different actors. National agencies may also define quality norms, procurement standards and, possibly, training programmes for equipment and service suppliers.
- **Local government**, usually at the regional or district level, may provide more direct support to local communities in planning, procurement of equipment and services, and training. In some cases, local government may do this directly, on behalf of communities or groups of communities within a project or programme area.
- **Communities**, under community-based, demand-led policies, become the owners of water supply infrastructure, with responsibilities that may include the procurement of equipment and services, and the setting and collection of user fees for (at least) operation and maintenance. The objective is financial sustainability. Also, communities themselves take on a responsibility for articulating demand for improved rural water supply in the first place – usually with some assistance (see below).

- The **private sector** is increasingly seen as the community client: contracted by communities, local government or a project on their behalf, to provide a range of support services for rural water supply. These may include the supply of equipment and spare parts, well or borehole siting, drilling, operation and maintenance and organizational support and training. In many countries, however, this remains a goal rather than a reality. Support services are more frequently provided directly by projects and/or government agencies.

3.2.6 Water as a social and economic good

Many of the current changes in approaches to the delivery of rural water supply services suggested above derive from a change in thinking about the nature of water. In the past, many viewed water as a social good only. As the social value of extending services was assumed to be always higher than the cost of provision, the emphasis was on extending coverage, meeting prescribed needs (based on a minimum level of service) and government provision as a public good. Governments often assumed that communities would manage their facilities, once installed, without building capacity or commitment to do so.

During the 1990s, a new global consensus emerged around water as **both** a social and an economic good. Water should be treated as an economic good, so the argument goes, because it has a value. Some uses are valued more highly than others, and some communities value the provision of rural water supply more highly than other communities. Therefore, it makes sense to give priority to investments in these communities, on the basis that **an expression of demand is an expression of value**. Allowing communities to self-select for projects, under widely understood rules, is one of the underlying principles of the demand-responsive approach outlined below.

3.2.7 Demand-responsive approach

Drawing on the above, a demand-responsive approach to rural water supply allows consumer demand to guide key investment decisions. In other words, a project is more or less demand responsive to the degree that users make choices and commit resources to support these choices. The approach has gained widespread and rapid acceptance (albeit with some caveats – see below) on the basis that

> water supply services which are more demand responsive are more likely to be sustainable at the community level than services which are less demand-responsive (Sara and Katz 1997).

Box 3.4 summarizes some of the issues.

The approach is based on three underlying principles:

BOX 3.4 How do we know if a project is demand-driven?

The term **demand-responsive approach** is now used almost routinely in many countries. But is it being seriously devalued through overuse and vagueness? And is it being used to add credibility to policies and projects which are not demand responsive at all? The answer is, almost certainly, yes.

A key point is that all projects (or programmes, or activities) are to some degree demand-driven. Whether a project is supply or demand-driven is relative, not absolute. However, the degree to which it is demand-driven depends on **who makes the decisions** about the type and level of service, and **what range of decisions** the users make, instead of having decisions made on their behalf. A project is therefore likely to be more demand-orientated if:

- the decision to participate is made locally rather than through an external determination of need
- decisions about which type and level of service to build, and over what time period, are based on user preferences
- negotiated arrangements for cost-sharing are reached locally, again based on user preferences and ability to pay (but bearing in mind there is no magic ratio for cost-sharing).

More detailed indicators of demand which can be used to assess whether a project is responding to (and meeting) demand throughout the project cycle are outlined in Box 3.7.

- Firstly, **prioritization**. In terms of which communities should receive services first, priority is given to those communities that are actively seeking improvements to their water services. Demand can be expressed in a number of different ways, and different indicators or demonstrations of demand can be used to establish a community's commitment to a project, from initial selection for support onwards (see Box 3.7).
- Secondly, **willingness to pay**, based on the link between the type and level of service people want, and how much they are willing to pay for these services. In other words, people's willingness to pay or contribute in some way to a project is used as a barometer of demand. This contrasts with the 'old' approach to demand assessment based on an assumed level of affordability for narrowly defined water provision.
- Thirdly, the idea of **informed choice**, whereby individuals or groups make decisions about the type, level and location of services (and about how, when and by whom services are delivered and sustained) with a clear understanding of the implications of such decisions. Implications may relate to individual or group responsibilities (e.g. contributions towards capital and/or recurrent costs), expected

participation in planning and implementation, and the expected availability of and access to water. This highlights the need good information and good communication between the project team and community members.

So much for the theory. What about its translation into practice?

The translation process depends crucially on the development of project rules, and on the capacity of rural water supply stakeholders to support and implement them. Rules create the incentives that make a demand-responsive project work as intended, creating a framework through which demand can be expressed and interpreted. They cover areas such as community eligibility to receive support, the selection of service options, cost-sharing arrangements and responsibilities for investment support. When these are unclear, poorly thought through or not widely understood by stakeholders, problems emerge. Some commentators have also raised concerns about the intrinsic weaknesses of using demand to guide project design in the first place (Box 3.5). Key concerns relate to:

- The assumed link between the value of water to users, or an improved water supply to a community, and willingness to pay. Many would argue that willingness to pay depends largely on the ability to pay. Hence, even with the same basic need for or value of water, the rich will get more and the poor less (Perry et al. 1997).
- The capacity to implement the demand-responsive approach, given the speed with which this approach is being scaled up in many countries and the demands it makes on institutions grappling with new mandates.
- The ability of some (perhaps more remote) communities to articulate their demand for improved services in the first place and, once a community is selected, the ability of poorer households within it to express their particular needs.
- Related to this, underlying assumptions about the nature of communities and community decision-making. Communities are often far from homogeneous and altruistic in outlook, and community decision-making may be biased in favour of richer or more influential households.

3.3 Project–community interaction in the project cycle

3.3.1 Introduction

The question we now ask is: what steps are involved in a project process, or cycle, that reflect the principles of community management and demand responsiveness outlined above? In particular, what is the relationship between the community, a project and other stakeholders in the development of sustainable rural water supplies?

BOX 3.5 Some common problems with the implementation of demand-responsive approaches

In many countries demand-responsive approaches to the provision of rural water supplies have quickly overtaken traditional, supply-driven approaches. However, rapid scaling up, institutional upheaval and a lack of local capacity to put policy into practice can create problems:

- Pushing a policy forward before procedures are in place for community self-selection, for example, can mean that government continues to drive investment and make decisions on behalf of communities. *The result? More top-down provision, not less.*
- Offering communities choice places major logistical and administrative demands on those charged with offering it. The process of informing, assessing and responding to demand is a challenging and time-consuming process, and may not be very attractive to service providers striving to meet narrowly defined coverage targets. *The result? Community dialogue and choice can be minimal, or non-existent.*
- Leaving decisions entirely in the hands of communities can reinforce existing inequalities based on caste, gender and wealth. *The result? The new community standpipe ends up in the compound of the village leader.*
- Cost-sharing and financing arrangements may discriminate against the poor, who may not have the regular cash income required to pay for service fees. Moreover, where different households select different service levels, but user fees remain the same, the poor cross-subsidize the rich. *The result? Poorer households opt out of new schemes, or fund the choices of others.*
- Since the demand-responsive approach focuses on the development and management of individual **sources**, there is a danger that the bigger **resource** picture is missed. *The result? In some hydrogeological environments, ad hoc development of water points can result in interference between community sources and, potentially, over-exploitation of the resource.*

Sources: based on BGS field experience in Tamil Nadu, Rajasthan and Gujarat (India); Ariyabandu and Aheeyar (2004); Joshi (2004)

Figure 3.3 identifies the steps involved. Interaction between the project and community is highlighted, with potential supporting roles played by the private sector, NGOs and other stakeholders. It is the interaction between the community and other stakeholders, with the community at centre stage in decision-making, that defines a demand-responsive approach to rural water supply.

