

Designing water and sanitation  
projects  
to meet demand  
in rural and peri-urban areas

- the engineer's role

Interim Report

**Paul Deverill, Simon Bibby,  
Alison Wedgwood & Ian Smout**

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Water, Engineering and Development Centre  
Loughborough University, Leicestershire  
LE11 3TU  
UK



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## Executive Summary

This report forms part of a DFID funded research programme investigating how water and sanitation projects can be designed to meet demand. It follows a detailed literature review and field visits to project partners in South Africa, Tanzania, Nepal and India, bringing together the lessons that have been learnt and preparing the way for a set of practical guidelines.

The meaning of demand and how it is expressed is at the centre of a largely ideological debate. Achieving a balance between economic and social points of view is important if the poorest users are not to be excluded. After due consideration, the following definition has been adopted:

Demand is an informed expression of desire for a particular service, measured by the contribution people are willing and able to make to receive this service.

The contribution does not have to be monetary, but should be:

- perceived by the potential user as affordable;
- sufficient to empower the user as a consumer with associated rights and responsibilities; and
- related to the cost of the associated option, in order to facilitate the achievement of cost recovery objectives.

The definition reflects the economic characteristics of effective demand. It should be qualified by stating that the right to a basic level of service should not be compromised by meeting demands for higher levels of service.

Whatever the theory, there are difficulties in developing and implementing a demand responsive approach that can be used in practice. DRA, the demand responsive approach developed and advocated by the World Bank and the Water and Sanitation Programme has been the subject of much debate. The report examines people's concerns in more detail, and in particular, its likely impact on the poor.

The approaches used by six implementing organisations visited during the fieldwork are also reviewed. A number of key constraints are identified that combine to limit the choice of service offered to households. The importance of ensuring that the poor are able to participate in the process, and the need to meet future as well as current demand are also emphasised.

Reflecting these points, the following set of principles is proposed that attempts to define what meeting demand actually means:

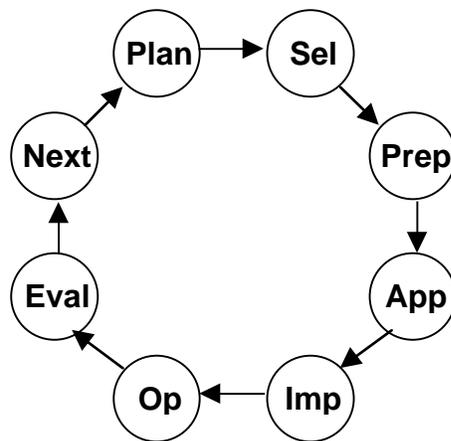
## Principles of meeting demand

1. Communities, households and individuals are enabled to make an informed choice of:
  - whether they want to participate in a project;
  - how services are to be allocated, managed, and maintained;
  - service level options;
  - how contributions are to be made and managed;

(In practice, options will be limited not only by their absolute feasibility, but also by the capacity of project staff and communities to deliver and sustain them).

2. Specific provision is made to ensure that marginalised groups are able to participate.
3. The right of all people to an affordable, basic level of service is not compromised;
4. Systems for effective collective decision-making are established; and
5. Facilities are designed and management systems are established which are capable of responding to future changes in demand.

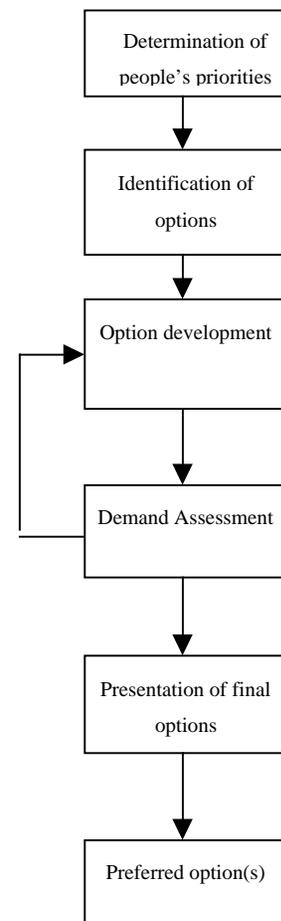
The principles are then applied to a project cycle (below left), describing the activities associated with each step, and drawing on the work of the many organisations visited during the course of the fieldwork. Where necessary, additional examples have been included from a variety of other sources, including WaterAid projects in Dar es Salaam and northern Mozambique.



**The project cycle**

Having worked through the project cycle, further detail is provided about the design process itself, focusing on the role of the engineer. The process is summarized in the flow chart opposite.

The participation of the poor and the importance of designing projects to meet future demand are emphasised throughout the report. The latter should be reflected in the infrastructure provided and the management systems established during project implementation.

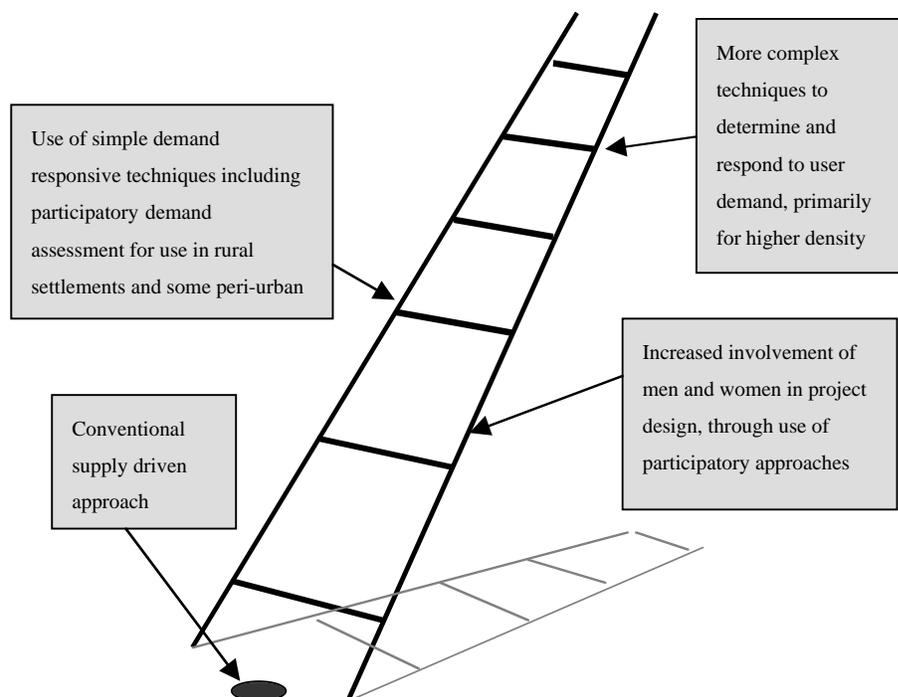


**The design process**

This process emphasises the need to treat potential users as clients, to focus efforts at household level, and to adopt a multi-disciplinary approach to project selection, design and implementation. Particular expertise, skills and individual qualities are needed by engineers, and these are identified in the report.

In terms of guidelines, a number of recommendations have been made. These are summarised below:

- Guidelines should be focused on the engineer's role, but should be accessible to project staff from other disciplines.
- Guidelines should be generic but capture practical lessons being learnt by the many organisations collaborating in the project.
- Guidelines will be in three sections: an introduction, details of the processes involved, and a summary of technical, financial and managerial options and their characteristics.
- Many organisations are in a process of transition from being supply driven to demand responsive and have limited capacity. This should be reflected in the style and contents of guidelines, which will occupy the lower and middle rungs of the schematic ladder shown below.
- A supplementary document may be produced pitched at the upper rungs of the ladder. This will focus on more elaborate techniques used to access demand which require specialist skills unlikely to be accessible to most implementing organisations.



**The 'ladder view' of meeting demand**

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### **Description of approaches adopted by collaborating organisations**

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## List of acronyms

CBO	Community based organisation
CVM	Contingent valuation methodology
DFID	Department for international development
EHP	Environmental Health Project (USA)
IRC	International Reference Centre (Holland)
KaR	Knowledge and Research project (DFID funded)
KWDP	Kalahandi Water and Development Project (Orissa)
NEWAH	Nepal Water and Health
O&M	Operation and Maintenance
PHAST	Participatory Hygiene and Sanitation Transformation
PLA	Participatory Learning and Action
RDWSSP	Rural Drinking Water Supply and Sanitation Programme (Kenya)
RWSSDFB	Rural Water Supply and Sanitation Development Funding Board (Nepal)
SHUWASA	Shinyanga Urban Water Supply and Sewerage Authority (Tanzania)
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
WAMMA	WaterAid, Maji, Maendeleo ya Jamii and Afya (Tanzania)
WEDC	Water, Engineering and Development Centre
WELL	Water and Environmental Health at London and Loughborough
WSP	Water and Sanitation Programme

# 1. Introduction

*'Designing water supply and sanitation projects to meet demand - the engineer's role'* is a Knowledge and Research (KaR) project funded by the Department for International Development (DFID).

The project's purpose is to produce practical guidelines which will enable watsan staff to offer rural and peri-urban communities, especially the poor, informed choices of upgradable levels of service and technologies. Further details about the project and its outputs are set out in the Project Inception Report<sup>1</sup>.

This interim report brings together the results of field visits to our project partners and other organisations in South Africa, Tanzania, Nepal and India. The result is a working document that can be used by all those involved in the project, both in the UK and overseas, to inform the development of practical guidelines. Gaps in knowledge have been identified, and the interim report establishes a point of departure for further work designed to fill them.

The interim report is structured in 11 sections. Following this introduction, section 2 considers what is meant by 'demand', why it is important, and how it is expressed. This fundamental issue determines the form that a demand responsive approach may take, and in particular, the extent to which the poor and other marginalised groups are able to participate.

Section 3 is a brief description of a 'model' demand responsive approach developed by the Water and Sanitation Programme, and best known by its acronym, DRA. This section discusses the potential strengths and weaknesses of DRA, and in particular, if the poor and other groups who may find it difficult to articulate their demand, risk being marginalised.

The following section considers the various approaches developed by six of the implementing organisations visited during the field research. Important issues concerning user satisfaction, the need for effective participation, the provision of options, and how to meet future demand have been highlighted. Detailed descriptions of the approaches being used have been included at the back of this report. The section concludes with what we consider to be the fundamental characteristics of a poverty sensitive demand responsive approach.

Section 5 describes the activities required in order to establish and meet demand, and how these relate to the project cycle. A more detailed analysis of the project design process is considered in section 6, which focuses on the engineer's role. This section discusses the identification, development and presentation of appropriate options in order that people's demand can be captured.

The evidence collected indicates that, whilst a variety of approaches have been developed to meet current demand, there is much less emphasis on meeting demand expressed in the future. Section 7 looks at this issue more closely, and in particular,

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the implications for the management of water supply schemes and sanitation projects after construction has been completed.

Section 8 analyses the human resource implications of implementing a demand responsive approach, focusing on the engineer's role, and the attitudes, knowledge and skills that would be required.

Section 9 concerns the project's principal output - practical guidelines. The section identifies the target audience, discusses the format guidelines may take, and outlines their contents. A participatory process by which guidelines could be developed, drawing on the experience and capacity of the project's overseas partners, is also suggested.

Section 10 identifies gaps in the research, and suggests ways in which they could be filled. This is likely to involve further input from project's overseas collaborators. Finally, section 11 brings together what has been learnt in a set of concluding points.

## 2. Demand

### 2.1 Background

The principal lesson from the International Drinking Water and Sanitation Decade, according to Cairncross, 1992, was that ‘progress and continuing success depend most on responding to consumer demand’. The author was basing this conclusion on a review of many successful and unsuccessful projects implemented throughout the 1980s.

More recently, other evaluations have concluded that water and sanitation systems which did not meet people’s demands have problems of under use, poor maintenance and poor cost recovery (for example, White, 1997 and Black, 1998). Such findings have resulted in the emergence of a new generation of project methodologies based on the concept of determining and meeting user demand.

At the forefront of these is a model best known by its acronym, DRA (the Demand Responsive Approach). DRA was developed during the 1990s by the Water and Sanitation Programme in an attempt to improve the efficiency of service delivery.

Since then, demand responsive approaches, and DRA in particular, have been the subject of a largely ideological debate<sup>2</sup>, much of which has been fuelled by differing sectoral perceptions of what ‘demand’ means.

#### Needs and wants

Before discussing different interpretations of demand, it is important to distinguish between the terms ‘needs’ and ‘wants’ as used in this report. Needs are commonly used to describe a lack of essential facilities or services, often from an external point of view. Wants are associated with the facilities or service that satisfy user perceptions of utility and value, and meet his or her aspirations.

### 2.2 What is understood by demand?

Achieving a consensus on what is understood by demand has been made difficult by the fact that engineers, economists and social scientists tend to have different points of view (Parry-Jones, 1999).

#### *2.2.1 Demand as an assumed level of consumption*

Most of the engineers that were consulted during the four field visits, and most of those interviewed by Bos in South Africa (Bos, 2001), equate demand for water with consumption. In the absence of other data, this is estimated using design norms, taking into account the level of service to be provided<sup>3</sup>. The level of service is often decided by government or donor policy (see section 2.2.3)

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<sup>2</sup> For example, the 1999 e-conference on DRA. See [www.mailbase.ac.uk/lists/dra](http://www.mailbase.ac.uk/lists/dra).

<sup>3</sup> Level of service can be expressed in technical terms - for example, a yard tap or pit latrine, or in terms of its characteristics. In terms of water supply, this would include water quantity, quality, convenience,

### **2.2.2 Demand as willingness to pay for a service**

Demand can also be described in economic terms - willingness to pay for a particular service (World Bank, 1993). Demand expressed in this way is known as *effective demand*. Effective demand may be relatively high for the service people want. The term 'service' not only refers to a particular level of service, but also how it is paid for, and how the project is implemented and managed (Sara, 1998).

Economists interpret 'willingness' as willing and able. Willingness to pay is not only related to the merits of a particular level of service; it is also linked to individual factors such as gender, income, age and knowledge; the user's attitude towards the service provider; and any sense of entitlement to free or subsidized services (World Bank, 1993).

This economic understanding of demand is supported by the following arguments:

- Coping strategies reveal that many people invest considerable economic resources to improve, or compensate for, service levels that do not meet their demands.
- Many governments cannot afford to provide a heavily subsidised, basic level of service. Fundamentally, if people are expected to pay for services, they must be able to choose the service they want and are willing and able to pay for.
- Willingness to pay is a more reliable measure of demand than affordability, based on an assessment of income, as it takes other factors into account.
- Users who pay for the quantity and quality of water they consume, or the sanitation improvements they receive, have some incentive to conserve resources, thereby providing increased opportunities for its equitable distribution.

There are however a number of counter-arguments. Firstly, by focusing on willingness to *pay*, demand responsive projects may focus on those with access to *financial* resources and information. Even if the word 'pay' is substituted by the word 'contribute', such an approach may still discriminate against marginalised groups and individuals (Ghosh, 1999).

Secondly, the poor may seem willing and able to contribute towards water supply and sanitation, but can only do so in practice by reducing what they invest in other essentials, such as nutrition and basic healthcare. Equating demand with willingness to pay or contribute assumes that users are in a position to choose how they allocate economic resources. When day to day survival is at stake, this assumption breaks down (Ghosh, 1999).

### **2.2.3 Demand as an expression of a right**

Many of these issues are reflected in what is known as a rights-based approach. Human rights adopted by the world community include rights essential for human survival, including a right to a standard of living adequate for health and wellbeing (Häusermann, 1999). This is reflected in the fourth Dublin principle:

*“Water has an economic value in all its competing uses and should be seen as an economic good. However, it is recognised that within this principle, it is vital to recognise the basic right of all human beings to have access to clean water and sanitation at an affordable price”.*

More recently, the rights concept has been extended to include opportunities to improve one’s quality of life and fulfil one’s potential (Häusermann, 1999). This not only implies that people should be able to take informed decisions concerning the type and level of services they want, but they should have opportunities to upgrade this sometime in the future.

Whether associated with the delivery of basic needs or providing opportunities for self-development, the rights based view of demand emphasises the need to ensure that people are not treated as passive beneficiaries. At least in this sense, both DRA and the rights based approach are in agreement.

## 2.3 Defining demand

A simple definition of demand is needed that takes into account the issues mentioned above. This will serve as a platform on which to base discussion and present possible approaches. The following definition is based on dialogue with the project’s collaborators and the participants of a project workshop associated with the WEDC conference in Dhaka, November 2000:

Demand is an informed expression of desire for a particular service, measured by the contribution people are willing and able to make to receive this service.
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The contribution does not have to be monetary, but it should be:

- perceived by the potential user as affordable;
- sufficient to empower the user as a consumer with associated rights and responsibilities; and
- related to the cost of the associated option, in order to facilitate the achievement of cost recovery objectives.

The definition reflects the economic characteristics of effective demand. It should be qualified by stating that the right to a basic level of service should not be compromised by meeting demands for higher levels of service.

This qualification throws up three issues: what is a basic level of service, what is affordable, and who decides? In practice, a basic level of service is often fixed by national policy. In South Africa, the basic level of service for water supply is 25 litres per capita day, a maximum of 200m from the homestead. Whether such figures are appropriate in all circumstances is debatable.

Cost recovery objectives are also often determined by policy. In general, there is a move towards achieving full cost recovery, although this is more realistic in urban areas where population density and economic conditions are more favourable.

## 2.4 Providing users with choice

Demand can be met or 'captured' by ensuring that people receive the service they want and are willing and able to support with a contribution.

For practical reasons, user choice is limited to a range of feasible options. As implied by Ghosh (1999), it is very important that the options are appropriate and provide potential users with a meaningful choice.

The process of meeting demand can be described in four stages:

- 1) identifying and developing a range of appropriate service options;
- 2) ensuring that people are informed about the benefits and costs of each option;
- 3) enabling people to choose the service that they prefer;
- 4) negotiating with users to agree a technically feasible design.

Relating demand to a service and not to a service level has important consequences. Individual households should be able to choose the level of service they want and are prepared to sustain. Collectively, they should also be able to determine how that service is managed<sup>4</sup>, how contributions are made, and how resources are distributed.

## 2.5 Effective communication

Effective communication between the implementing organisation, potential users and other stakeholders is vital if demand is to be met. To this, the following objectives must be met:

- Local perceptions of ownership and access to water resources should be taken into account in developing any proposed initiative;
- Potential users must be able, and if necessary, enabled, to express their demand for service options measured in terms of their willingness to contribute. This applies above all to marginalised individuals, households and communities, and to women as well as men;
- Project staff need to be sufficiently informed about local priorities and perceptions, and what they want and are willing to contribute in return, so they can identify and develop appropriate options; and
- People must be fully informed of the relative benefits, costs, risks and implications of each option, compared to their present situation.

These objectives may be difficult to achieve in practice. Perceptions of being able to communicate easily with households, individually and collectively, may be optimistic. Field visits conducted during the research indicated that many people find it difficult

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<sup>4</sup> This is not necessarily advocating community management, but reinforces the importance of potential

to participate: the poor often have to work long hours well away from home, whilst women can be personally inhibited from attending meetings or expressing their views. The poor are usually the least likely to have the confidence to come forward to articulate their demand and therefore face a double jeopardy of not being actively included as well as excluding themselves from any consultative process. Skilled facilitation is therefore required, as well as the additional time to seek out the poor and disadvantaged and develop workable systems for their inclusion in the consultative process.

## 2.6 How demand is expressed

Having defined demand and considered how in theory it can be met through providing potential users with an appropriate selection of options, it is important to consider how demand is expressed in more detail.

Demand for *existing* services is expressed by the actions of users. For example households may make a contribution (whether this be monetary or non-monetary) in order to use an existing service. Users may also seek to improve their existing service and express their demand in doing so, for example, by investing in additional storage containers, or treating the water provided.

Such actions can often be investigated and used to evaluate an existing situation. This forms the basis of revealed preference surveys, a form of demand assessment (for more details see section 5.1). Revealed preference studies can be a useful tool early on in the project cycle.

Tangible expressions of demand can also be *demonstrated* at various stages during the project cycle. These can be designed to provide project staff with a useful series of milestones that indicate if demand is likely to be met. Examples of this technique, used by our project partners, are shown in Table 1.

Stage in project cycle	Possible expression of demand
Project selection	Application form completed and signed Mass meetings held Water committee elected
Preparation	Bank account opened Community action plan prepared Financial or in-kind contributions made
Approval	Contract signed between community and implementer
Implementation	Local materials collected Additional contributions collected related to level of service Labour contributed
Operation	Facilities used Regular payments collected

**Table 1: Demonstrations of demand elicited during the project cycle**

A rather different type of approach is to establish what potential users would be prepared to contribute towards a range of service options. This can be achieved by presenting people with hypothetical service options, and asking them what they would be prepared to contribute in return. This concept is used by contingent valuation

methodologies (CVM) and participatory demand assessment. Both are described in more detail in section 6.8. Care has to be taken when eliciting demand directly, and in particular, to identify possible biases that would result in expressions of demand not being translated into reality.

## 2.7 Complications and contradictions

Meeting demand may be complicated by a number of additional factors:

- The local political, institutional and legal environment may reflect supply driven rather than demand driven priorities.
- Although the theory of demand is largely focused at household level, it is inevitable that a degree of consensus and collective decision-making will be required. The word 'community' implies a level of homogeneity that is rarely found in practice.
- Responding to household demand may result in women being marginalised or excluded from decision making processes.
- Water is wanted for a variety of purposes, but many water supply projects focus on its provision for domestic use only. Unmet demand for other uses of water may manifest itself in a way that throws a project off balance, particularly when there are competing demands for water.
- In many cases, often associated with sanitation, perceptions are such that there may be insufficient demand for a service for its implementation to be feasible. The issue then is how one can *stimulate* demand.
- Demand can change considerably as the population changes and circumstances and perceptions are altered (Webster, 1999). Meeting demand has to be a continuous rather than a one-off process.
- Users may or may not give much weight to the long term, or to the need to protect the environment. In particular, vulnerable households and communities may have understandably short planning horizons, whereas the improvements offered may have a life expectancy measured in decades.
- Without an effective participation process, the determination of preferences may be captured by a local elite, to the detriment of groups in the community.

Meeting demand is therefore relatively simple to conceptualise, but its practical application is more complex when the issues raised above are taken into account. This complexity is itself an important issue when one considers the limited capacity of implementing organisations, the resources available and the pressure to meet national or international development targets. As commented in the DFID guidance manual, a more simple approach that offers fewer options may be preferred as a pragmatic solution (WELL, 1998, p176).

## 3. DRA

### 3.1 What is DRA?

DRA is a model approach, developed and advocated by a number of organisations including the Water and Sanitation Programme. It reflects two principles that were endorsed at the 1992 International Conference on Water and the Environment in Dublin:

- water is an economic as well as a social good and should be managed as such;
- water should be managed at the lowest appropriate level, with users involved in the planning and implementation of projects.

(Sara, 1999)

Although the Dublin conference focused on water, the principles can also be applied to sanitation. DRA emphasises the economic value of water and sanitation, and the need to elicit and respond to effective demand, measured in terms of people's willingness to pay for a particular service.

The approach also emphasises the role of the private sector, service delivery through market mechanisms and the prioritisation of communities where demand is strongest.

### 3.2 Characteristics of DRA

The key characteristics of DRA identified by Sara, 1999 are:

- Community members make informed choices about:
  1. Whether to participate in a project.
  2. Technology and service level options based on willingness to pay.
  3. When and how their services are delivered.
  4. How funds are managed and accounted for.
  5. How their services are operated and maintained.
- Government plays a key facilitative role, sets clear national policies and strategies, encourages broad stakeholder consultation and facilitates capacity building and learning;
- An enabling environment is created for the participation of a wide range of providers of goods, services and technical assistance to communities, including the private sector and NGOs;
- An adequate flow of information is provided to the community, and procedures are adopted for facilitating collective action decisions within the community.

The key point is that households and communities must be aware of the implications of any choice they make, in terms of costs, expected participation in planning and implementation, and responsibility for operation and maintenance (O&M).

DRA is also associated with the use of project rules. These are intended to establish a procedural framework designed to facilitate the expression and interpretation of demand, by setting out roles and responsibilities for different stakeholder groups.

### **3.3 Critical appraisal of DRA**

In economic terms, DRA may improve the efficiency of service delivery and the sustainability of the facilities and services provided. However, the DRA model, and in particular the implications of putting it into practice, has been the subject of criticism. Six particular concerns with the approach are described below:

#### *Need to satisfy collective perceptions as well as individual demand*

DRA emphasises the need to satisfy individual or household demands. As suggested by Nicol, 1999a, the need to investigate collective perceptions concerning the ownership and allocation of water resources is not emphasised. In some circumstances, collective demand may indicate that a more equitable approach to water resource allocation is appropriate. There is a risk that multiple service levels could be imposed on communities, who will then be expected to manage the resulting scheme.

#### *Overall impact on marginalised groups*

The overtly economic definition of demand used by DRA results in water and sanitation being treated as commodities. Access to water resources and sanitation would be determined by market forces. Garn, 1998, spells out what this actually means: communities would compete for project funds by 'self-selection', based on their willingness and ability to engage in the process as defined by project rules.

DRA emphasises the need to provide an adequate flow of information to the community and facilitating collective decision-making. Experience suggests that this may be difficult to achieve in larger and more diverse communities, suggesting the need for alternative approaches (Trace, 1999). In all situations, marginalised groups risk being excluded because they may be unable or unwilling to participate in decision-making, or because they are unable to articulate their demand in the economic terms required. (Ghosh, 1999)

In practice, the amount of water available to meet people's demands is often limited. This may result in competition for water. Ockelford, 1999 makes the point that there is a real risk that the poorer sections of society will inevitably lose out unless their rights to a basic supply are specifically safeguarded.

#### *Reliance on project rules*

DRA relies on project rules to create incentives and define roles and responsibilities, the aim of which is to create an environment in which people are able to express their demands (Garn, 1998). One of the conclusions of the Water and Sanitation Programme report investigating the impact of project rules was that rules are frequently ignored in practice by those implementing projects, and cannot be used as a

substitute for developing implementation skills or capacity (Sara, 1997). The problem is not limited to service providers: as demonstrated by Dahito, 1998, communities may fail to understand or accept the implications of signing agreements with an implementing organisation.

### *Assigned institutional roles*

DRA assigns particular roles to institutions, with responsibilities for implementation being transferred from government to the private and NGO sectors. The DRA model is based on a free market scenario, in which the private sector provides the most efficient response to meeting people's demands. In practice, however, free market conditions may not exist, the private sector may not be willing or able to undertake this role, and government may neither have the capacity nor the skills to facilitate and regulate private sector delivery (Rall, 1999).

Whether and to what extent communities should be responsible for managing their services is an associated issue. Community management, at least for rural water supply, is frequently linked to DRA and often advocated by its supporters (for example, Sara, 1998). However, DRA theory suggests that users should determine how a system is to be managed, not that they should necessarily undertake this task for themselves.

One possible option would be for local government to assume some managerial responsibilities, for example, associated with the expansion of an existing water supply, or assisting with larger repairs. This presupposes it has the capacity to undertake this role. Although local government is often a major stakeholder in rural and peri-urban areas, several commentators have suggested that it risks being marginalised by DRA (for example, Nicol, 1999b).

### *Conclusion*

In conclusion, DRA is a philosophical model based on well-established economic principles. It is not a blueprint approach, and must be tempered by reality: options may be limited in practice, not only because of environmental, technical or financial reasons, but also by the capacity of project staff and community members to deliver and sustain them.