In the discussion below we provide an overview of the complete process, summarizing the rationale for the steps identified and what, and who, might

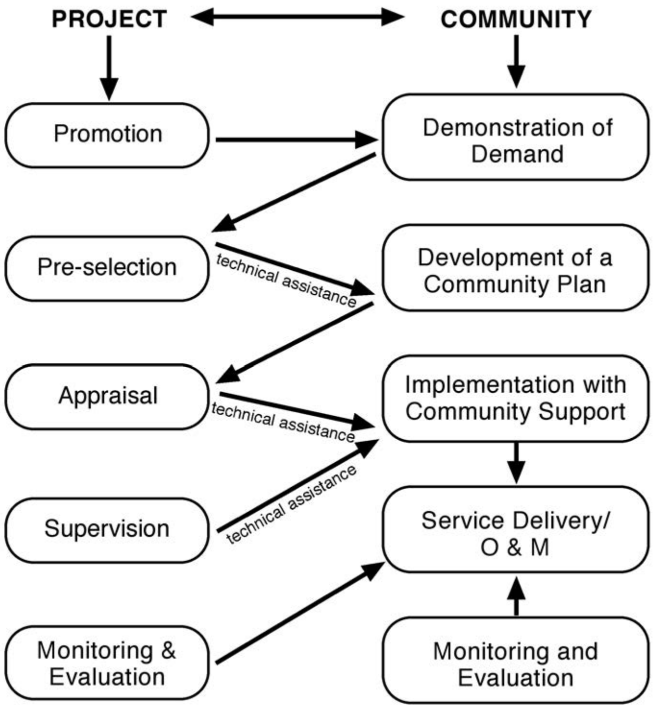

Figure 3.3 Project and community interaction during the project cycle. Points of technical support required at different stages of a project are highlighted.
Source: adapted from World Bank-BNWP 2002.

be involved, with a particular focus on the role of a project manager. The discussion draws heavily on Deverill et al. (2002) and the World Bank-BNWP (2002).

Before proceeding, several important points should be noted:

- Although the focus of this book is clearly on groundwater development for rural water supply, the discussion below is not specific to groundwater. This is because water supply options are not usually predetermined before project planning and strategy development has begun. So, the discussion does not prejudge decisions on options or service levels, but rather aims to show how groundwater development – along with other options – might be screened by a project and discussed with communities.
- What follows is a summary of the project process, not an in-depth manual for planning and implementation. There are comprehensive guideline documents dealing with rural water supply planning, and references to these are provided at the end of the chapter.

3.3.2 Project preparation – developing a project strategy

Why prepare a strategy?

This is one of the most important steps in the project process. Strategy development provides an opportunity to develop a dialogue with key stakeholders, such as local government or regional agencies with support or oversight responsibilities. It is also an opportunity to define and agree responsibilities within the project team (and with those outside), and to develop or adapt project objectives and rules within the wider framework of rural water supply in which the project must operate. This includes looking at the policies and institutions that guide service delivery within a country, and that define 'who does what, when and how'.

What is involved?

Developing a strategy is likely to include the following elements:

- A review of the political, institutional and legal framework for rural water supply within which the project operates.
- The development or adaptation of project rules. Project rules guide the operation of a project, and inform stakeholders of their rights and responsibilities. This should be supported by a review of the technical, management and contribution-related options that may be applicable to the local situation and which will inform rule development.
- Definition of and agreement on the roles and responsibilities of different team members, and the identification of training or additional support needs, as necessary.

Who should do it?

Strategy development is normally the responsibility of the project or programme manager. However, the project manager needs to draw on the skills of the rest of the team, perhaps delegating different elements of strategy development to those with the most appropriate skills. For example, the project technician or engineer might be responsible for looking at service targets, standards and option feasibility, in terms of the technical and environmental constraints affecting supply possibilities (groundwater versus surface water) and service levels (single point systems, standpipes and household connections). Meanwhile, the social development specialist or community facilitator might focus on procedures for communicating with and prioritising communities for project assistance. There are no hard and fast rules about who does what, however. The key is to ensure that strategy development is comprehensive, and initiates a dialogue with key stakeholders – the people and institutions that are likely to have an important bearing on the success of the project.

Is it covered in this book?

Yes. Section 3.4 discusses what is involved in more detail, and provides some suggestions on issues that need to be addressed. Chapter 4 discusses the technical process of groundwater reconnaissance: how to determine whether groundwater can provide a source of rural water supply within a project area.

3.3.3 Project promotion – engaging and selecting communities

Why is a promotion phase important?

Under a demand-responsive approach, priority is given to communities that are actively seeking improvements to their water services. A promotion phase can therefore provide a first opportunity for the project to engage communities in deciding whether or not they want a project, and in the case of multisector projects, defining their development priorities, one of which may be improved water supply.

If rural water supply is **defined by the community** as a priority, then a promotion phase can provide a window for communicating information about the project approach, including eligibility criteria, procedures for project implementation and community responsibilities.

What is involved?

A promotion phase can be used to communicate the basic approach, rules and procedures under which communities are eligible to receive support. An effective strategy generally involves the use of several communication channels, such as radio broadcasts and pamphlet distribution, supported by community visits. A degree of facilitation or capacity building may be required to move the process along, and to help poorer, more remote communities articulate their priorities in the first place. Seeking out the disadvantaged and ensuring their inclusion should be a top priority.

Various indicators or demonstrations of demand can be used to select communities, including:

- the completion of an application form, or project–community **memorandum of understanding**
- the establishment of a project fund, for example a savings account in a local bank
- a village clean-up campaign, in which people come together to achieve a shared goal, as a demonstration of demand and community motivation and organization
- the completion of a basic village map, showing the distribution of households and existing water points
- direct observation by a community facilitator (a facilitator may be

employed by the project or local government to identify priority communities as a complement to, or substitute for, other demonstrations of demand).

Of course local demand, however flexibily facilitated and interpreted, may not be the only criteria used in the selection process, even where formal policies state otherwise. In practice, selection may also be based on external priorities such as local government plans, or on coverage data held by a government department. In these circumstances, initial selection decisions may be based on an external determination of need. At this stage, the project manager will need to ensure that community selection is not compromised by targets, or incentives, that favour the 'easy' areas where community supplies supply can be developed quickly (see Box 3.6).

BOX 3.6 Conflicting objectives and definitions of success

In a project in Ghana, many of the boreholes drilled under a donor-funded project were concentrated in a small number of villages. Yet there were many villages in the project area that had no improved water supply. Why?

One reason relates to the conflicting incentives that agencies, drilling contractors and projects may have in prioritizing areas and selecting communities for rural water supply. A private contractor, for example, may be paid according to the number of successful boreholes drilled, with 'success' defined by the number of boreholes that meet minimum yield and quality requirements. A project-implementing agency, keen to demonstrate success in terms of meeting targets within a limited period, may employ similar reasoning. The outcome in both cases can be that easier environments are chosen first, where groundwater can be easily found and success rates are higher. Wells and boreholes are developed in less vulnerable areas; more difficult, water insecure areas are ignored.

Lessons? Risks can be reduced in two main ways:

- *Firstly, by working with those involved in the oversight of projects and programmes (e.g. local and regional government) to ensure that the targets they set for investment in rural water supply do not distort or dilute their own policy objectives.*
- *Secondly, by ensuring that contracts are written in such a way that they do not make it unreasonably difficult for contractors to go to geologically difficult areas where groundwater is harder to find.*

Source: Calow et al. (2002)

Who is involved?

A number of different stakeholders may be involved in the promotion and selection process. Some projects engage promoters familiar with community facilitation, for example, to visit communities (especially those unlikely to

BOX 3.7 Monitoring demand from a community

Indicators or demonstrations of demand that can be used to monitor a project's demand orientation are listed below. They can be used by project staff to indicate how effective service options offered will be in terms of meeting community, household and individual demands. Identifying those people who are **not** demonstrating their demand, and finding out why, is also important.

Project selection

- Application form completed and signed
- Community meetings held
- Bank account opened
- Water and/or sanitation committee formed, or committee functions delegated to existing community-based organization.

Planning

- Water and/or sanitation committee formed, or committee functions delegated to existing community-based organization
- Bank account opened
- Focus groups formed and sustained (to discuss options)
- Community participation in baseline data collection
- Community action plan prepared
- Cash or other contributions made.

Appraisal

- Action plan agreed by community
- Contract signed between community, implementing agency, local government and/or private sector.

Implementation

- Contributions of cash, materials, time and labour linked to specific services and service levels
- Continuing participation of different households and wealth groups
- Operation
- Maintenance contributions collected
- Upgrading of service levels, e.g. from standpipe to household connection
- Extension of existing service to new areas/community members.

Source: based on Deverill et al. (2002)

hear about the project through other channels) to assess priorities and discuss mechanisms for project assistance. They may be team members, or contracted separately by the project to do the job. The government may also have an important role to play in making initial area/community selection decisions, and in promoting new rural water supply policies and project guidelines.

Is it covered in this book?

No. Those wishing to find out more should consult one of the manuals identified in the further reading section at the end of this chapter.

3.3.4 Developing a community plan

Why is the development of a plan important?

The planning phase is important because, through a process of project–community dialogue, it should allow communities to make informed decisions about the type of facilities they receive, and how they are going to be managed and maintained. The plan should, therefore, include a detailed technical design, with associated costs and a management-contribution systems included. In areas where water supply options are limited to a single community well or borehole, the process is likely to be relatively straightforward. In other areas (those with larger, more heterogeneous communities, and a greater number of technically feasible options and service levels) the development of a plan will be more time-consuming. Whatever the circumstances, good information and effective communication are essential: users need to be fully informed of the characteristics, costs, benefits and risks associated with a particular option.

What is involved?

Several steps are involved in developing a community plan. These are illustrated in Figure 3.4, and described briefly below.

Evaluating problems, defining objectives

The starting point for any plan is an understanding of what the current situation is regarding water availability, access and use, and why improved services are wanted in the first place. Understanding the needs and priorities of different households is essential, and the project will need experienced community facilitators to identify different groups and explore problems and priorities without pre-judging what is and isn't important for people. Useful tools include:

- **Focus group discussions**, based on locally defined wealth groups, for example, and separate discussions with men and women. Seasonal calendars of water availability, access and use, developed

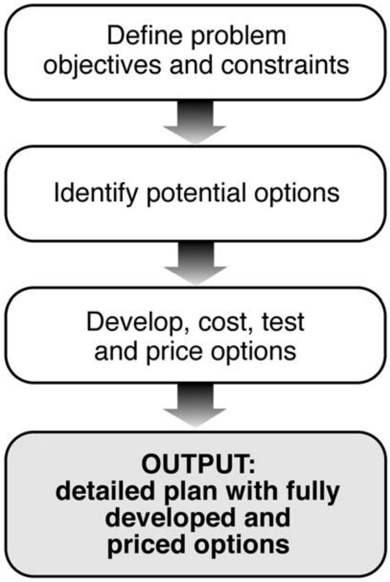

Figure 3.4 Developing a community plan.
Source: Deverill et al. (2002).

separately or as part of a broader activity calendar (i.e. related to work-income calendars), provide a useful reference point for discussion, and can highlight problems some people may have contributing cash during lean periods.

- **Participatory mapping** – identifying where different groups live, for example, and the different water sources they use – and developing a community map, which can be used to focus and guide discussion.
- **Problem trees and problem ranking**, useful for prioritizing problems and identifying cause–effect relationships.
- **Water point interviews**, where project staff spend time at a village well, for example, to speak with the people queuing and collecting water.

The project engineer or technician has an important role to play here, working with a community or taking on some of the participatory exercises her/himself, as appropriate. For example, understanding why certain groundwater sources fail (or are not used) seasonally or during drought (mechanical failures and their causes; lack of water; changing taste and quality) may have an important bearing on final option selection. This kind of information can often be gathered by spending time talking to people at individual water points.

Identifying potential options

The analysis and discussions above should establish the attributes of a water supply that different people in the community think important. These attributes will be informed by men's and women's perceptions of convenience, security, privacy and other values, which may well differ. The identification of options with the **potential** to meet this demand (pre-screened according to their technical feasibility) can then take place, with the advantages and disadvantages of each discussed with the community. The discussion will focus around differences in likely water availability, reliability, quality and accessibility for different people in relation to existing and intended uses. Again, there is a real need for technical input into this dialogue. People must be fully informed of the potential benefits (and costs) of different technology types and service levels.

Developing, costing, testing and pricing options

Once one, or more, potential options have been identified, they can be developed into **real** options with management and contribution systems attached. In practice this is likely to be an extension of the option identification step above: the difference is in the level of detail involved, and the comparisons that need to be made between cost, service level and willingness to pay, amongst other things, before a final decision is reached. Useful approaches for developing options with communities through dialogue and demonstration include:

- visits to neighbouring projects where similar options have been developed
- pictures and photographs of similar options as a focus for dialogue
- physical models of the proposed facilities to help explain how they work and what is required to maintain them
- role-plays and street theatre to illustrate how a management and/or contribution system could work.

To reiterate, **informed** choice is essential. This means that, while any final decision on option selection needs to reflect users' priorities, it must also be technically feasible and environmentally sustainable. This amplifies again the need for technical input. Project technicians do not have a monopoly on technical know-how, however. It will be important also to tap into local knowledge about resource conditions and availability, recognizing the contribution that local people can make in screening options and identifying good sites for a well or borehole (see Chapter 5).

At this stage, it will also be necessary to make users aware of the risks associated with the development of options. For example, if a decision is taken to develop a borehole, it must be made clear that finding groundwater may not be a foregone conclusion. Drilling may be unsuccessful in the preferred location, and other sources may need to be discussed.

Alternatively the project technician may need to make users aware of the trade-offs between convenience and security of supply – if the most drought-resistant location for a borehole would involve a longer walk to collect water for certain households, for example. In either case, it will be important to have a clear project rule about who bears the risk, and cost, of drilling unsuccessful boreholes. If this is borne by the community, then a 10 per cent contribution towards total capital costs could turn out to be very expensive. An alternative would be for the community to meet 15 per cent (say) of capital costs **net** of siting and drilling costs, avoiding the uncertainty and risk of an open-ended cost commitment.

The project technician will also need to consider the impact of future demand in system design. Planning for future population growth and other drivers of demand can be difficult, but designing systems with upgrade **potential** – assuming water resources are available – can provide some flexibility. In this case, the project will need to think carefully about the duration of any subsidies on offer, so that people who join a scheme late are not denied the support offered during the initial project period.

The principle of user choice can also be extended to management and contribution systems, though guidance may already be provided through local and regional policies. For example, policies may outline the makeup, role and legal status of a water committee, its responsibilities in relation to local government, the expected contribution of communities towards project costs, and subsidy arrangements (usually for capital costs only). If not, or if some flexibility in interpretation is possible, then the project will need to develop its own guidance based on what works elsewhere, local politics and any existing community planning arrangements. Whatever the situation, it will be important to:

- Carry out some form of assessment that tests people's demand for an option and their willingness to pay for it. Various techniques can be used, but all are based on (a) a detailed description of the option(s), including the expected service level (for rural groundwater supply, this usually varies from a simple well with windlass, to borehole and handpump, and in some circumstances motorized pumps and a distribution system); and (b) asking people what they would be willing to pay for it. Demand assessment should combine individual interviews with focus group discussions.
- Determine the likely capital and operation and maintenance (O&M) costs of the option(s) selected, which are often location-specific. This should include projected replacement costs of parts, and any additional costs associated with the purchase and replacement of tools, for example.
- Establish a financial management and tariff plan based on outcomes from the above. This needs to be transparent, with a clear process for setting, reviewing an adjusting prices with user approval. The

potential impact on poorer users must also be assessed by the project before a pricing system is implemented, and any subsidy arrangements agreed. Flexibility is important. In contributing to capital costs, for example, poorer households could be allowed to increase their labour contribution in return for a lower cash payment.