Whether it is possible to reduce what is a multi-dimensional problem with social, environmental, technical and economic facets to a single economic dimension is questionable. Such theoretical discussions are to an extent irrelevant: what is more important is to establish if projects that demonstrate DRA's characteristics can be effective, inclusive and sustainable.

## 4. Approaches in use

### 4.1 General

The field research involved relatively short visits to a number of implementing organisations<sup>5</sup>, focusing on the approaches they have developed. The principal organisations involved are listed in the table below.

Organisation	Location
Mvula Trust	South Africa
Oxfam GB	Tanzania
WAMMA	Tanzania
Nepal Water For Health (NEWAH)	Nepal
Rural Water Supply and Sanitation Development Funding Board (Fund Board)	Nepal
UNICEF Child Environment Programme	Orissa, India
UNICEF Child Environment Programme	Madhya Pradesh, India

**Table 2: Principal organisations visited, May - October 2000**

The approaches being used by implementing organisations vary considerably in their degree of demand responsiveness. A profile of each organisation listed above and a description of its approach is included at the back of this report. The information presented is based on interviews conducted with representatives of each organisation, supplemented with referenced material.

Particular points relating to *Designing to meet demand* are summarized below and discussed in more detail in the following sections.

Back-to-office reports associated with the field visits to South Africa, Tanzania, Nepal and India are also available<sup>6</sup>. These include details of the other implementing organisations visited, the approaches they are using, and additional case study material.

### 4.2 Summary of approaches

The field visits highlighted many important issues associated with *designing water and sanitation projects to meet demand*. Issues are summarised here in point form: further detail, case studies and possible approaches are discussed in the following sections.

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<sup>5</sup> Throughout this report, the term 'implementing organisation' has been applied to those organisations responsible for managing the implementation of programmes. In this respect, the organisations named above are all implementing organisations. The term 'project agent' has been applied to their partner NGOs and private companies which are involved at project level.

## *General*

The approaches adopted reflect the priorities, policies and objectives of the implementing agencies and governments involved, as well as the practical difficulty of translating theory into practice.

- In terms of water supply, the emphasis is on the provision of a *basic level of service at an affordable price*, rather than offering an informed choice of service level. The exception is the Fund Board programme in Nepal, which offers private connections to piped water supplies. That is not to say that project designs were completely inflexible: users were able to influence designs albeit to a limited extent. In Orissa, for example, it was observed how potential users had negotiated the number and type of improvements to be made with UNICEF's local partner.
- Cost recovery objectives are in general limited to O&M and a portion of construction costs. Emergency funds that could be defined as replacement costs are often used to pay for basic maintenance.
- It was felt that many implementing staff and community leaders were uneasy about the ethics of offering higher service levels to those who could afford them, if there was any risk that others could be deprived of their 'share' as a result.
- More sanitation options are being made available. The 'household' nature of sanitation means that the rights issue referred to above is much weaker.

## *User satisfaction*

User satisfaction with the services being provided is difficult to analyse. The researchers had to rely on the 'snap shot' impressions received from observations and interactions with users, both women and men. The following points are important:

- In some cases, providing a basic level of service in return for a contribution may meet people's demands. In some Nepalese hill villages, for example, it was clear that the great majority of users, men and women, were very pleased with their service they had received in return for a relatively substantial contribution that amounted to about 30% of the total construction costs.
- However, in other cases, many people were clearly not satisfied with the level of service provided even though they had contributed towards capital costs. Unmet demand was demonstrated by people investing in higher service levels (informal connections and hose pipes), unwillingness to pay, or simply not using the water supply provided.
- Satisfaction with toilets was associated with perceptions of their relative costs and benefits; these included privacy, comfort, ease of cleaning, maintainability, security and status, and not just the health improvements by which toilets were often being marketed.
- Taking people's perceptions into account when providing service level options is very important, but can prove difficult in practice. This was illustrated by the failure of many families in hill villages in Nepal to maintain simple pit toilets. These were made from the same materials used to build homes which had survived for generations

The majority of projects visited reinforced the point that demand changes with time. It is therefore critically important that sustainable systems are established that are able to respond to future demand .

Responding to future demand does not just mean being able to upgrade or extend facilities, but also being able to manage consumption. This is especially important if water resources are restricted.

### *Effective participation*

Many of the points outlined above underline the need for participation. This is needed in order that people are able to make important decisions about the services they are supporting, knowing what the implications will be.

In terms of the design of the project and the engineer's role, participation is essential in order that the priorities, perceptions, demands and capacities of potential users can be taken into account when identifying and developing service options. In this respect, a number of points apply:

- There needs to be an effective mechanism that will enable all users to participate.
- During the field visits it was repeatedly seen how both the poor and women were excluded from consultation or decision-making processes.
- Participatory techniques have considerable potential as tools that can be adapted to elicit people's opinions and inform a project design. However, they must be used correctly. The use of PLA<sup>7</sup>, as observed in Gangam, requires skilled facilitators and commitment, neither of which may be available.
- In practice, dialogue, consultation and decisions concerning technical matters are often focused on water supply and sanitation committee members. One of the responsibilities of a committee should be to take collective decisions on behalf of the community. However, in terms of identifying and developing appropriate service levels, if not everyone, a *representative selection* of people must be consulted.

Effective participation does not just require a skilled facilitator, but also time and resources. These must be made available if demand is to be met. During the field visits it was observed how pressure to achieve tangible results quickly resulted in participation being ineffective. This impacted mostly on marginalised groups.

### *Options for water supply*

Options for water supply were limited. This does not just apply to levels of service, but also the associated contribution or payment system, and how the scheme is to be operated, maintained and managed. The problem is associated with a number of factors, including;

- limitations in the quantity of water available may preclude higher levels of service;
- funding may only be available to subsidize a basic level of service for domestic purposes only, albeit with some expansion capacity;
- higher levels of service may be associated with relatively high marginal costs;
- lower levels of service may be ruled out by minimum standards;
- the notion of offering higher levels of service may be rejected by communities in the interests of equity or because they foresee difficulties in managing such a system;
- demand for different levels of service is not being established;
- engineers are often unfamiliar with a range of technical options, their characteristics, costs and their associated operational, maintenance and management requirements;
- engineers may be unwilling or unable to adapt standard designs to meet local needs;
- project staff are often unfamiliar with a range of financial and managerial options;
- individual responsibilities for developing and presenting financial and managerial options are unclear;
- there may be little or no incentive for project staff to offer, identify and develop options – numbers covered and facilities built may be considered more important.

One point needs emphasis. At times it may seem appropriate to develop ‘lower’ levels of service, relative to the ‘basic’ level defined by national policy. For example, a community tube well shared by five or ten households may meet local demand. However, this could be ruled out if it does not satisfy minimum national water quality standards.

### *Future demand for water*

The approaches reviewed emphasise present rather than future demand. Although distribution mains are designed to meet predicted future consumption, responsibilities for upgrading and extending schemes are often poorly defined. Certainly, many community management organisations have not been informed or equipped to manage future demand. The problem is that unmet demand for higher levels of service often manifests itself in the form of ‘informal’ connections or hose-pipes.

In order to be sustainable, capacity to meet and manage future demand must be reflected in the project’s overall design. This does not just apply to infrastructure, but also in terms of the capabilities and skills of managers, and the management and cost recovery systems they use, and possible linkages with supporting organisations.

The problem is that it is often very difficult to predict what the future demand will be, particularly where the facility itself attracts inward migration as experienced by WaterAid in Dodoma (Mather, 2000).

### *Options for sanitation*

In general, more options were offered for sanitation compared to water supply. The concept of offering a range of service levels is simplified because sanitation is often perceived as a household rather than a community 'good'. Water and sanitation projects are very different because of this distinction, and also because demand for sanitation often has to be stimulated. This has major implications for the identification and development of options and how the project is managed and sustained;

The following points were observed:

- The projects visited in Nepal integrate water supply and sanitation. The same community organisation is responsible for both, despite their very different characteristics. There is scope for identifying alternative management options.
- A range of options should be prepared that takes into account perceptions of the benefits of sanitation, their practices and lifestyles, and what they are willing to contribute in return. This reinforces the need for a multi-sectoral approach to project design.
- Demand for sanitation is not being established. It is therefore not clear if it is 'captured' by the range of options being made available.
- UNICEF in India and the Oxfam team in Shinyanga use a much broader definition of sanitation, which includes waste water disposal, solid waste disposal and drainage. It is evident that by providing broader options, demand is being met. The implication is that engineers should also be familiar with options for environmental sanitation, and not focus on the provision of domestic toilets.
- In general, engineers are not sufficiently familiar with a range of 'generic' options and their advantages and disadvantages, including the sanplat system, various pit-lining technologies, the use of local construction materials, the provision of hand washing facilities, and the specific requirements for school and market toilets. Engineers should also be able to provide advice on simple but effective methods of excreta disposal which do not require a toilet.
- The use of PHAST<sup>8</sup> to facilitate people's understanding of the link between sanitation and health and to introduce the concept of upgradable service levels was demonstrated in South Africa and Tanzania. However, the quality of facilitation is important to avoid it becoming just another training aid or an extractive tool to suit the needs of project staff.
- Tools are also needed that would facilitate community management of sanitation, bearing in mind the time scale associated with this type of project. Some useful examples, based on a 'job card' system, have been developed in South Africa.

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<sup>8</sup> PHAST: Participatory Hygiene and Sanitation Transformation. This is a largely graphical technique developed in the early 1990s by the Regional Water and Sanitation Group in East Africa and the Community Water Supply Group of WHO. Although originally developed to facilitate community self-assessment and incremental improvements in hygiene and sanitation, PHAST is now used in a wide

### 4.3 Guiding principles implicit in meeting demand

Taking into account the issues just described and the points made in the preceding section, the following set of principles is now proposed that attempts to define what meeting demand implies:

1. Communities, households and individuals are enabled to make an informed choice of:
  - whether they want to participate in a project;
  - how services are to be allocated, managed, and maintained;
  - service level options, for each of which there is a meaningful contribution related to the cost of providing the option;
  - how contributions are to be made and managed;

It is recognised that, in practice, options will be limited not only by their absolute feasibility, but also by the capacity of project staff and communities to deliver and sustain them.

2. Specific provision is made to ensure that marginalised groups are able to participate.
3. The right of all people to an affordable, basic level of service is not compromised;
4. Systems for effective collective decision-making are established; and
5. Facilities are designed and management systems are established which are capable of responding to future changes in demand.

Ideally, service level options should take into account effective demand for water for non-domestic purposes, such as horticulture, stock watering and small-scale enterprises.

Several of the characteristics have been taken or adapted from those originally proposed by Sara and Katz (1997). We have given additional emphasis on meeting demand for non-domestic water, ensuring the right of access to basic services is not compromised, ensuring that the poor are able to participate, and that future changes in demand are taken into account. The five characteristics represent an ideal and could provide an initial starting point for the design of a locally appropriate demand responsive approach, or could be used to compare those already in use.

## 5. The demand responsive project cycle

Demand responsive projects place considerable emphasis on consulting potential users, establishing their priorities and demands, and then responding to these. As part of this process, demand for water and sanitation may have to be stimulated through social marketing. This applies not only to the service being provided, but also in terms of service options and associated perceptions and practices. Marginalised groups must be actively identified and enabled to enter the consultative process. The detailed structure of a demand responsive project is therefore very different to a supply driven project.

The preceding section has emphasised, above all, the need for quality participation, effective interaction between the project staff and potential users, and the identification and inclusion of marginalised groups. These issues should be reflected in the capabilities and skills of project staff, and the time and resources made available.

This section suggests how an existing project cycle can be modified in order that it can take these factors into account. The discussion is based on the eight stage project cycle shown in Figure 1 below.

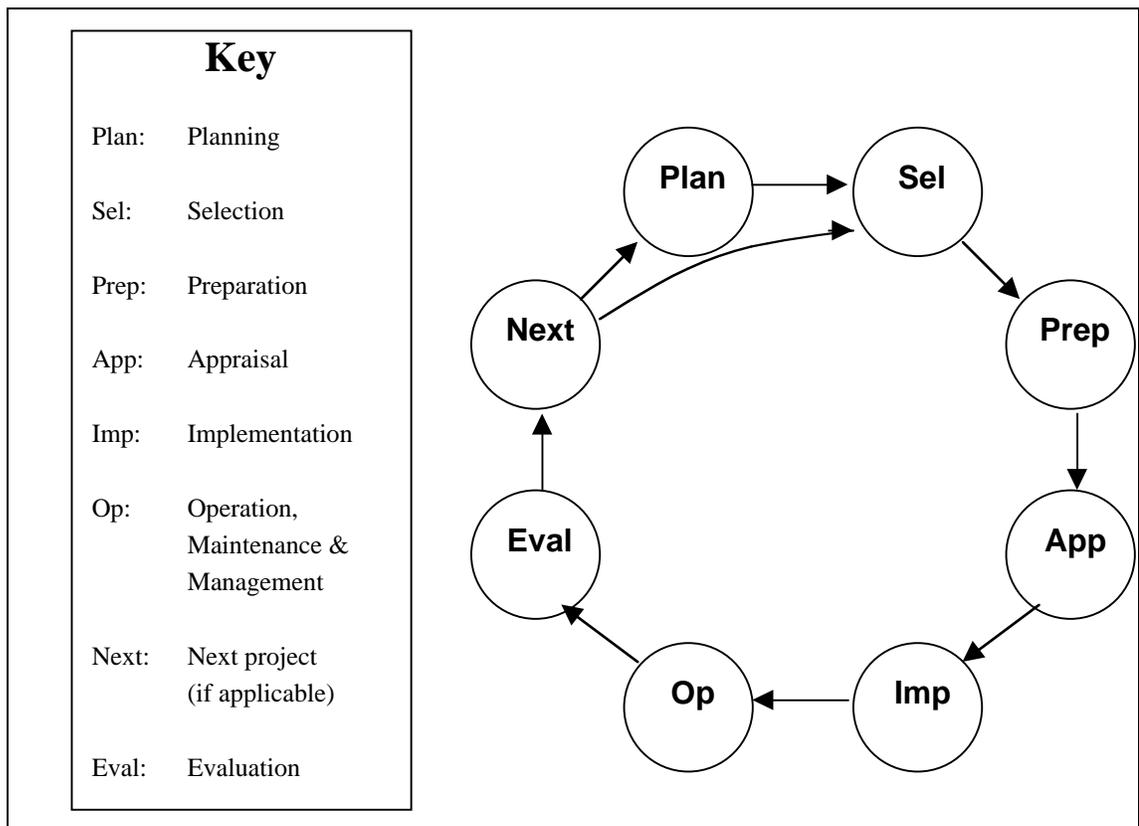


Figure 1: The Project Cycle

To avoid confusion, it is necessary to clarify what is meant by 'project'. For the purpose of this report, this is a planned undertaking, with a specific area, community, targets, resources and time limits. A project can be a single entity, or may consist of a number of sub-projects, each associated with a specific area and a target community.

## 5.1 Planning

### 5.1.1 *General considerations*

Before selecting a specific area or community in which to work, planning is needed to:

- agree overall project objectives, geographical area, major activities and outputs;
- establish key institutional linkages, roles and responsibilities;
- design activities for each objective, estimating the resources required;
- establish project management systems;
- identify and train project staff; and
- agree, and if necessary, test the methodologies to be used with project partners and stakeholders.

(Reed and Ockelford, 2000).

These steps are designed to provide a cohesive, supporting framework in which a project can be implemented. Whilst the reader is referred to Reed and Ockelford for more detail, there are key elements in the planning phase relating to the design of a demand responsive project. A number of points are listed below, all of which must take into account the perceptions and opinions of community representatives as well as other stakeholders:

- Clarify national, regional and local policies related to the provision of services being considered, and how those policies can be interpreted by project staff. As already suggested, the policy environment can facilitate or constrain the adoption of a demand responsive approach.
- Clarify the roles and responsibilities of the project's major stakeholders, in particular, those of the implementing organisation, local government and the community. This should take into account longer-term responsibilities for dealing with changes in demand expressed in the future after the project has been completed.
- Assemble a project team which emphasises the multi-sectoral skills implicit in determining and responding to demand. Inputs from social scientists, technical staff, financial specialists and local facilitators are likely to be required. Being able to work as part of a team, and willingness to devolve decision-making to potential users, are likely to be as important as technical or engineering skills.
- Go to the field. The following points must be informed by a multi-disciplinary assessment of the project area, the people who live there, and their coping strategies:

- Assuming the project area consists of a number of individual communities (these could be rural settlements or urban wards), limited project resources may require that these be prioritised. Selection criteria should be agreed that can take into account demand for improved services. The selection process itself should be fair: the risk that some communities may be unable to express demands in the manner required should be taken into account.
- Review a range of feasible technologies which are likely to be appropriate. An example illustrating how this could be achieved is shown in Box 1. Associated with this is the identification of possible 'delivery' options, including, for example, small-scale private providers. Some technologies may be linked to particular delivery options, others not. It may even be possible to facilitate the emergence of new delivery mechanisms.
- Pilot particular tools and techniques to establish their effectiveness and inform project strategy. This applies in particular to demand assessment (see below), investigating people's willingness to contribute for a range of possible service options.
- On the basis of the information collected, agree realistic objectives, outputs, activities, budgets, cash flows, time frames and a project scale up strategy that will facilitate rather than hinder the use of a demand responsive technique. This information could form the basis of a project proposal.

#### **Box 1: The Kalahandi Water and Development Project: Technical Review**

The Kalahandi Water and Development Project (KWDP) was designed in 1995 as a poverty focused and largely supply driven project. One of its main objectives was to improve access to safe water for communities in some of the poorest areas of Kalahandi District .

The project proposal focused on the provision of hand pumps, but this did not reflect the practical difficulties of drilling boreholes in very remote areas, or indeed maintaining the hand pumps installed. As a result, there was a risk that the project, like so many before it, would end up concentrating activities in road side villages, where access to safe water was much higher.

Instead, the project team carried out a rapid appraisal in over 100 villages. These were categorised according to their remoteness, using a number of objective parameters. The survey indicated that different villages, and particular groups within them, faced very different problems. In the roadside villages, for example, many of the boreholes were in need of rehabilitation. This led to a thorough review of possible technical options being conducted by the project team. The aim was to establish a portfolio of options that could then be developed locally. In particular, information was needed on life cycle costs and the inputs needed to build, operate and maintain each potential option.

During the course of three months, dug wells, protected wells, spring protection, rain water harvesting, remote drilling, bore hole rehabilitation, iron removal plants, in-house water treatment and water harvesting structures (to maintain ground water levels in wells and boreholes) were all investigated (KWDP, 1996). The technical review was completed during the planning phase of the project, and became a useful source of information for the activities that followed.

### **5.1.2 Scoping demand**

Before it has been decided exactly where in the project area to begin, there may be opportunities to make an initial assessment of demand. At this stage, service options would not have been developed and could not be used to establish the associated demand. However, an investigation of people's coping strategies, and perceptions about the services they receive, is often possible.

Assessing demand at this stage in the project cycle can provide key information by establishing the likely demand for a broad range of service options. This in turn can be used to inform the project's strategy, in particular relating to:

- prioritising where to start work;
- the objectives and activities of a social marketing strategy needed to stimulate demand;
- an overall focus for the development of appropriate service options;
- the knowledge and skills likely to be needed by the project team;
- the design of demand assessment tools for use later in the project cycle;
- opportunities for cross subsidy and the provision of appropriate external subsidies;
- the provision of base line data for use in future evaluations.

Box 2 describes how an investigation of coping strategies can provide information about demand. The usefulness of such an exercise has to be tempered, however, by the limited transferability of the results. In peri-urban areas, demand can vary considerably from street to street, and also varies as local circumstances and perceptions change over time.

#### **Box 2: Investigating coping strategies to assess demand for an improved water supply: Dehra Dun, Uttar Pradesh, India**

Dehra Dun, a city with a population of 290,000 has piped water supply plagued by low pressure and frequent supply interruptions. In an attempt to solve this problem, a study was undertaken to investigate demand and identify options to alleviate the problem. Over 1,100 households were surveyed by a team of 10 locally trained enumerators in late 1995, focusing on qualitative descriptions of people's coping strategies, as well as calculating an econometric estimate of household demand.

An analysis of coping strategies showed that those with private connections spent on average an additional 2.4 Rupees / m<sup>3</sup> on water filters, pumps and tanks to improve their supply. The time spent queuing for water by those dependent on public taps was estimated as being equivalent to 40 - 50 Rupees / m<sup>3</sup>. The information obtained was used to develop a number of possible tariff options. The results obtained by investigating coping strategies were compatible with those obtained by CVM, which is often more expensive to implement.

## 5.2 Selection: where to work, who to work with

As already stated, if the project area consists of a number of individual communities, it may be necessary to prioritise these, in order to optimise the allocation of project resources. Selection criteria agreed during the planning phase may include expressions of demand. The following factors should, however, be taken into account:

- community's should have sufficient information about the objectives, costs and benefits of a project necessary to make an informed decision about whether to participate;
- if demand is expressed, it is more likely to come from 'movers and shakers', and may not be representative of the community as a whole;
- expressions of demand which are not supported by tangible evidence may not be reliable;
- marginalised communities and social groups within them may be excluded if they are unable to express their demand; and
- a weak expression of demand may indicate that communications have failed or a demand stimulation strategy is needed.

As already suggested, factors other than demand could also be considered:

- relative need: in other words, the accessibility of safe water and sanitation;
- practical issues, not least the capacity and skills of the implementing staff available; and
- strategic issues associated with a future scaling up of activities, such as the need to pilot particular approaches.

Possibly the most important point is to agree and communicate transparent criteria for project selection. A public information campaign could then be used to create a 'level playing field', in order that communities are enabled to express their interest in the participating. An example from Kisumu, Kenya, illustrating how these points can be brought together, is shown in Box 3 below.

### **Box 3: Participation in project selection**

The Rural Drinking Water Supply and Sanitation Project (RDWSSP), supported by the governments of Kenya and the Netherlands, was initiated in Nyanza in 1983. Now nearing the end of its current phase, project staff have investigated ways to improve project selection and have recently developed a new approach.

The first stage is to agree a geographical area in which to work, in collaboration with government departments and other implementing organisations. The size of the area is constrained by the capacity of RWSSP, but would typically include 30 – 40 villages.

To identify which villages to select, two representatives from every village (a man and a woman) are to be invited to a two day briefing in a central location. The project's rules and methodology will be carefully explained, including criteria for selection. The representatives will receive training in order for them to fill in a village application form, and a date is agreed by which time this must be done. Post boxes will be established in convenient locations to facilitate the collection of the forms. The idea is to achieve a level playing field in terms of the knowledge people have, and assess interest, rather than demand, balancing this with other considerations based on the information received.

Before this approach could be implemented, it would be necessary to check that villages are not being excluded because the invitation does not reach them, or it cannot be understood. The response obtained would also depend to a large extent on perceptions of the RDWSSP, and the costs of attending the briefing.

Toot, 2000

The dangers of excluding the poor by only taking into account expressions of demand during the selection process is illustrated by the following case study (Box 4). This also demonstrates the value of using participatory techniques, in this case, community mapping.

### **Box 4: Exclusion of a low caste hamlet: Banjaridhana, Madhya Pradesh**

Banjaridhana is a hamlet of 56 low caste or *harijan* households, situated about 500m from the outskirts of Sohapur, a much larger and wealthier village. In fact, the Banjaridhana is administratively and politically part of Sohapur.

Banjaridhana had been unintentionally excluded from the UNICEF supported Child Environment project in Sohapur, which should have included both communities. UNICEF staff were unaware of the existence of the hamlet until an innocent question was asked by a harijan during a community meeting. The local project agent apparently knew about the hamlet, but was keen to focus activities in Sohapur, where tangible results could be achieved more quickly.

In Orissa, participatory mapping is being systematically used by UNICEF's project agents to identify surrounding hamlets, and project boundaries are set accordingly.

Deverill and Wedgwood, 2001

## **5.3 Preparation**

Project preparation is possibly the most important stage in the demand responsive project cycle, involving a number of critical activities. Many of these involve inputs

from engineers. Only an overview is presented here, as the issues are described in more detail in sections 6.

### *Demand Stimulation*

The need to stimulate demand for water and sanitation services could be identified during project selection. It can also be highlighted by an initial assessment of people's priorities and perceptions. Demand stimulation, both for a service and for specific service options, is achieved through social marketing. This can be applied to both sanitation and water supply services. The details of a social marketing strategy can be worked out during a project's preparation phase, and put into action once the proposal has been appraised.

### *Community organisation*

Mechanisms that facilitate collective decision-making are often required in rural and peri-urban areas, in order that management, operation, maintenance and cost recovery options can be discussed, and a single preference expressed that takes into account the opinions of all users. The issue of water resource ownership, and implications for how water should be distributed, may need particular attention in rural areas.

Also needed are mechanisms that enable individuals and social groups to express their priorities, perceptions and demands. Some people may have to be enabled to participate in these processes, with additional time and resources being made available. One case study, based on our visit to Madhya Pradesh, illustrates the relevance of this point (Box 5).

At this stage, it may be appropriate for a community to demonstrate its collective demand for the water supply or sanitation project being prepared. This could take the form of the collection of funds in a community managed bank account, or alternatively the collection of local construction materials. It must be recognised, however, that such tasks are done 'at risk', as the project has still to be approved. This reinforces the need for transparency, accountability and openness between project staff, potential users and their representatives.

Breslin (1999 a) recommends that before a project can be approved, potential users should demonstrate 1) their interest in participating, 2) their ability to sustain the options being considered (see below) in terms of the payments or contributions required, and 3) their capacity to manage operation and maintenance.

#### **Box 5: Effective participation? Redwa village, Madhya Pradesh**

In Redwa, a village in Betul District, Madhya Pradesh, a discussion was arranged to discuss the UNICEF supported Child Environment project, and the activities which had been planned. Men and

involved in the process. A number of chart papers displaying the outputs from recent participatory exercises had been pinned up on the wall of the meeting room, and the women present were asked to describe what they signified.

Of the forty women present, it transpired that only three could read the Hindi script used, and none could explain what the wall charts showed. A Venn diagram was interpreted as a village map. Although women had attended a workshop, they had not been able to participate effectively.

During the discussion, the women were asked to think of ways to improve their water supply. Several proposed a water harvesting structure (in this case a small permanent dam) to replace the one that had been washed away. This would help maintain the water level in the wells they used.

The men of the village identified another option, bringing water by pipe from a local borehole, and installing a number of taps. This was being translated into a plan of action.

The project agent, an NGO responsible for over 80 villages throughout the Block, explained that he did not have the resources or time to ensure that women were able to participate in the process, but that they were kept fully informed.

(Deverill and Wedgwood, 2001)

### *Identification and development of service level options*

Basic supply options should be identified which are likely to meet people's priorities. These should be developed into practical options which provide a range of levels of service most likely to meet demand, both now and in the future, supported with an appropriate choice of contribution and management systems. The life cycle costs associated with each option must also be established.

### *Costing and pricing of options*

Options should be costed and priced (in monetary or equivalent terms), any difference implying the use of a subsidy. The field visits suggested that engineers often find it difficult to estimate capital, recurrent and replacement costs. One reason is that information is not always readily available. Another problem is that the cost may depend on their relative popularity - the influence of economies of scale and the need for 'lumpy' investments. The costs of piped water systems may be highly sensitive to population growth rate and the rate of upgrading from one service level to another, both of which can only be estimated (Webster, 1999).

The use of subsidies is itself a complex and contentious issue. Often subsidies are imposed by national policy. Key points regarding the management and application of subsidies appear in section 6.