- Develop a facilities management plan for O&M, including arrangements for collecting and saving agreed contributions. The roles and responsibilities of the designated community organization responsible for managing the system, and of the external organizations it has to interact with (e.g. local government) must also be clear. Though policy may state that the creation of a water committee is a prerequisite for project assistance, experience suggests that communities should be allowed flexibility in deciding what kind of organization they want to operate and manage the system. This may be a new water committee, but it could also be an existing community organization (Sara and Katz 1997).
- Consider what might happen to existing water points, the people who may continue using them and management arrangements. For example, experience in Sri Lanka suggests that those who do not sign up for new schemes (often the poorest) end up paying more for the upkeep of old ones. In other words, the burden of maintenance for an existing well or borehole falls on a smaller, impoverished section of the community (Ariyabandu and Aheeyar 2004). In these circumstances, there are arguments for bringing both old and new community water supplies under one management system.

Appraising a community plan

Drawing on these outcomes, a written plan or proposal can then be drawn up with the community. Assistance may be provided directly by the project, or recruited and paid for from among consultants and NGOs, or by hiring a qualified individual within the community.

Such a proposal can serve a number of different purposes:

- Firstly, it can be presented in draft form to the community for explanation, discussion and approval. In UNICEF-supported rural water supply projects in Orissa (India), for example, community action plans are represented in picture form on a large wall in the centre of each participating village, providing a focal point for discussion (Deverill et al. 2002).
- Secondly, it can be used to inform the project's funder or local government about the outcomes of the planning process following community approval, providing both a demonstration of demand and capacity, and a means of checking that important qualifying steps have been followed.

The form the proposal takes and the way it is presented will need to be tailored to the needs of the audience, but it might include:

- the alternatives considered
- the decisions which were taken and the process through which they were reached
- details of the management and contribution systems that have been worked out.

Who is involved?

The discussion above highlights the need for different skills and expertise, and the need for a mix of top-down advice (in identifying technically and environmentally feasible options, for example), and bottom-up decision-making (ensuring the views of different users are taken on board). Without this balance, there can be no informed choice. It is important to emphasize, therefore, that a demand-led approach does not mean that project staff – or those they contract – can leave all decisions to community members. Neither does it mean, however, that project technicians or community workers can impose their preferred choices, with communities agreeing to decisions made with token community participation.

Is this covered in the book?

This book does not discuss any further the process of option screening and selection discussed above, demand assessment techniques such as contingent valuation, or the development of management and cost-sharing arrangements. These issues are comprehensively dealt with in other books and reference texts (see the end of this chapter for further reading). However, Chapter 5 provides guidance on working with communities on the siting of wells and boreholes.

3.3.5 Implementation with community support

Why is it important?

Implementing a plan involves the community, the project and contractors working closely together to achieve a shared objective: to put in place firm foundations for sustainable service delivery and operations and maintenance. This requires intensive community-level assistance and training to reinforce ownership, and to formalize (and if necessary reach final agreement on) contribution and management systems set out in the community plan.

What is involved?

A number of different issues need to be considered, from agreeing a final plan (if this has not been done already) to organizing and paying for construction work. An effective communication strategy for the project is essential.

Agreeing options

Important issues to raise include:

- details of project implementation (management structure, budget, timeframe, reporting and feedback arrangements)
- what options are available (for mixed technologies and service levels)
- contribution size and method(s) of payment
- how users can apply to receive a particular service.

Confirming user commitment

The commitment of users to a project intervention can be demonstrated in a number of different ways. For example contracts, upfront cash payments, and contributions of labour and/or materials for construction can all be used to confirm demand for a system (or particular service level), and indicate to project staff, the donor and/or local government that planned improvements match user expectations.

Training for operations and maintenance

Operations and maintenance responsibility starts with the management organizations chosen by, and accountable to, the community. An individual, or individuals, should therefore receive basic training in the day-to-day maintenance of a system, organized by or through the project. A technical manual should be left with the management organization for future reference, listing both maintenance tasks and a task schedule for preventative maintenance. Backstopping services also need to be planned for major repairs.

Preparing management

Ideally, all the responsibilities of a management organization, such as a water point committee, should be practised during implementation with the assistance of the project. This is a vital area of capacity building, and can include:

- price review and the collection of contributions
- the procurement of services from local government or the private sector (e.g. for drilling and equipping the new borehole, or the projected repair or extension/upgrading of facilities using simple job cards)
- the establishment of monitoring systems (e.g. for monitoring the quality of work undertaken, recording problems and requests for assistance, and so on).

To complement this, it is recommended that the project also prepares a handbook for the management organization, explaining its responsibilities and tasks, and with suggestions on who to contact should a problem arise. This may be in addition to the traditional technical manual on operation and maintenance, or part of it. In either case, the handbook(s) can be used as both a training aid during planning and implementation, and as a reference manual in the future.

Who is involved?

As is clear from the above, the community must be involved throughout the implementation phase, from agreeing options, service levels and cost-sharing arrangements, to training in the technical and managerial aspects of system upkeep. The role of the project team may vary, however, depending on which (if any) support functions are contracted out, either by the project (on behalf of a community) or by communities themselves. For example, a project team may be directly involved in all of the activities listed above, providing training, management support and technical assistance. Alternatively, the community may manage some or all funds themselves, and hire (and supervise) qualified individuals or firms to carry out specific tasks. In the later case individuals within the community, or the water committee, would require prior training in the procurement of goods, services and works, including rules, procedures and responsibilities for letting contracts, selection and supervision.

Are these steps covered in the book?

The technical aspects of groundwater development for rural water supply are covered. The community facilitation aspects of option and service level agreement, training and capacity building for management organizations are not. However, Chapter 5 provides some guidance on locating wells and boreholes through community consultation. Tips for further reading are provided at the end of the chapter.

3.3.6 Operation and maintenance, monitoring and evaluation

Why is this important?

Lack of effective O&M is the most common problem of rural water supply projects. To address this problem, O&M training should begin during the implementation phase, focusing on the community's capacity to ensure reliable and sustainable service delivery. This issue is covered under implementation above.

Monitoring and evaluation (M&E) systems can be viewed as tools for helping stakeholders at various levels focus on achieving sustainable service delivery. Traditionally, M&E has been the responsibility of the external agency responsible for implementing the project, or the government agency responsible for ensuring rural water supply objectives have been met, and investments carried out as planned. More recently, attention has turned to community-based M&E on the basis that it can help local management sustain a project, and is not just a tool for external assessment.

What is involved?

Issues of O&M are dealt with above. Here we focus on the indicators and tools that can be used to help local management monitor the performance of rural water supply services. Indicators should ideally be tuned to the local situation, Table 3.1 provides some possible suggestions.

Tools that can be used in M&E include:

- **logbooks**, which can be used by a water committee to record problems, actions taken to address them and response times (e.g. for external contractors)
- **questionnaires**, which are more difficult to complete for some users, but can be used to uncover a wider variety of problems
- **posters**, which can help communicate messages about how to report a fault or apply for an improved service, for example, or may advertise the forthcoming meeting of the water committee.

Are these steps covered in the book?

Not specifically, though much of the guidance in this book is designed to prevent technical problems occurring with wells and boreholes.

3.4 Developing a project strategy

In this section we look at how the project manager, or team leader, can develop a project strategy – taking some of the ideas presented in section 3.3 a little further. This is one of the most important parts of the project cycle: during strategy development, key relationships are forged between team members, and between team members and other stakeholders; responsibilities are defined and agreed; project rules and objectives are defined in the wider context of rural water supply targets and policies; and sub-projects selected.

Below, we focus on four elements of strategy development:

- Rapid sector assessment: a review of the enabling environment in which the project sits, including the political, institutional and legal framework.
- Following on from this, the development or adaptation of project rules, defining who receives support and how support can be provided in a demand-responsive way.