As already stated, prices can be derived by considering costs and applying a subsidy policy. However, there is often scope for building in variation to achieve local objectives, for example, a cross subsidy. This may manifest itself in the form of a variable tariff structure. However, in such cases, coping strategies should be investigated to ensure that any proposed subsidy reaches the poor.

A local pricing policy can be informed by demand assessment (see below). The fact that prices are only approximate may have to be explained during the demand assessment exercise.

### *Demand assessment for service level options*

Demand assessment has already been mentioned in the context of project planning (see section 5.1). It can also be usefully employed during project preparation, to test demand for specific options and to inform a local pricing policy.

A number of techniques can be used in this respect, and some of these are described in more detail in section 6.8. The information can be used to adapt or add to the service options being made available, to inform a social marketing strategy, or to inform a pricing policy. As already suggested, opportunities to cross-subsidise the poor can also be explored. The demand assessment may indicate that the prices of some options may have to be changed from those calculated from initial estimations of their relative popularity.

## **5.4 Appraisal**

The preparation phase may be completed with the joint finalisation of a detailed project proposal, including an implementation plan, detailing service level options and their anticipated uptake, informed by the demand assessment.

At this stage, sufficient information would be available for a detailed project appraisal, if this is required. The criteria used to appraise a project should be agreed with stakeholders during the planning stage of the project cycle. In particular, appraisal provides an opportunity to assess whether the marginalised groups risk exclusion by the approach being adopted.

It should be recognised that until options have been developed and associated demand assessed, an accurate budget cannot be estimated. Even at this stage, the prepared budget and cash flow is still based on the results of a demand assessment. Adopting a demand responsive approach will inevitably require a greater degree of flexibility from donors than may otherwise be available.

## **5.5 Implementation**

Once a detailed proposal has been approved and funding arrangements are confirmed, individual households can be informed of the options available and the associated price or contribution required, and how this is to be made. It may be necessary to negotiate the final design, balancing individual preferences with what is technically feasible and environmentally sustainable, and the resources available. The need to provide an affordable basic level of service should not be compromised.

The implementation stage provides key opportunities to develop and practice the systems by which the scheme is to be managed and demand is to be met in the future. Community management is only one generic option, and other stakeholders from local government, the private sector, or the NGO/CBO community may be involved.

Whatever the options agreed, during implementation there are opportunities to:

- ensure that long term roles and responsibilities are understood and are reflected in the selection, training and activities of individuals;
- establish financial, management, technical and monitoring systems that continue to be used after implementation;
- train more than one individual for key roles such as book keeper or pump mechanic;
- consolidate links with supporting organisations; this may include a period of mentorship undertaken by the implementing organisation; and
- develop a user friendly management, operation and maintenance support manual that is referred to during and after implementation;

## **5.6 Operation**

Operation in this context means continuing to respond to user demand. This implies not only operating and maintaining a system, but meeting any increase in demand caused by demographic change or people wanting to change their service levels. In this context, meeting does not necessarily mean satisfying: it may be necessary to manage consumption in order to reflect supply limitations.

Whatever the advantages of community management, such tasks are unlikely to be easy, hence the suggestion that external organisations may have a key role to play, assuming they have the capacity, resources and incentives to assist.

Simple monitoring systems may also facilitate the long-term management of a scheme. In practice, monitoring is more often associated with the external needs of implementing organisations to improve their own performance. Whilst this is important, there is a need to identify simple process indicators (concerning the use and sustainability of the scheme) and performance indicators (concerning its management) that can be used by the management organisation itself.

## **5.7 Evaluation**

Predictably, the penultimate stage in the project cycle before moving on to the next project (or sub-project) is evaluation. Evaluation is usually done a shortly after a project has been completed. This provides insight into the initial use of facilities, but it is difficult to determine how sustainable facilities are going to be in the longer term. A good quality hand pump may function for five years or more before a component fails. This reinforces the need to establish sustainability indicators that take into account people's perceptions as well as the physical condition of facilities. It may be possible to tie these in with the monitoring system outlined above.

## 6. The design process

### 6.1 General

Despite the body of literature about demand responsive approaches, there is little information concerning the practical implementation of a truly demand responsive project. This section addresses this issue, focusing in particular, (but not exclusively) on the design process and the role of engineers and other technical staff.

In simple terms, the task of designing to meet demand can be divided into two processes. The first concerns the identification, development and testing of appropriate options specifically designed to meet current and future demand. These activities mostly take place during the preparation phase of a project cycle. In some cases, it may be necessary to manage rather than satisfy demand, for example, when resources are limited. The second process, associated with project implementation, concerns the presentation of options to potential users, eliciting their preferences and negotiating the final design. The design and implementation of a social marketing strategy to stimulate demand may be superimposed on this framework.

Each of these processes necessarily involves considerable interaction between the staff responsible for designing the project and its potential users. The final outcome is likely to be the result of iteration and negotiation, balancing a variety of differing demands with what is practical and environmentally sustainable.

This section will look at these activities in detail, identifying possible approaches that could be employed, their limitations and resource needs, and when in the project cycle they could be applied.

### 6.2 Determining people's priorities and demands

One of the weaknesses of many water supply projects, whether they are supply or demand driven, is that water is usually provided for consumptive use only<sup>9</sup>. Similarly, the provision of sanitation is often focused on building toilets in order to achieve health improvements. Whilst attempts are frequently made to establish people's priorities for basic services (water, health, education, transport, sanitation etc), the priorities people attach to the different uses of water and different aspects of sanitation are not often ascertained. As a result, the options being offered may not reflect perceptions and livelihoods, and may be too focused to capture demand.

Perceptions, priorities and needs for water and sanitation can be established by a survey or through a variety of more participatory techniques. Each method has potential advantages and disadvantages. Participatory techniques can highlight causal relationships, promote a common understanding of an issue, and build trust between project staff and potential users. However, they are not as statistically robust as a survey. Surveys are less vulnerable to domination by an elite but require careful design and trained enumerators (MacGranahan et al, 1997).

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<sup>9</sup> This is associated with the provision of a basic level of service. Consumptive use excludes water used

An example of a matrix that could be developed to elicit priorities for water supply is shown in Figure 2. This has been developed from a PHAST tool originally used to assess sanitation options. The completed matrix could be the result of a participatory exercise, in which people describe how they use water, their perceptions of the existing supply, and their priorities for improvement.

The exercise could be undertaken by different groups within a community to highlight differences in perceptions and needs, and establish a basis for agreeing overall priorities. Once demand has been stimulated for sanitation, there is no reason why a similar matrix could not be developed. The matrix can be completed using symbols or language to represent perceptions. Whatever is used should be approved or decided by the participants in order to ensure that their views are recorded.

**Perceived Importance** →

Characteristic	Irrigation and brick making	Vegetable gardening and domestic animals	Clothes washing	Bathing Water	Food preparation and cooking water	Drinking Water
Where used						
Quantity used per week						
Quantity needed						
Overall perceptions of current supply						
Priorities for improvement						

**Figure 2: Priority matrix for water supply**

This information can then be discussed with the community to inform the option selection process. The matrix could also contribute to the identification of specific objectives and a market segments (groups of potential users with common characteristics) for a social marketing strategy.

### 6.3 Social marketing strategies

Social marketing provides a mechanism to stimulate demand for both water supply and sanitation. It is an approach based on promoting the benefits of the service being offered, using marketing technique and building on positive perceptions of potential users. It does not do this in isolation but addresses three other key issues associated with demand: the product itself, its price, and how the product is made available (Box 6). In other words, social marketing has much in common with a demand responsive approach, but in addition, focuses on promotion.

#### **Box 6: Social Marketing**

Social marketing is a systematic approach. It is not motivated by profit alone, but is concerned with achieving a social objective. It is therefore concerned with how a product is used after it is sold. The aim is therefore not only to sell latrines, but also to encourage their use and maintenance.

As in commercial marketing, social marketing relies on 4 P's: Product (in terms of its form, characteristics and presentation), Price (based on costs and people's willingness to pay), Place (where the product is to be available) and Promotion (how users will know it exists, its benefits and costs, and how to get it).

The processes involved are summarized below:

1. A representative sample are consulted about their needs, wants and aspirations, and collaborate in the development of feasible solutions;
2. Achievable overall promotion objectives are developed;
3. The data collected are analysed and used to develop a marketing plan in collaboration with stakeholders;
4. Potential users are segmented into social groups, based on an analysis of the data;
5. Products and messages are developed based on consumer preferences and characteristics for relevant segments. These are tested, and people's demand established. Products, messages and prices are modified, refined and re-tested. Key stakeholders are consulted.
6. The product or message is launched;
7. The performance of the product or service is monitored, evaluated, and the strategy revised accordingly.

WELL, 1998

As identified by Well, 1998, social marketing can be applied to the provision of a service, the development and acceptance of products, and the adoption of new behaviour. It is therefore not a one-off even, but should be applied in stages as a project is prepared and then implemented.

In practice, social marketing strategies are often associated with sanitation and the promotion of hygiene. Its potential is, however, much wider. For example, it could be used to promote the following:

- the need to contribute towards the costs of a water supply;
- the need to maintain water points and drains;
- the need to conduct preventative maintenance;
- the risks of using water from a contaminated or high-risk source;
- options which are feasible but do not satisfy initial, unrealistic, expectations;
- the need to conserve water and manage demand.

All of these messages are associated directly or indirectly to demand, either for a service, or for a product.

There are however a number of risks associated with such a strategy. Messages may be designed to favour a particular product or behaviour, based on the preferences or bias of an influential individual or group, inside or outside the community. The motivation may be personal, political or commercial. An associated risk is that an individual product is promoted not in terms of its merits, but by denigrating another which may still be the preferred by some. Potential users should be enabled to make an informed choice, rather than manipulated to select someone else's preference. Finally, there is a danger that promotion is biased in favour of a product, and does not take into account the need for it to be correctly used and maintained.

## 6.4 Identification of options

In order to meet demand for a variety of water uses and associated levels of service, a variety of potential supply options may have to be identified. In practice, this is not being done for a number of reasons, including:

- The view that water should only be provided for domestic purposes only (reflected in terms of its quantity and quality), and sanitation only concerns the provision of toilets.
- Inflexible and possibly inappropriate standards relating to water quality and quantity.
- The adoption of a narrow range of standard technologies and designs.
- The capacity of project staff, especially concerning rain water harvesting, in house water treatment and low cost options based on improving traditional practices.
- The limited time and resources available to identify and develop options;
- In urban areas, conventional water and sewerage technologies persist. These require that users connect to urban infrastructure, limiting the scope for innovation and more independent action (Evans, 2000).

In terms of water supply, one approach could be to undertake a systematic assessment of all water sources, estimating water quality, quantity and seasonal availability, and matching this to the anticipated requirement. One advantage of this technique is that water quality is taken into account. There may be little point supplying high quality (and high cost) water for a market garden or to water cattle if a lower cost surface water option exists.

The guidelines developed by this project should identify and describe a range of technical, financial and management options in terms of their basic characteristics (in terms of benefits and costs) and highlight their adaptability or upgradability.

## 6.5 Developing service level options

One of the greatest challenges facing project staff, and technical staff in particular, is to transform crude options into a refined package capable of capturing demand.

As already emphasised in section 5, the development of a range of service level options, including details of how they are to be implemented, is likely to benefit from interaction between technical staff and potential users. This can only occur if a mechanism is in place that facilitates the exchange of concepts, opinions and the characteristics of what is wanted or being proposed. Case studies from Tanzania and Nepal, which illustrate the importance of this point, rather than possible solutions, are described in Boxes 7 and 8.

### **Box 7: Contribution options for poor households: Neupane Gaon, Nepal**

Neupane Gaon is a hill village of 66 households, located 65 kms west of Kathmandu in Dhading District. The population includes 40 low caste households. NEWAH has recently completed a water and sanitation project in the village, together with the Progressive Youth Club, its project agent.

In line with NEWAH policy, each household was required to provide about 40 man-days free labour to construct the new facilities, and raise a sum of 125 rupees for the maintenance fund. One third of the households in Neupane Gaon are landless, and worked on other people's fields. The majority of these had to borrow money from local lenders. The impact on these families of having to contribute free labour was not investigated.

The fact that so many of the poor had to borrow money for their cash contribution suggests a savings scheme may have proved a useful option. It is also important to note that no obvious allowance for the poor had been made by better-off households, and the idea of cross subsidy in this case had not been discussed.

Deverill and Wedgwood, 2001

### **Box 8: Involving potential users in the design process: Shinyanga, Tanzania**

The need to involve potential users in the design of appropriate options is graphically illustrated by an example from Ndala Ward, Shinyanga. A standard four-cubicle toilet block (two female, two male and a urinal) was built as part of a new market complex. During the field visit, a number of points were noticed:

- the majority of people in the market were women, but the level of service offered was based on the needs of men;
- women may not be comfortable using a toilet facility shared and managed by men;
- the price to be charged, 100 shillings per cubicle user and 50 shillings per urinal user, discriminated against women and was not based on people's perceptions of willingness to support the service provided with a meaningful contribution.
- the VIP, waterless technology used may not be acceptable to Muslims who make up half the local population.

As the toilet had not been opened at the time of the visit, it is fair to say that these points are themselves based on supposition. The point is that potential users need to be consulted in order to get a better idea of what is likely to be used and sustained.

Deverill and Wedgwood, 2001

Four activities are associated with the development of appropriate service options from those already identified as being feasible:

1. Identifying and developing appropriate management options. The aim is to give people choice of how their project is to be managed, in terms of its implementation, operation and maintenance, both now and in the future.
2. Designing infrastructure. This should take into account people's priorities and perceptions, their different uses of water, the resources to implement and sustain an option, the skills and the materials available. Hardware must also take into account possible changes in demand that are manifested in the future. Inevitably, assumptions will have to be made concerning both population growth and changes in user preference concerning levels of service. The aim is to be able to offer potential users a meaningful choice, options being sufficiently robust or flexible to cope with future demands.
3. Establishing the inputs needed to provide, operate and sustain each level of service. Guidelines such as those developed by IRC can facilitate this process (IRC, 1997). There was strong evidence from Nepal, India and Tanzania that costing was not being done systematically, often because information was unavailable (Deverill and Wedgwood, 2001).
4. Identifying and developing a range of possible contribution systems. The aim is to complement user choice of level of service with a choice of payment method. One possibility may be to cross subsidize, exploiting the relative values placed on different service levels and water uses as a lever. In some communities, there may already be an established cross-subsidy mechanism. This was observed in one village in Madhya Pradesh, where the amount of land owned by each family was used to determine a contribution of cash or grain (Deverill and Wedgwood, 2000).

Clearly, a degree of iteration will be needed, reinforcing the need for a mechanism that allows for interaction with a representative group of potential users. The following related points were noted during the field visits:

- Particular care needs to be taken to ensure that the poor are not marginalised and are able to participate (Box 9).
- The range of service levels being offered is often restricted. In some cases there was unmet demand for higher service levels. Meeting this could have provided opportunities for cross subsidising the poorest households.
- There were also relatively few examples of intermediate or incremental options capable of bridging the gap between 'basic' and 'higher' service levels (Box 10). The sanitation options offered by UNICEF in Madhya Pradesh and Orissa, and the upgradable tubewells of the Ubombo Family Wells Programme in KwaZulu Natal, South Africa, are two exceptions.
- One intermediate service level option for water supply developed in South Africa, the domestic trickle feed tank, also provides opportunities for managing consumption without the disadvantages associated with water meters. This may make it attractive as a means of meeting demand for higher service levels especially when the water supply available is limited.
- Insufficient emphasis is being given to the identification and development of possible payment systems, including the concept of cross-subsidies. In fact, it was not clear who should be responsible for this particular aspect within project teams.

#### **Box 9: Meeting the demands of the poor: Simpali, Nepal**

Simpali is a hill settlement of 150 households located 30 km north-east of Pokhara on the main Pokhara - Mustang highway. Its water supply, implemented by a Fund Board project agent, was commissioned a year before the visit. During the visit it became clear that some households had had difficulty in raising a 5.5% cash contribution and in contributing unskilled labour, together worth 3,500 rupees. Although the village development committee (local government) ended up paying about 60% of the total owed, about 20 families never paid, 15 of these being low caste. 5 out of 22 public taps, all used by low caste families, had been locked by the local committee.

This example is not unique, but it reinforces the need, and the difficulties of ensuring that lower caste households are enabled to participate in collective decision-making. The idea of contributing labour in lieu of cash may disadvantage low caste families, many of whom have to work long hours on other people's land to earn a subsistence living.

Deverill and Wedgwood, 2001

#### **Box 10: Demand for intermediate levels of service**

In Nepal, it is possible that demand for water and sanitation was not being captured because intermediate levels of service were not being offered.

In the hill village of Neupane Gaon, toilet options were limited to 1) cement masonry lined, tin roofed *pukka* structures, or 2) *kutchha* toilets made entirely from local materials which were hard to clean and highly vulnerable to rain damage. An intermediate answer was provided by one woman, who had reused the slab from her now defunct *kutchha* toilet, used a tin roof and mud-masonry to build walls and line the pit. The toilet had survived three monsoon seasons with no obvious sign of damage. It is important to note the cement for the slab was paid for with a subsidy. It is possible that without this, the woman concerned would not have invested further resources in a toilet.

In Chaksibot, another hill village, the water committee was uneasy about offering five full pressure private connections as part of a scheme that include six community standpipes. With a flat rate payment system and no incentive to conserve water, the fear was that the five private connections would 'crash' the system. A cost recovery system based on metering water consumption would be expensive to implement and add to the complexity of managing the scheme. Clearly, an intermediate level of service between a community tap and a full pressure yard tap would have provided a possible solution, such as shared connections or trickle feed.

Deverill and Wedgwood, 2001

## 6.6 Designing for future demand

Demand is not constant but changes over time, not only as the size of the local population changes, but also as the demands of users change. This does not only apply to peri-urban centres but to rural areas as well. The availability of a range of service levels may in itself stimulate demand for upgraded levels of service. Either way, it is as important to meet future demand as it is demand expressed in the present. If not, there is a risk that users will not be satisfied by their service and be less willing to sustain it.

Designing for future demand presents a number of problems. It may be difficult to predict population growth, and even more so to predict an 'upgrading rate'. Both these factors can have a profound influence on the design of water supply infrastructure in particular, as demonstrated by Webster, 1999. Demand for domestic toilets can also grow rapidly if their use becomes a social norm

The problems of meeting future demand can be reduced by:

- Knowing the constraints imposed by the resources available, in particular, the water resources available.
- Ensuring that current demand is met as far as possible. In South Africa, the provision of community taps was not satisfying many users who wanted yard taps. Many of the schemes visited were non-functioning following the widespread adoption of informal private connections within a relatively short time (Deverill and Wedgwood, 2001).
- Rather than relying on national or regional statistics, base assumptions of population growth rate and upgrading on local experience or on similar scenarios;
- Using demand assessment techniques to estimate future demand for higher service levels;

- Model the impact of likely future scenarios on the proposed design to test its sensitivity - a technique is used by Webster, 1999.
- Involving local people in planning to meet future demand, for example, by establishing if any particular area is to be reserved for expansion;
- Developing measures that will facilitate the management of future demand and if necessary, the management of consumption. For example, agree rules and procedures for upgrading and tariff setting;
- Adopting a modular design with optimized design horizons (Webster, 1999) and optimising spare capacity<sup>10</sup>,
- Design water supplies that can be upgraded (and financed) incrementally over the life of the project, for example, by adding to storage capacity;
- Promoting water saving technologies such as distributed storage and trickle feed, and water saving practices.

The feasibility of offering service level options that offer an increased quantity of water (such as a private connection) may be reduced or ruled out in situations where water resources are known to be finite and limited.

One of the additional complications of designing to meet future demand are the additional costs incurred in the present. If spare capacity is to be built into a system, that will increase the cost. Governments often require that the influence of population growth be incorporated into the design of a piped water system based on a basic level of service. However, the question remains. Who should pay the capital costs of surplus capacity in infrastructure designed to accommodate future upgrading?

## **6.7 Costing, subsidies and pricing**

The following section considers three important and interrelated issues. However, in the interests of brevity, only an over view is provided. This is also to avoid overlap with another KaR project concerning cost recovery<sup>11</sup>.

### **6.7.1 Costing**

The field work suggests that in many cases, the lifecycle cost of options are often not determined. Instead they may be based on a largely uninformed estimate. In some cases, committees are expected to come up with their own tariff system with little external advice. One result is that user contributions may end up being either unnecessarily high or too low, influencing both demand and longer-term sustainability. Demand assessment may also be invalidated if options prices are based on inaccurate cost estimates.

This situation may have several causes, including:

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<sup>10</sup> This applies to a piped water supply, in which the design of certain components can be optimised to meet future demands. A good example demonstrating this is the Ezinqeni-Mpini water supply implemented by Mvula Trust in KwaZulu Natal (Deverill and Wedgwood, 2001).

- Accurate information about costs may not be readily available to project staff. In particular, it is often difficult to estimate how long a component is likely to last before it needs replacing. The local cost of spares is also location specific.
- Project staff may lack the skills required to cost options and use this information to derive a tariff system. It may be particularly difficult to factor in the additional capital costs of meeting future demands;
- The cost of an option often depends on its popularity. For example, the costs of providing and sustaining a private or yard connection (associated with relatively high consumption) will depend on the number of households wanting these options, as opposed to a community tap. This makes demand assessment difficult, as people's demand has not been established.
- Project staff may omit to inform users of additional, non-monetary costs associated with receiving and sustaining a particular service. These are often considered as user-responsibilities, for example, emptying a pit latrine, desilting a well, maintaining a roof or collecting sufficient water to clean a latrine slab.

Guidelines should therefore include practical information on how to assess the cost of service options, stressing the need to identify other 'costs' such as those mentioned above.

### **6.7.2 Subsidies**

To users, one of the most important characteristics of water or sanitation is its price. It is therefore not surprising that effective demand can be increased through a subsidy. In practice, the use of subsidies has often been driven by a political agenda, with few of the benefits reaching those in most need (WELL, 1998, p108).

In South Africa, basic sanitation is heavily subsidized and this has had the effect of increasing the uptake of domestic toilets. However, it is not always clear if people simply want a toilet in order to get their 'rightful share' of a government subsidy. There is a risk that subsidies can confound or replace a demand stimulation strategy based more on people's perceptions, expectations and needs (Mqadi and Holden, 1998). This is very important, considering that it is the use of the facilities provided, rather than their physical existence, which is the key to achieving a positive health impact.

One of the major concerns with subsidies is that they tend to benefit better-off households rather than those most in need. The following problems arise:

- Governments are unable to afford high levels of subsidy, so the policy itself may not be sustainable. As a result, their use is limited, and expectations are created that cannot be fulfilled;
- Governments find it difficult to target subsidies at the poor who are least able to afford a basic level of service. Means testing to qualify for subsidies often leads to better, more informed people misrepresenting their situation to take advantage of what is available.
- The use of subsidies can lead to the use of inappropriately expensive facilities that cannot be maintained;

- Subsidies aimed at helping the poor can associate a certain technology with poverty, reducing its overall appeal.
- Subsidized facilities may be built during a pilot phase, assuming people will copy the models later. In practice, people seem more inclined to wait.

(Adapted from EHP, 1997)

In some cases, however, a relatively small subsidy can have a big impact, both by making a basic option more affordable, and also by motivating people to take action. UNICEF have learnt the following lessons:

- subsidize the basic level of facility only;
- ensure that the price of options still reflects the level of service provided after a subsidy has been applied.
- before designing a subsidy programme, find out what people are willing to contribute; and
- never give subsidies as a short-term fix to increase coverage.

(from EHP, 1997)

An example from South Africa illustrates how a sanitation subsidy policy can be applied in the field is described in Box 11.

#### **Box 11: Managing subsidies to stimulate demand: Mbila, KwaZulu Natal**

For some years, South African sanitation policy has been dominated by a 600 Rand household subsidy for basic sanitation. In some areas where a pit lining is not needed, this can amount to over 85 % of the total construction costs of a simple VIP toilet. However, in sandy conditions where a full lining is required, most options are significantly more expensive. This is the situation in Mbila, in northern KwaZulu Natal.

The Mbila sanitation project has been running since 1998. In this case, the subsidy is used to complete a lined superstructure and slab, as well as providing a vent pipe, pedestal and seat. Householders are responsible for the toilet's superstructure, and can choose from a range of options illustrated in a simple design manual they receive. These are also demonstrated at a central resource centre. Although the teams responsible for digging and lining the pits are trained in their construction, the choice of who does the work lies with the householder and not project staff. However, a quality control mechanism, linked to a returnable deposit, has ensured that standards are maintained.

In overall terms, the project's management and logistic systems have been made as simple as possible. This has enabled work to be carried out in up to four different *izigodi* (sub-wards) within Mbila simultaneously. The systems are also sufficiently robust for the project to continue and expand with minimal external inputs other than monitoring.

Deverill and Wedgwood, 2001

### **6.7.3 Pricing: what people pay**

The third element in the financial equation is pricing, that is, determining what people need to pay or otherwise contribute in return for the option they want. The price of an option is a fundamental determinant of people's willingness to pay for it, either in monetary terms or through an alternative contribution. It is therefore important that people's perceptions of what something is worth, and whether they are able to afford it) are taken into account when developing options. This signposts the need for demand assessment.

The results of demand assessment can be used to either re-design an option, if necessary making it more affordable, or to design a demand responsive pricing policy, for example, a tariff structure. The latter may be constrained by the policy environment: a household contribution towards capital costs may be a fixed amount or a fixed percentage. There may still be some scope to introduce internal cross subsidies. An example is a lifeline tariff for piped water supplies. It should be emphasised that one would need ensure that that people who buy water from vendors or live in a communal block fitted with a single water meter would not be disadvantaged by such a policy.

The price of an option does not necessarily have to be fixed in monetary terms: people time, labour, local materials and produce all have an economic value. However, to sustain a service, financial resources may be required, and this must be taken into account.

Demand for an option is not just related to price, but also how something is paid for. If demand is to be captured, a number of payment options should also be identified. Possible options include payment by lump sum, and payment by instalment. Both can be linked to savings schemes. Enabling people to generate income from the water provided is another. Just as a mix of technical options may be needed to capture demand, a mix of payment options may also be required. The capacity of stakeholders to establish and maintain these will inevitably be a limiting factor.

## **6.8 Demand assessment**

The development of a range of appropriate levels of service and associated options is incomplete without an assessment of effective demand. As already suggested, demand assessment can be used throughout the project cycle in a variety of ways and to achieve a variety of objectives:

- during planning: to inform project staff of the type of services and range of associated service level options that are likely to capture demand;
- during project selection to check if the community want to participate;
- during preparation, to inform project staff of people's willingness to contribute associated with a menu of developed options;
- during implementation, by tangible demonstrations of demand;
- during operation, to evaluate the extent to which demand has been met.

Assessing demand for a menu of options developed during the project preparation phase can provide project staff with critical information and insight that goes well beyond establishing willingness to pay, including:

- a check on the likely popularity of both the service and levels of service being offered, including associated financial and managerial options. If necessary, this information can be fed back into fine tuning the options or more radical changes;
- the detailed design of an appropriate tariff structure, highlighting possible opportunities for cross-subsidy;
- highlighting the risk of any particular group being disadvantaged or excluded;
- details of the communication strategy to be used to present options and enable people to exercise an informed choice; and
- anticipate future demand for higher service levels.

In general, demand assessment techniques that establish willingness to pay or contribute were not being used during project preparation by our collaborating organisations. One reason is that implementing organisations and project agents are not familiar with the associated techniques, or lack the capacity or resources to use them (Deverill and Wedgwood, 2001).