Table 3.1 Possible indicators for monitoring the performance of a rural water supply system

Indicator	Notes
Upfront cash or other contributions	A strong indicator of demand, and can be used during project implementation
Regular payment for services provided	If users are not satisfied with the service they are receiving, they may be reluctant to pay for it. However, there may be other reasons for non-payment. In drought years, for example, users may be unable to pay. Even in normal years, some users may struggle to contribute regular cash income. It is therefore important to find out who is not paying, and why
Water availability	A properly designed, sited and constructed well or borehole should provide a reliable supply of water, even during the dry season
Water access	If water is available but some people are not using the improved supply, reasons need to uncovered. They might include factors related to discrimination (social status, gender, religion), difficulty in meeting user fees/contributions and preference for other sources
User satisfaction and complaints	It is important to measure user satisfaction that is not related to payment, particularly for women who may not control the financial resources used to pay for services, but are the ones collecting most of the water
Upgrading	Upgrading (e.g. extension of an existing system) is a good indicator that people are valuing water supply more, and there is a system in place that can respond to changes in demand
Hand washing and use of soap	An indicator of both the effectiveness of a health and sanitation programme that may be part of the rural water supply project, and an indicator that there is enough water to meet basic needs

- Simple economic assessment of groundwater exploration techniques which can be used to help (a) assess whether groundwater development is a realistic option; and (b) guide the type of groundwater exploration techniques employed in particular area.
- The roles and responsibilities of different project team members, employed directly by the project or contracted-in (with project oversight) by the community, and/or local government. In particular, we focus on the essential role of the engineer or technician.

3.4.1 Rapid sector assessment

As noted in section 3.2, the sustainability of community-based systems is heavily dependent on the technical, financial and management support networks in which they are embedded. These support networks, in turn, are shaped by the policies and institutions that set the 'rules of the game' for investment in rural water supply. Understanding this external environment in terms of the opportunities and constraints it creates (see Table 3.2) will help the project manager design and oversee interventions that have the greatest chance of providing sustainable water supplies. So what exactly is involved?

Table 3.2 Sector assessment: a data collection checklist

	Key questions and information needs	Sources and Tools
1	**Rural water supply objectives, targets and indicators**	
	What are the national, regional and local priorities and plans related to service provision and water resources management?	Policy documents
	Do plans make any reference to wider poverty alleviation goals? If so, how?	Interviews with regional and local government staff
	What targets are defined? Are basic service levels for water (& sanitation) set in terms of quantity and quality, distance to improved sources etc?	Discussion with other programmes and projects
	What scope is there for flexible application, if any?	
	What procedures are there for water quality testing and monitoring?	
	What technical specifications, norms or standards apply to infrastructure design and construction? Who monitors them?	
2	**Rural water supply policies**	
	What is the strategy to meet the targets and standards described above?	Policy documents
	What are the underlying principles of the strategy? Does it include elements of a DRA? If so, which ones?	Interviews with regional and local government staff
	Do selection criteria exist to prioritize communities or households? What are they, and who is involved in the selection process?	Discussions with other programmes and projects
	Do policies define for what purposes water may be provided?	
	Is RWS integrated with hygiene and sanitation strategies or policies, or wider poverty alleviation activities (e.g. credit schemes, food security interventions)? If so, how?	
	Is RWS linked with national or regional policies on water resources management, such as integrated basin management? If so, how?	
3	**Institutional roles and responsibilities**	
	Which institutions are responsible for policy development?	Institutional mapping

Table 3.2—*cont*.

	Key Questions and Information Needs	Sources and Tools
	Which institutions are responsible for policy implementation? How are roles and responsibilities distributed between different organizations? Are responsibilities for service provision and support defined? If so, how? How does RWS 'fit' within the decentralisation agenda (both political and administrative)? Which particular tasks, duties and responsibilities have been devolved, and which retained? What is the actual capacity of local government, the private sector, NGOs and CBOs to plan, implement and sustain projects? Do community-based organisations (e.g. water committees) for managing water points already exist in target villages (the legacy of previous RWS interventions)? Do policies provide any guidance on what, if anything, should happen to existing RWS systems and management arrangements? Is the formation of a new water committee a prerequisite for receiving project assistance, or can the community delegate management to an existing organization?	Stakeholder analysis, based on review of formal roles and responsibilities (from policy documents) and discussion with government, civil society and private sector agencies
4	**Legal framework** Is local government legally mandated to support service provision? Is the project and/or the community management organization authorized to propose, implement and operate projects, form contracts, make bye-laws, set tariffs and collect payments? Is the local management organization obliged to register with local/regional government? How effective is this process? What is the legal framework regarding asset ownership? What is the legal framework regarding water use (e.g. registration or licensing of new boreholes; spacing requirements between boreholes, and between boreholes and latrines)? Have there been any serious conflicts regarding water resource use, and are there mechanisms in place for resolving such conflicts?	Policy documents Water laws Review of customary rights and practices Key informant interviews

Table 3.2—*cont.*

	Key Questions and Information Needs	Sources and Tools
5	**Technology options and standards**	
	Do policies allow or promote community choice in the type, level, design and siting of services and systems? Does this extend to individual households	Policy documents
	How are these choices framed, or screened, and by whom?	Discussion with government, civil society and private sector agencies
	Are certain types of technology or sources favoured, or forbidden (e.g. boreholes in certain areas; surface water sources in others)?	Discussions with other RWS projects and programmes
	Are there standards and norms for RWS service levels and technical design and construction (see Q1 above)?	
	Are standards monitored and enforced? If so, by whom?	
6	**Finance and cost recovery**	
	What policies are there for the financing of service provision? (from construction and installation to operation and maintenance)?	Policy documents
	Are contribution levels towards capital and recurrent costs defined? If so, how?	Discussion with government, civil society and private sector agencies
	What is the policy on subsidies? Over what period of time are communities and households eligible for subsidies?	Discussions with other RWS projects and programmes
	Are subsidy rules rigid, or is there scope for flexibility (e.g. allowing poorer households to exchange cash for labour contributions)?	
	What is the policy on cost limits, if any?	
	Who bears the risk and cost of unsuccessful drilling? (e.g. do communities pay only a percentage cost of a successful borehole?)	
	Are funds available to start up savings and credit schemes, to make services more affordable?	
	What are the sources of funds, and what procedures are in place for connecting source with recipient?	

- Firstly, it requires a clear understanding of the **policies** that influence how projects are designed and implemented. For example, the national standards or targets that any project should support, and the approach (and its rationale) for achieving them. A review of policy documents and statements can provide this, as well as providing a route map of functional responsibilities held by government institutions – both political and administrative – at different levels.

- Secondly, and following on from the above, it requires a clear understanding of **institutional responsibilities and functions**. These may still be evolving where decentralization policies are being promoted and there is increased scope for private sector and/or NGO involvement in service delivery. In these circumstances, the nature of partnership arrangements (intended and existing) between government, private sector and civil society organizations will need to be explored, particularly in terms of the capacity of different stakeholders to undertake prescribed roles. It is also important to look at the rights and obligations of users themselves.

The institutional analysis should also include a review of **relevant legislation** affecting ownership of assets and the mandate and powers of local management committees. For example, a local management organization such as a water committee can be authorized through legislation to award contracts, to set and adjust tariffs, and to collect payments for services provided. The same mandate may also set limits to these powers requiring, for example, an annual audit of accounts (Deverill et al. 2002). Customary rules existing outside the formal legal framework should also be explored, particularly in relation to the status of local management organizations (do customary and formal powers conflict in any way?), and their potential influence on rights of access to improved water supplies (might some groups be excluded?).

How can this be carried out? A lot of information should be available in general policy documents, statements and manuals available from government departments, or indirectly through other organizations. Talking to people is also essential. Developing a dialogue with some of the key stakeholders involved can provide valuable insights into what actually happens on the ground, and not just what should happen. In particular, the following stakeholders and the fulfilment of their roles should be examined:

- **Local politicians**, for example those in local government, with respect to their mandate and capacity to support communities.
- **Civil servants** in administrative departments with responsibilities for identifying and/or supporting local communities. In many countries, for example, borehole drilling units are still in the public sector, and it will be important to find out how they operate and to whom they are accountable.
- **Private sector suppliers** of goods and services for the design, construction, procurement and sale of spare parts. In particular, the capacity of private sector operators to fulfil roles envisaged in new policies should be scrutinized.