Instead, project staff often have to rely on offering 'standard' options with fixed prices. This may be a reflection of limited resources, capacity and information. Standard options may also be fixed by policy. Whatever the reason, there is a risk that local priorities and perceptions are not taken into account. The menu of choices being offered may not be able to capture demand, either now or later on in the future.

Two practical examples of demand assessment are described in Box 12 and 13 below. The first is an illustration of the use of participatory demand assessment, using PHAST tools to establish demand for service level with which people have little experience. The second, conducted in four streets in Dar es Salaam, demonstrates the combined use of indirect observation, surveys and CVM.

### **Box 12: Use of participatory demand assessment, Maúa & Nipepe, Mozambique**

New government policy in Mozambique states that communities must contribute 2% of the total cost of a water scheme before construction. In the village of Matoto, a workshop was used to test whether this was acceptable. Men and women were separated and discussed a variety of service level options, facilitated by the use of PHAST techniques.

Participants were encouraged to talk about these options and the problems associated with each of them. The groups were then brought back together to discuss differences of opinion. This was followed by a planning session, the result of which was a plan to build a demonstration protected well.

People agreed to contribute labour to excavate the well, locally available materials including fired bricks, and to participate in future planning and evaluation. Whether they knew about government policy is not clear, but the value of the contributions offered exceeded 50% of the cost of the well. The workshop reinforced the value of PHAST to facilitate group understanding and decision-making.

### **Box 13: Use of CVM to assess demand for water and sanitation in Dar es Salaam**

WaterAid Tanzania have used demand assessment as a tool to plan and evaluate community water supply and sanitation projects. CVM was used in conjunction with other techniques in four street communities in the Temeke District of Dar es Salaam. This was associated with the development of a number of options relating to levels of service and payment mechanisms.

The demand assessment methodology consisted of:

- Indirect observation of coping strategies;
- A survey of randomly selected cross-section of households, focusing on coping strategies;
- Interviews to establish people's willingness to pay for a proportion of capital costs for private or community managed kiosks, and payment by lump sum or instalments as part of the household survey;
- Community meetings to understand resident's preferences for different levels of service;

The exercise stressed the importance of the role of enumerators and their training, and demonstrated the net advantage of using local people in this role. A local artist was employed to develop option cards.

It was recognised that selecting appropriate options for the demand assessment was a critical task. Technical options had to comply with what was feasible given practical constraints and the institutional environment. The tariff had been fixed by the local authority at 20 shillings per 20 litre jerry can. In this case, this restricted options for water supply to local ground water sources. However, it was unclear how sustainable this would be in the long term. It was also difficult to establish the costs of each option, and an oversight led to an unrealistically low price being adopted by the interviewers. One of the key lessons learnt was that technical staff must ensure that the costing process receives sufficient priority.

The results from the study indicated that a relative large minority of households preferred private connections to community stand pipes despite the significantly higher prices offered for the former (25,000-200,000 shillings compared to 200-1000 shillings). The range of prices that people were willing to pay was also significant, probably related to large income differentials within communities.

Interestingly, it was also concluded by the study that people's willingness to pay for sanitation was not significantly different in the two streets in which PHAST had been used to promote sanitation, compared to the two others where this had not been achieved. This contrasted with the results of participatory meetings which showed sanitation to be a priority in the two streets where PHAST had been used. It was suggested that not enough time had elapsed or momentum developed for a measurable change in values to occur. In total, 277 out of 424 respondents were unwilling to pay for sanitation. Clearly, this remains a low priority. WaterAid were considering building a communal latrine in one street, Zamcargo, but only 1 out of 86 respondents selected this option.

In this case, the results of the study were not analysed statistically for bias. This would have added to the costs and time frame. As it was, the exercise required two weeks of an economist's time. It is possibly more important to ensure that enumerators are well trained and the survey well designed.

(Wedgwood, 2000)

If demand assessment is to be effective, a number of points should be borne in mind:

- The technique or techniques used must be appropriate in terms of the demographic and social characteristics of the project population; the expertise, time and resources available; the objectives of the exercise, and when it is being used in the project cycle.
- CVM is particularly expensive in terms of the specialist knowledge needed, and is often considered more appropriate for use in high-density urban and peri-urban areas. Participatory techniques are considered more appropriate for use with rural communities (WELL, 1998).
- To ensure that effective demand being expressed is *credible*, it can be associated with some form of up-front contribution. In that case, arrangements must be agreed that are acceptable to potential users.
- Facilitators and enumerators must be familiar with the techniques to be used. Tools used to explain options must be prepared and tested. Any demand assessment technique should itself be tested before it is employed widely. The objectives of the exercise should be understood by all those involved, especially if hypothetical options are being used and willingness to pay will be used to inform rather than determine the size and type of contribution required.
- A representative range and number of potential users should be involved. They should be fully informed about each option, in terms of its likely benefits, costs and any risks attached. As only a limited number of options can be presented to avoid overloading participants with information, these must be chosen carefully in order to capture demand.
- Demand can be highly seasonal. An assessment of demand conducted at one time of year may not necessarily be valid in another. This can apply to water and sanitation (the latter because water may be needed for hygiene, or to flush or clean a pan), and in peri-urban areas as well as rural areas.

One important question that needs to be asked is to what extent is it necessary to assess demand during project preparation? The limited capacity of many project agents, the apparent complexity and high costs of demand assessment, and fact that demand often changes over time and season anyway, are important factors. It could be argued that an initial assessment of demand during project planning, coupled with the involvement of potential users during option identification and development, may be sufficient. Ways of improving the accessibility to project staff of simple, effective demand assessment techniques would however be very useful.

## **6.9 Presenting options and negotiating demand**

The results of a demand assessment exercise should be taken into account when finalising the levels of service and associated financial and managerial options to be presented to potential users. It would often be necessary to take into consideration other factors, including technical and environmental feasibility, the overriding need to ensure all users have access to an affordable basic level of service, and the need to manage consumption.

In practice, there are few examples illustrating how the results of demand assessment exercises have been used in this way. The result is a lack of evidence relating to the effectiveness of these techniques. Clearly, further research is needed in this area.

In theory, each option should be described to potential users, with detailed information on its benefits (in terms of performance and other characteristics), costs (in terms of its purchase price and installation, operational and maintenance requirements expected of the user), and any associated risk. Choice may also extend to how a service is delivered and how it is to be paid for, unless these aspects have already been agreed by collective decision making. This could be achieved by using demonstration facilities (see below), possibly supported by a series of community meetings, and the use of picture cards and other graphical tools such as those used by PHAST. The concept of being able to offer upgradable service levels is clearly important in this context.

Many of the projects visited use demonstration facilities as part of a demand stimulation strategy. Although this is mostly associated with sanitation, demonstrations have also been used to stimulate demand for water supply in situations where people are largely unfamiliar with the technologies to be used. This is especially useful in situations where there is a general idea or preconception of what is proposed (such as a well) but no experience of its actual characteristics, which may be rather different. This point was highlighted recently in a WaterAid project in northern Mozambique (Breslin, 2001 b).

## **6.10 Summary**

The flow chart on the following page summarizes the design processes described in this section. This relates to the demand responsive project cycle described in section 5, and in this case has been applied to water supply. The following key points emerge from this section:

The perceptions and capacity of implementing organisations, project agents, communities and other local stakeholders will also limit the degree of demand responsiveness that can be achieved. The time and resources available to inform perceptions, develop options and build capacity is also limited. This must be reflected in the guidelines if they are to be practical.

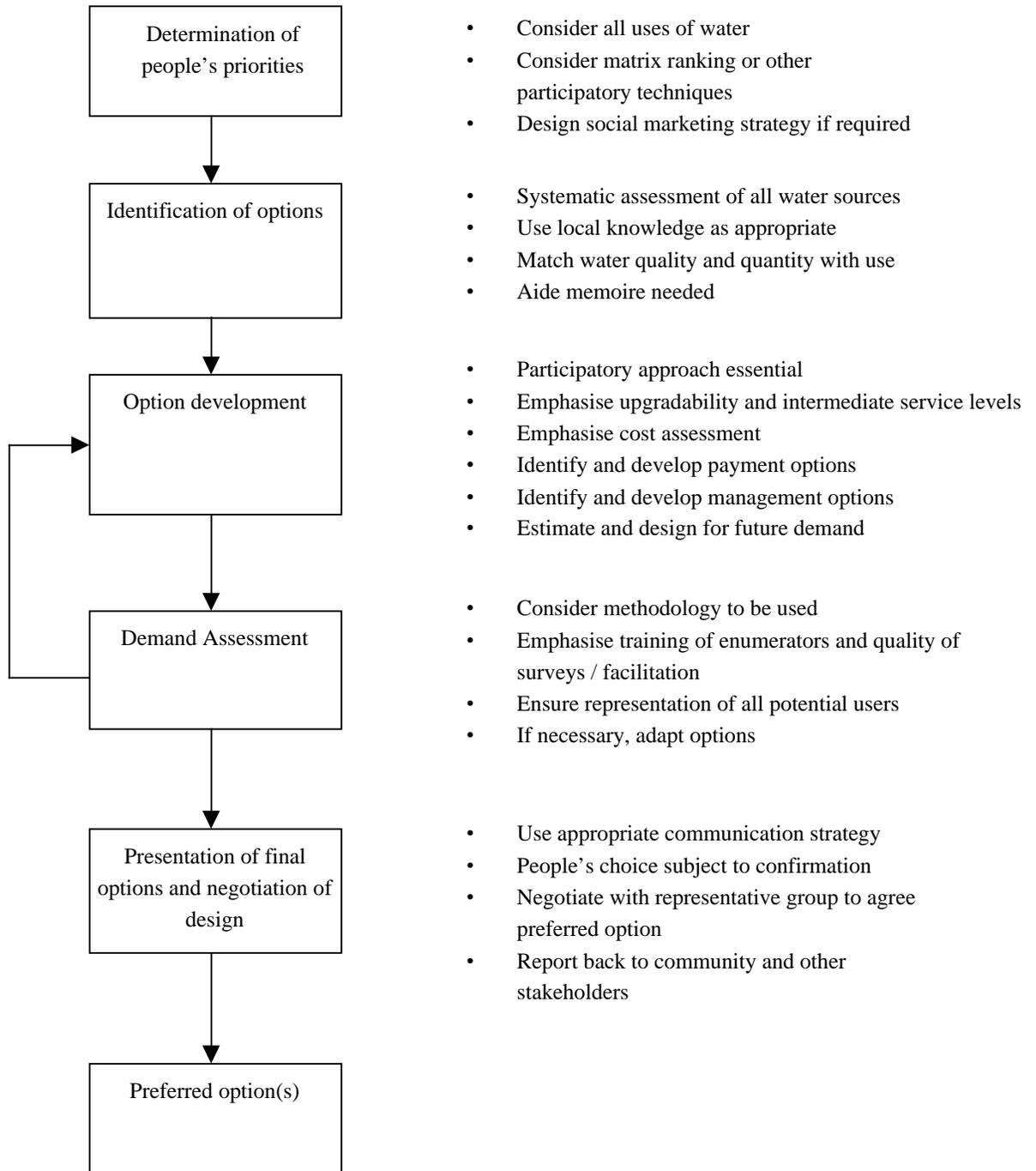
In effect, a ladder of demand responsiveness is needed, the more simple measures being at the bottom, the most complex at the top. Stakeholders can then assess where they are in terms of their current approach, and where they want to be, taking into account the resources and capacity available and the project scenario.

In situations where resources are scarce, meeting demand does not just mean satisfying it, but managing it as well. Depending on the local circumstances, this may mean managing consumption.

The challenge of meeting current demand are magnified by the need to meet future demand. In some cases, the provision of mixed levels of service may stimulate latent demand for higher service levels that cannot be met due to resource constraints, reinforcing the need for sustainable demand management.

The need to be aware of social differentiation within communities, and in particular, to ensure that marginalised groups are able to participate in the process in order that it has a positive impact, has been emphasised. Irrespective of the various supportive

measures proposed, a pro-poor attitude among stakeholders is still going to be required.



**Figure 3: The Design Process**

## 7. Sustainable management

### 7.1 General

If demand for water supply and sanitation is met, the prospects of a project being sustainable in the longer term should, in theory, be improved. However, one of the main concerns arising from the field research is that project activities are largely focused on determining and meeting current demands. Longer-term sustainability may be compromised because the associated management structures and systems are not designed to meet future demand.

Evaluations of NEWAH and Jakpas projects<sup>12</sup> have revealed that local management committees tend to weaken after a few years. As a result, when a technical problem occurs, no system exists to deal with it. A further case concerns the Arumeru village water supply, a large multi-village scheme potentially supplying 40,000 people. The scheme's management committee were unclear about what they should be doing in a few weeks time, when construction would be completed (Deverill and Wedgwood, 2001).

Lacking a sense of purpose or direction, the drive and enthusiasm of many committees is apparently exhausted once the initial construction work has been completed. This issue is highly relevant in the context of *designing to meet demand*. There seems little point in investing considerable resources in meeting current demand if future demand cannot be met.

### 7.2 Roles, responsibilities and training

One of the points to emerge from the research work is that management organisations need to be clear about their longer-term roles and responsibilities. Extending and upgrading may involve external organisations, in which case their roles and responsibilities should also be agreed.

Options for how a system is to be managed, and who is going to manage it, need to be identified and discussed during project preparation, and there are often many alternatives. In Shinyanga, the proposed community water points could be managed by a street water committee, an entrepreneur, the service provider, or by one of several CBOs. The potential advantages and disadvantages of each option could be explored, and the final decision made collectively.

Roles and responsibilities should be agreed and used to guide training. In practice, the emphasis for both the selection of community representatives and for the training that follows is on construction, rather than managing a system after it has been completed. Several examples illustrating this point were identified during the field visits (Deverill and Wedgwood, 2001).