- **Other projects and programmes in the area** with experience in following new policies, and the constraints they have faced.
- **Communities themselves** in terms of their ability to manage the procurement and oversight of equipment supply and O&M services.

3.4.2 Developing project rules

Project rules guide the operation of a project. They inform stakeholders of their rights and responsibilities, detailing basic principles and obligations. Stakeholders include potential users (communities, and the households within them) and those responsible for implementing and supporting projects. The starting point for developing rules is the sector assessment described above as rural water supply policies are likely to guide – and in some cases specify – the technical, management and contribution-related options that are available, and can therefore be offered. For the project manager, key questions relate to the degree of flexibility a project has in interpreting, adapting and implementing policies in ways suited to the local situation.

Five broad categories of project rules can be identified (after Sara and Katz 1997):

- **Eligibility criteria**. Service commitments should ideally follow, not precede, community initiative in seeking assistance. As noted previously, a basic tenet of a demand-responsive approach is that more communities should be eligible to receive services than can be served. In this way, priority for service should be given to those communities **actively** seeking improvements to their water supply system. However, communities may need assistance in registering or articulating their demand, hence the need for a project promotion phase, and the need for flexibility in agreeing which indicators of demand can be used by a project to signal 'active' community initiative (see earlier). In this respect, the project may need to move beyond recommended indicators and information pathways to ensure that poorer groups and communities are not excluded.
- **Informed requests from the community**. At the same time, a project needs to have procedures in place that ensure an adequate flow of information to communities. Communities should, for example, be able to make informed choices about whether to participate in a project, based on **prior knowledge about the terms of their participation and responsibilities for sustaining a water supply system**. Again, these issues need to be dealt with during a project promotion phase (section 3.2), paying particular attention to ensuring messages reach poorer groups in an appropriate, understandable format.

- **Technical options and service levels**. Demand-responsive approaches emphasize the need for community engagement in selecting service options, levels and locations, with related cost and operational consideration made clear. In order for people to make informed choices, however, projects need procedures for (a) screening options before project-community dialogue over choice begins; and (b) communicating information about the advantages and disadvantages of feasible (screened) options, including the costs and complexity of O&M. In practice, rural water supply policies may favour or prescribe certain sources and technologies, reducing opportunities for local decision making and innovation. Moreover, a project's capacity to support choice, and what this implies in terms of technical, logistical and training support, may be limited. The project manager therefore needs to work within the constraints imposed by policy, and the constraints of their own organization (Box 3.8).
- **Cost-sharing arrangements**. The basic principles of cost-sharing should be specified and made clear to all stakeholders at the outset. A basic principle of the demand-responsive approach holds that cost-sharing arrangements should be designed so that the community chooses the level of service for which it is willing to pay.

BOX 3.8 Working with constraints

The technical choices that can be offered to communities are often constrained by:

- the policies set by government
- the availability of water – rainwater, surface sources, groundwater resources
- the availability of good information on water availability, especially groundwater
- the capacity of a project to design, implement and sustain different options
- the capacity of local government and private sector organizations to support different options and choices (e.g. for construction work and the provision of spare parts).

Constraints can be eased by building the capacity of the implementing organization, for example by ensuring project staff are familiar with a range of technical, management and financial options, and the inputs required to sustain a scheme. Where constraints cannot be easily removed, flexibility is still possible. Even where water resource constraints limit options to a single village well or borehole, for example, local people may still be able to decide on the details of design, the location of the water point, how and when contributions are to be made, and how the service is to be managed.

Again, cost-sharing arrangements and subsidy packages may be guided by government policy, and the project manager will need to investigate what scope there is for refining or adapting rules to the local situation.

- **Responsibilities for investment support**. Rules regarding asset ownership, O&M and ongoing recovery of system costs should be established and agreed upon by all stakeholders.

3.4.3 Assessing the cost-effectiveness of groundwater exploration

Here we look specifically at the issue of groundwater development for rural water supply, focusing on the cost-effectiveness of alternative exploration methods. Why is this important, and why consider it here as an element of strategy development? There are several reasons:

- Simple cost analysis can help the project team decide between different technology options and even whether groundwater development is feasible in an area. Of course other factors will influence decisions about potentially feasible options – not least the availability (and quality) of other water sources – but cost is an important consideration.
- Projects have a finite source of money, therefore higher costs of individual sources means other communities go unserved.
- Too many projects attempt to develop groundwater by drilling boreholes more-or-less randomly, with negative consequences. This often leads to large numbers of unsuccessful boreholes and therefore a higher cost per working water point, and a cost to communities, in terms of unmet expectations.

Groundwater exploration

In some areas, for example on major alluvial plains with abundant rainfall, groundwater may be widely available at relatively shallow depths. In these areas, little or no hydrogeological investigation is necessary as wells or boreholes may be successful wherever they are developed. Siting can therefore be determined by the local population alone.

In environments which are more geologically heterogeneous, however, investigations ranging from simple field observation to more costly exploratory drilling and surveying may be necessary to ensure success (see Table 3.3). Where investigations help reduce the number of unsuccessful wells drilled, cost savings may be significant, more than covering the cost of the investigation procedure (Figure 3.5). A simple methodological approach for evaluating the most appropriate approach to groundwater exploration, based on cost-effectiveness criteria, is outlined below.

One approach is to compare the costs of groundwater exploration with the costs of drilling, on the basis that hydrogeological knowledge can reduce the

Table 3.3 The costs of different exploratory techniques

	Groundwater exploration technique	Costs	Notes
One-off project cost			
Reconnaissance	Gathering background maps and information on the geology and hydrogeological conditions (see techniques in Chapter 4)	A one off cost – several weeks' time of a project member or consultant. More expensive (but not prohibitively so) if data have to be generated from satellite images etc.	Essential first step for understanding the groundwater resources. To generate new data a consultant or university would need to be involved
Costs per borehole (**increasing costs** ↓)			
Hydro-geological fieldwork	Siting by eye – examining the geomorphology and the rocks in an area Discussion with local communities	Requires a well trained and experienced engineer to visit the community	Objective is to 'ground-truth' results gathered from reconnaissance
Geophysical surveying	See Chapter 5 for the different techniques. Must be combined with reconnaissance data and hydrogeological fieldwork	Equipment varies in price but is generally <$US 20 k. A well-trained geophysics team will need at least 1 day in each community	Important to have good analysis of the data. Investment in training staff highly beneficial
Exploratory drilling	Drill exploratory boreholes in a community – often combined with hydrogeological fieldwork and geophysics	Costs equivalent to drilling a dry borehole, but considerably reduced if the team has control over their own rig. Could be a one off cost if the exploratory drilling leads to better interpretation of geophysics	The only way to 'prove' that groundwater occurs in an area. Requires careful facilitation to ensure that communities do not get frustrated by drilling of 'test' boreholes

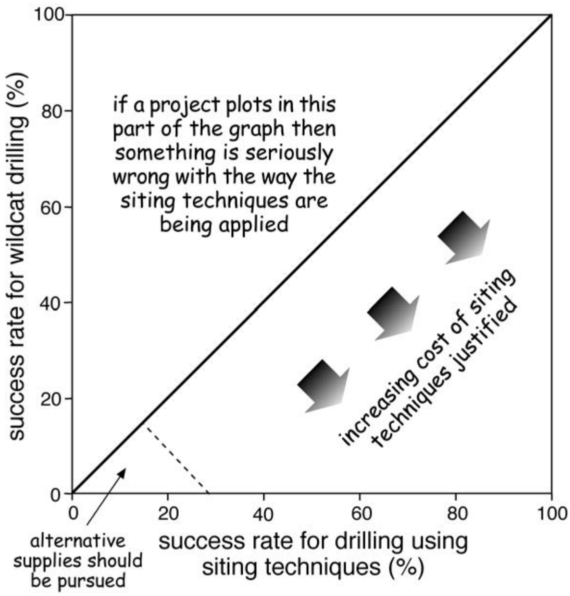

Figure 3.5 Summary of the circumstances when siting techniques can be economically justified.

number of unsuccessful wells or boreholes drilled (Reedman et al. 2002). Hence, the benefits of acquiring hydrogeological knowledge can be quantified as drilling costs saved. This type of economic approach is known as a **cost-effectiveness analysis**. As in any economic appraisal, comparisons are made between a baseline scenario (what would happen without investigation, or a certain level of investigation), and one or more alternatives (what would happen with a certain level of investigation).

Technology choice

A second important cost factor for the project is the costs of different technologies, or varying designs of technologies. Drilling rigs vary enormously in cost – from less than $100 000 for a small airflush down-the-hole hammer rig, to more than $500 000 for large truck-mounted rigs. If a project has control over buying a rig, it is important that the most appropriate rig is bought for the project (see Table 3.4). There is no point in buying a large heavy rig with a high-capacity compressor if the boreholes are to be less than 100 m into basement rocks.

Another related cost is the diameter of the borehole drilled. A 200-mm diameter borehole will remove nearly 3 times as much spoil from the ground than a 125-mm borehole. The difference in the running costs of

BOX 3.9 Investing in groundwater investigation: is it worth it?

A project manager in Nigeria was faced with the following dilemma. Information collected during the reconnaissance phase of the project suggested the project was underlain by crystalline basement. Previous projects had reported a 40 per cent success rate from drilling boreholes in the village centres using no groundwater exploration methods. The project manager has calculated that an unsuccessful borehole (unequipped) will cost the project \$3000 and a successful borehole (equipped and functioning) \$5000. A geophysics team is available at \$500 per borehole. What success rate would they need to get to make it worthwhile?

Random drilling

For every successful borehole, 1.5 unsuccessful boreholes need to be drilled, so the project cost per successful borehole is

$$1.5 \times \$3000 + 1 \times \$5000 = \$9500$$

With groundwater exploration

With groundwater exploration, an unsuccessful borehole will cost \$3500 and a successful borehole \$5500.

The money that can be spent on unsuccessful boreholes is

$$\$9500 - \$5500 = \$4000$$

This is equivalent to 1.14 unsuccessful boreholes.

The breakeven success rate is 2.14 boreholes per successful borehole (47 per cent)

Therefore, any success over 47 per cent will give significant savings to the project and allow more communities to be served.

- **Drawbacks:** This method assumes prior knowledge about the success of random drilling in an area. Accurate information can be difficult to get hold of since success rates often go unreported, or different definitions of 'success' are used by different agencies.
- **Conclusion:** it is useful to find out as much as you can about the successes – and failures – of other projects and programmes so that mistakes are not repeated. If data are available, it can be useful to carry out some simple economic tests.

the compressor and wear on the rig per borehole are huge. In low-yielding rocks there is little difference in hydraulic efficiency between a 200-mm and a 125-mm borehole. The diameter should be determined by the size of the pump to fit down the casing.

Table 3.4 Summary of the costs and constraints of different drilling methods

	Hand digging	Hand drilling	Percussion rig	Small multi-purpose air flush rig	Large multi-purpose rig
Capital cost (US$ k)	1	<5	20–100	<150	>200
Running costs	Very low	Low	Low	Medium	Very high
Training requirements	Very low	Low	Low-medium	Medium	Very high
Repair skills	Very low	Low	Low-medium	Medium	Very high
Holes to 15 m in unconsolidated material	Slow	Fast	Fast	Difficult	Fast
Holes to 50 m in unconsolidated material	Generally impossible	Slow and difficult	Moderately-fast	Very difficult	Fast
Holes to 15–50 m in consolidated material	Very slow	Impossible	Very slow	Very fast	Very fast

Source: adapted from Foster et al. (2000).

3.4.4 The project team and the role of the engineer

In this final section, we look at the roles and responsibilities of different team members, focusing particularly on the role of the engineer in a more demand-led approach to service provision. For the project manager, assessing the capacity of those involved to fulfil new roles, particularly in terms of support for local decision making, is vital. This issue needs to be considered before implementation begins, hence its inclusion here under strategy development.

In section 3.2, we highlighted the need for multidisciplinary approaches, noting that sustainable rural water supply projects require both technical inputs – particularly in terms of option screening – and substantial investment in community sensitization, mobilization and participation. The shift to more demand-responsive approaches also has implications for the ways in which inputs are provided. We therefore need to look beyond the need for disciplinary balance, to consider how decisions are made with respect to service provision. Traditionally, engineers and other technical specialists have been trained to take important technical decisions on behalf of communities, or donors. With demand-responsive approaches, engineers are expected to work with communities.

The need to involve users in decision making is well rehearsed, but it can create some uncertainty for engineers and technicians. In particular, they may be uncomfortable with an approach that appears to contradict their training by giving community members decision-making powers. For government engineers, the uncertainly may be compounded by wider institutional changes, especially the change in the role of the state from direct implementation to facilitation (Gross et al. 2001; Deverill et al. 2002).

Below we highlight some key responsibilities in the project process, amplifying some of the points made above. Table 3.5 provides a checklist of skills

Table 3.5 Knowledge, skills and attitudes of project staff needed to help design and implement rural water supply projects

	Project manager	Engineer or technician	Social development
Knowledge			
Policy, legal and institutional framework	Essential	Useful	Useful
Roles and responsibilities of relevant external (to project) people	Essential	Useful	Useful
Individual and team project roles and responsibilities	Essential	Essential	Essential
Advantages and limitations of different water supply options	Essential	Essential	Essential
Wider uses and benefits of water	Essential	Essential	Essential
Household livelihood strategies	Essential	Essential	Essential
Water resource constraints	Useful	Essential	Useful
How to cost options accurately	Useful	Essential	Essential
Technical and design standards	Essential	Essential	NA
Different community management options	Useful	Useful	Essential
Different participatory techniques for assessing demand	Useful	Useful	Essential
Skills			
Ability to adapt technologies to meet demand	Devolve	Essential	Useful
Ability to cost options and recommend prices	Devolve	Essential	Essential
Ability to communicate technical concepts to people with little technical background	Devolve	Essential	Essential
Ability to communicate financial concepts to people with little experience of community financing	Devolve	Useful	Essential
Ability to adapt to resource and environmental constraints	Devolve	Essential	Useful
Ability to engage with all users, especially women and poorer households	Devolve	Essential	Essential
Attitudes			
Ability to lead, motivate and supervise	Essential	Useful	Useful
Ability to work as part of a multidisciplinary team	Essential	Essential	Essential

Table 3.5—*cont.*

	Project manager	Engineer or technician	Social development
Willingness and patience to devolve decision-making to communities and households	Essential	Essential	Essential
Willingness to work unconventional hours and to work in remote or difficult situations	Essential	Essential	Essential
Willingness to adapt standards as appropriate, assessing risk and retaining responsibility	Essential	Essential	Essential
Sensitivity to the demands, culture and circumstances of vulnerable groups	Essential	Essential	Essential
Commitment to continuous professional development	Essential	Essential	Essential

Source: adapted from Deverill et al. (2002).

required for project design and implementation. A key question the project manager needs to ask is: are these skills available or can they be developed in the team, or does specialist assistance need to be contracted-in or outsourced?

Skills for strategy development and project promotion

The project engineer or technician should be able to provide advice on rural water supply objectives, and the feasibility of meeting them through different options in the project area. This can be achieved by:

- Working with other team members to assess the political, institutional and legal framework for rural water supply from a technical perspective. This may include an assessment of targets and standards, and of the capacity of partner agencies – private contractors, local government – to provide support services, including the provision of equipment and spare parts, well or borehole siting, drilling, technical training and maintenance.
- Identifying potential water supply options from a technical perspective, based on policy guidance, the experience of other projects and programmes in the area, and the engineer's own assessment of water resource availability and quality constraints. This may include an assessment of the development potential of groundwater resources to meet rural water supply targets, and the cost-effectiveness of alternative investigation/siting techniques (3.4.3 above).
- Working with other team members to examine the potential 'fit' between the options identified above and people's likely demand and ability to pay. Messages about informed choice – and the need

to screen options according to their technical and environmental feasibility – will need to be fed into the project promotion phase.

Skills for developing and implementing a community plan

In order for consumers to be able to take decisions, they have to be informed about their options. Drawing on the initial feasibility assessment above, the project engineer will need to work with the community to develop potential options into real ones, including appropriate management and contribution systems (see section 3.3.4). At this stage the engineer will need to guard against foreclosing on alternatives, based on what s/he considers most appropriate. Particular responsibilities and skills are likely to include:

- Assessing local water resource conditions and helping to assess demand (alongside social facilitators or community development specialists), including the attributes of an improved water supply that different people consider important, and potential changes in demand over time (between seasons, and over the longer term).
- Discussing with communities, and different groups within them, the characteristics, benefits and limitations of different option types and service levels. This implies that the engineer will need to be familiar with a wide range of options – including the technology and materials used, and the mechanisms used to supply, operate, maintain and upgrade services (Deverill et al. 2002). A willingness and ability to adapt standard designs, based on demand and resource assessments, is also useful.
- Based on this knowledge, the costing of different options, including capital, recurrent and replacement costs, so that affordable options can be identified with the social facilitator or community development specialist. Even where projects employ a financial adviser for this role, the engineer should be involved in the process.

Capacity building for the project team

Capacity building is not just something a project is supporting within a community; it may also be required for the project team. Relatively few engineers or technical specialists have the breadth of knowledge and experience to carry out these tasks. And not all social development specialists are used to working with, and not just alongside, engineers. What can be done?

One possibility – noted in Box 3.8 – is training and experience-building for project staff. This requires time and money, but is an investment in the sustainability of follow-on activities. Training could take several forms, including:

- formal courses at local, regional or national resource centres
- fact-finding visits to other projects and programmes

- structured workshops, where staff from several projects (and government agencies and other stakeholders, as appropriate) meet to share ideas and experiences.

Another possibility is for project staff to contract in or otherwise outsource specialist assistance as and when required. For example the project might employ a financial specialist, or outsource advice on the appropriateness of wells or boreholes in a specific area. If this is the case, the manager will need to make provision for this during the initial design or strategy development phase.

Finally, the project manager may have to ask hard questions about what the project can realistically offer. After all, there are limits to the number of informed choices that can be offered, service levels arranged, training courses organized and subsidy/cost-sharing schemes developed. It may be better to stick with the 'tried-and-tested', rather than offer options and choices that are ill-informed and unfamiliar.

3.5 Summary: key messages for the project manager

- Investment in rural water supply is about much more than achieving health goals, or coverage targets. The benefits of rural water supply extend to income generation, education and, further downstream, to improvements in food security and livelihood resilience. This has implications for the way projects are conceived, designed and implemented.

  Lessons? Avoid pre-judging what is and isn't important to people. Ensure that demand assessments carried out by team members consider the wider role of water in the community and household economy, and not just water for drinking, washing and cooking. Investment in rural water supply is an investment in poverty alleviation, not just about meeting basic needs.

- People often have entrenched opinions about what is and isn't important. For example, it is not uncommon to hear that 'technical issues are not important', or are less important than social ones in ensuring sustainability. In reality, projects require both software and hardware. Good technical design informed by an understanding of resource conditions (availability, quality, reliability) is essential. So is investment in community mobilization and participation.

  Lessons? Sustainability has different dimensions. It is not just about financing and community management and ownership of assets. It is also about whether there is enough water, of a suitable quality, to support livelihoods across seasons, and between good and bad years. This element of environmental sustainability is often ignored in the literature on the demand-responsive approach. The project manager must resist the temptation to collapse sustainability into a single area and invest in this element only.

- Many of the current shifts in rural water supply policy stem from a change in thinking about the value of water, and a recognition that centralized approaches to service delivery are unsustainable. More bottom-up, demand-responsive approaches emphasize community decision making, where communities make informed choices about: whether to participate in a project; the preferred level of service based on willingness to pay; how services are planned, implemented, operated and maintained; and how funds are managed and accounted for. Cost-sharing arrangements under which the community owns assets, and is responsible for their upkeep, are the norm. Partnership arrangements between the community and government (as facilitator-supervisor), NGOs and the private sector (as contractors and service providers) are advocated.

  Lessons? The institutional and political framework for service delivery and natural resource management is changing. Roles and responsibilities may still be unclear, and partnership arrangements not yet developed. In this environment, the project manager needs to understand formal policy objectives and institutional relationships (defining how things 'should' work), and informal realities (how things actually work in practice), learning from the experience of other projects. For example, new community-based, demand-led initiatives may challenge the vested interests of old bureaucracies, including government maintenance departments and their agents. Understanding feasibility – political, institutional, logistical – is essential.

- Community participation in the selection and siting of services, and community management and ownership of systems, has a major bearing on the sustainability of the infrastructure of rural water supply. Despite its 'feelgood' overtones, however, community decision making and management does not, by itself, ensure the interests of all households are met. Care needs to be taken to ensure that the needs of all groups – especially women, children and the poor or marginalized – are factored into decisions on service type, level, location and financing.

  Lessons? Projects should take steps to ensure that the views of different people are heard and acted upon. Traditional leaders and water committees will need to be consulted, but as part of a wider consultation exercise that includes focus group discussions (based on wealth groups, for example), household and water point interviews, and (larger) village meetings. This can be time-consuming – especially in larger settlements – and demands good skills in participatory rural appraisal (PRA). However, it is time well spent. The quality of participation and the quality of information provided to users will largely determine the success of the project and the sustainability of the services provided.

- New approaches to service provision emphasize the need for key investment decisions to be guided by consumer demand. In other words communities (and sometimes individual households) should make informed choices from a range of options, service levels and potential sites for the location of services, with opportunities for people to choose a higher level of service by paying more. In practice, choices are likely to be constrained by both the availability of water, and by the ability of service providers to support local choice. Offering different communities a range of supply options and service levels can create a heavy administrative and logistical burden for a project tasked with developing different technical, training and cost-sharing/subsidy packages on a place-by-place basis.

Lessons? In many rural areas, options are likely to be very limited. Care must therefore be taken to avoid raising unrealistic expectations about choice where local decision making may be limited to consultation on siting a single well or borehole. The project engineer, or technical contractor, has a vital role to play here in ensuring that options are screened by an understanding of technical and environmental feasibility. At the same time, the project manager must be realistic about what a project can do, given its administrative and technical capacity, and the capacity of other stakeholders (e.g. the private sector; local government) to support, or back-up, community decision-making. Knowing the difference between what should be done and what can be done – given the capacity of the project and wider support structures – is essential.

- Good projects need to draw on a range of skills and experience. New approaches to rural water supply also imply new ways of applying skills and experience. Traditionally, the project engineer has made key technical decisions on behalf of communities. Now, the engineer is expected to provide users with informed choices, leaving them to take final decisions. Traditionally, a community development worker or social development specialist has handled the project–community dialogue. Now, they should be expected to work with engineers to screen and develop options, and develop management and cost-sharing systems.

Lessons? The project manager needs to ensure the project can draw on a mix of skills, and that there is communication and learning across the team. For example, the project engineer/technician and community development worker need to work together to ensure that the options offered to communities reflect resource constraints as well as user preferences and payment abilities. The project manager may need to invest in capacity building for the team to ensure it is familiar with a wide range of technical, management and cost-sharing possibilities, and is equipped with the necessary skills to work with, rather than in, communities.

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Useful websites

Water and Sanitation Programme: http://www.wsp.org

WaterAid: http://www.wateraid.org

The Africa Water Page: http://www.thewaterpage.com/

The Water and Environment Development Centre (WEDC): http://www.wedc.lboro.ac.uk/

IRC International Water and Sanitation Centre: http://www.irc.nl

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