In practice it is often possible for project staff to provide training and practice for the local management team and technical staff during project implementation. This could

focus on longer-term roles and responsibilities, and the associated management systems, rather than on construction. For example:

- Financial management, based on the actual accounting procedures and documentation to be used after construction. The ability of a committee to review and if necessary adjust tariffs should also be exercised if this is likely to be needed.
- Cost recovery and tariff collection, maybe using the payment of an up-front contribution to practise operational systems. Procedures to deal with complaints and non-payment can also be considered and practised<sup>13</sup>.
- Extensions and upgrading - part of the system could be used as an exercise to practise the committee's organisational and operational skills in this context. If necessary, this should test the committee's ability to contract external agencies or link with local government, depending on the responsibilities agreed.
- Routine and emergency maintenance – exercises need to be conducted to confirm the committee's ability to organise maintenance, and the capacity of technical staff to undertake tasks.
- Monitoring systems – these should be designed to assist local management of a scheme and established during the project's implementation.

### **7.3 Simple, sustainable systems**

Simple, sustainable systems should be developed with local managers to assist them carrying out their responsibilities. In terms of designing to meet demand, this applies in particular to upgrading levels of service, and extending a scheme.

In the context of a piped water supply, upgrading or extension is likely to be complicated by having to take into account pressures and flows. In this case, some sort of technical guidelines would be needed to avoid the possibility of compromising the overall service being provided.

For point source water supplies and indeed for on site sanitation options, the use of a job card as an adaptable management tool has been demonstrated in several Mvula Trust projects in South Africa. Examples include the Ubombo Family Wells Programme and Mbila Sanitation Programme, both in KwaZulu Natal. The job card facilitates community management of installation, including financial control, logistics and quality control (Deverill and Ntuli, 1999).

The Mvula Trust specifically requires that project agents furnish communities with detailed 'as-built' drawings and a maintenance manual. The latter is potentially very useful for the long term operation, maintenance and management of the scheme. A well designed user manual could be useful in facilitating both extension and upgrading, as well as providing advice on cost recovery, tariff setting and monitoring performance (see below). Such a document could be assembled and used throughout the scheme's construction. In practice, however, manuals are often the last thing to be

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<sup>13</sup> An example illustrating this process is the Namponjwani Water Project with KwaZulu Natal, South

completed, receiving insufficient emphasis, and are presented to, rather than developed with, a local management organisation.

#### **7.4 Performance monitoring and goal setting**

Projects cannot easily be sustained by a local organisation without systematically monitoring their performance, yet in practice, this issue receives little attention. Post completion monitoring or evaluations are usually undertaken to inform the implementing organisation or its project agent, rather than those responsible for the scheme's operation. What is required is a simple set of useful indicators that can be used locally to measure a scheme's performance, technically, financially and in terms of user satisfaction. One useful set has been developed by Narayan, 1993.

In South Africa, this issue is now receiving attention. Umgeni Water has developed a number of key performance indicators which can be plotted graphically to establish the overall health of a water supply (Stephen, 2000). The indicators developed by Umgeni are technical or financial, and could be reinforced by others that address user perceptions. This is the focus of an unrelated piece of work currently being undertaken by Mvula Trust<sup>14</sup>. Whatever indicators are used, further work is needed to establish how communities should interpret indicators and to inform appropriate interventions.

Indicators can also be useful for a local management organisation to set targets. Attempting to achieve these may provide a committee with purpose and direction, as well as a useful bench mark for it to monitor its performance. This in itself may go some way towards preventing the stagnation of local management organisations which seems to be a significant cause of their demise.

## 8. The engineer's role

### 8.1 General

The differences between demand responsive and more conventional supply driven approaches to project design do not only influence roles and specific responsibilities, but more fundamentally, the interactions and relationships between stakeholders.

The field visits confirmed that many water and sanitation staff are largely unfamiliar with the term 'demand' and the concept of meeting or responding to it in order to improve project sustainability. Accordingly, they have not had to consider the implications that adopting a demand responsive approach is likely to have on their roles and responsibilities. This applies as much to non-technical staff as it does to engineers.

If a demand responsive approach is to be adopted, watsan staff, and engineers in particular, will have to place far more emphasis on establishing the perceptions, priorities and demands of potential users, and designing the project accordingly.

#### *8.1.1 Treating users as clients*

In conventional, supply driven approaches, potential users often tend to be treated as passive beneficiaries. Engineers often make general assumptions about what people want and are willing to pay for. By contrast, potential users who are effectively empowered as consumers should assume a far more prominent role in determining decisions. As such, they become clients, whom the engineer should consult, inform and advise.

#### *8.1.2 Focusing at household level*

Associated with this shift in perceptions is the recognition that people are individuals with their own set of perceptions and preferences, rather than homogeneous communities. In practice, the smallest building block of a community is a household, and this is the level at which decisions concerning individual choice should be made. Engineers implementing demand responsive projects have therefore to be able to focus at this level, something that can only be achieved through effective social intermediation.

#### *8.1.3 A multi-sectoral approach*

Focusing a project on its potential users emphasises the need to adopt a multi-sectoral approach. The issues described in this report cannot be dealt with by an engineer, social scientist or an economist working in isolation. A team is required. There is no implicit reason why this team should be led by an engineer.

In practice, it may be desirable to appoint a project manager who can ensure that the focus remains on meeting the demand of potential users rather than on technology, and who can develop and sustain an environment that facilitates communication.

In practice, engineers are often found based in the field and working in isolation, as are other watsan professionals. In such cases, the individual concerned must have sufficient understanding of all issues involved so he or she can adapt and use some measures, whilst knowing when to seek external support.

## 8.2 Technical responsibilities

In technical terms, project engineers are likely to be involved in a number of tasks, associated with the following:

- identifying options that meet perceptions and priorities;
- developing feasible technical options with potential users;
- designing infrastructure to meet future demands;
- providing detailed information about the costs of options;
- demand assessment;
- negotiating technical design and levels of service ;
- providing advice, information and training on future upgrading and extension; and
- assisting with the development of the scheme's management system.

These tasks necessarily involve non-technical as well as technical inputs. For example, the identification of options has to take into account people's priorities, requiring the skills of a social scientist. In practice, overall responsibility for a task should take into account the relative weight of the inputs required.

The tasks implicit in a demand responsive approach can be analysed accordingly, and this is shown in the table below. Further detail has been presented in the relevant sections of this report.

Task	Description of Engineer's role	Other inputs likely to be needed
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Identification of technical options	Assessment of range of available options likely to meet expressed priorities and needs	Social development skills to facilitate expression of household priorities and needs, especially from women and marginalised groups. Water resource skills may be needed to advise on environmental sustainability of possible options.
Development of options	Working with representatives of potential users, develop initial options into potential solutions with a range of service levels likely to capture demand. The engineer should be able to establish life-cycle costs for each option in order to determine their price. Future demand must be estimated and taken into account in the options provided.	Social development skills to ensure effective participation and facilitate communication and understanding. Financial skills to determine an appropriate pricing policy and associated financial options relating to cost recovery. Institutional expertise may be needed to develop management options.
Demand assessment	Providing full technical and cost information associated with each design option and associated level of service. If applicable, assisting with the portrayal of options on card etc, to be used as part of the informing process.	Depending on method used, a variety of additional skills likely to be needed. CVM and survey techniques require specialist economic knowledge. More participatory approaches require expert facilitation.
Stimulating demand	Possible tasks include the construction of demonstration facilities or models.	Social marketing skills to determine an appropriate strategy. Social development skills to ensure that information is being communicated in a way in which it can be assimilated.
Negotiation of preferred option/s	Once people have indicated their preferences, these should be accommodated as far as possible in the final design, subject to technical feasibility and financial and environmental sustainability. Negotiation and iteration may be needed to come up with the ultimate design.	Social development skills to facilitate the negotiation process and ensure participation is effective.
Provision of information, training and advice on O&M, upgrading and extension	The engineer is responsible for developing useable technical guidelines and providing advice and training that will enable the scheme's managers and technical staff to meet future demands.	Skills to ensure that financial management is emphasised in advice, training and material supplied. Social development skills to ensure that information is being communicated in a way in which it can be assimilated.
Developing a sustainable management system	The engineer is likely to be involved in the identification and means of measurement of performance indicators, and developing guidelines on how to use and respond to them.	Managerial, social and financial inputs all needed.

**Table 4: Task Analysis: the Engineer's Role**

### 8.3 Required qualities and skills

As identified by Bos, 2000, particular expertise, skills and individual qualities are likely to be needed by engineers designing to meet user demands. These are listed below. The qualities considered most important in terms of the ability to implement a demand responsive approach have been marked with an asterisk.

#### 8.3.1 Expertise

- expertise of (and the confidence to use) a wide range of water supply and sanitation technologies, their characteristics, and their practical application both in isolation and in conjunction with others (affordable, adaptable, upgradable,

transferable or extendible technologies would seem particularly useful in this context);\*

- detailed knowledge of how to cost options in terms of capital, recurrent and replacement costs;
- detailed knowledge of management of operation and maintenance and cost recovery;
- general knowledge of a range of financial and management systems - options should be seen as complete entities, not only in technical terms; and
- understanding of the responsibilities, approaches and tools employed by other watsan professionals, and the type of technical inputs that are likely to be required to support them.

### **8.3.2 Skills**

- the ability to interpret priorities and use locally available information to develop viable options capable of meeting people's demands – this implies the flexibility to adapt standard designs or technologies; \*
- the ability and confidence to communicate the characteristics of possible options and service levels (including their costs) and exchange concepts with potential users; and
- the ability to adapt or modify a design through a process of negotiation with potential users in order that it can best meet the demands being expressed (this may mean mixing levels of service).\*

### **8.3.3 Personal qualities**

- a willingness to respect households and individuals as customers and clients, with their own and collective demands and perceptions;\*
- sensitivity to the possible existence of marginalised groups within communities, and an understanding of the potential and limitations of social processes that may be used to enable such people to express demand;
- a willingness to discuss risks and uncertainty openly with potential users and watsan staff;
- the ability to listen to and respect the views of others, both watsan staff and potential users, and the decisions made by them;\*
- the ability to work in a team, and respect the role and skills of other watsan professionals;\*

In practice, it is unlikely that any one individual will demonstrate each and every of these characteristics. It will therefore be necessary to take into account both the characteristics of the project and the expertise, skills and qualities of other staff members.

As already indicated in section 8, one of the problems in implementing a demand responsive approach is finding an engineer with expertise in variety of technical options, in particular low cost technologies and intermediate levels of service. This

reinforces the need for practical guidelines that describe a range of options and their characteristics.

## 9. Guidelines for engineers

At this stage it is possible to determine the focus, structure and content of practical guidelines that will enable engineers and other watsan staff to design water and sanitation projects to meet demand.

### 9.1 Target audience

The work carried out to date strongly suggests that guidelines for meeting demand are required for all watsan staff, and not just engineers. Whilst much of the theory concerning demand and DRA in particular is now available, there is little practical guidance on how to design projects to meet demand, taking into account factors such as the participation of the poor, and the need to meet future demand.

In order to meet demand effectively, a multi-sectoral approach with a high degree of interaction between different professionals will be required. This also implies that multi-disciplinary guidelines are likely to be more effective, in overall terms, than a number of separate pieces of work. This view was endorsed by several project partners and DFID staff in both South Africa and Tanzania.

Nevertheless, designing water supply projects to meet demand will require a fundamental change of approach, and indeed culture, for engineers in particular. By focusing on this particular audience, there is more scope within a set of practical guidelines to develop some of the key technical concepts implicit in designing to meet demand. There are also opportunities to emphasise the need for engineers to work with other professionals and the potential users of facilities. The resulting guidelines should still be made accessible for other watsan staff in order that they get a better idea of the role of the engineer, but this will be a secondary goal.

With this in mind, the field research identified the following ‘market segments’ for guidelines, each with particular requirements. This is presented in the table below.

Sanitation projects do not always involve engineers, (for example, if implemented by health professionals), in which case much of the information within the guidelines may be essential for the non-technical project staff involved.

Field technicians and field facilitators are ‘missing’ from this simple analysis. This is because they would require information to be presented in a different way, and quite possibly, in a local language. Field technicians and facilitators are often managed and/or supervised by project engineers. It would therefore make sense to focus on the groups identified above, and rely on information being extracted and disseminated through them.

Requirement	Market Segment		
	Project Managers	Project Engineers	Project Staff (not engineers)
Introduction to concept	Essential	Essential	Essential
Project cycle	Essential	Essential	Useful
Roles and responsibilities of engineers	Essential	Essential	Useful
Practical guidance for engineers (how to meet demand for water and sanitation)	Useful	Essential	Useful, essential in the case of sanitation if technical staff not involved
Examples demonstrating process and interactions	Useful	Useful	Useful, essential for sanitation if technical staff not involved
Summary of technical options	Useful	Essential	Useful
Summary of management options	Useful, maybe Essential	Useful, maybe Essential	Essential
Summary of contribution options	Useful	Useful, maybe Essential	Essential

**Table 5: Division of responsibilities**

## 9.2 Generic or local guidelines?

One of the main issues raised by all project partners, and reinforced by many other organisations consulted including DFID overseas staff, was that they would like to see local rather than generic guidelines. This was for a number of reasons:

- local guidelines would be able to take into account the local water and sanitation policy environment; for example, policy in South Africa advocating a free basic level of service for water supply is very different from the Sector Reform process being piloted throughout India
- local guidelines would reflect local demand in terms of focus and presentation; for example, in South Africa, the range of technologies available is different from in India, whilst practical guidelines for Nepalese engineers would be more effective if written in Nepali rather than in English;
- locally relevant case studies and lessons could be included;
- opportunities would be created to bring together a number of implementing organisations and their project agents, ensuring their 'ownership' in the resulting document; it was felt that this would encourage the use of the final document; and
- involving several implementing organisations in the production of local guidelines would provide a key capacity-strengthening opportunity in the sector.

The production of local guidelines would not prove expensive, assuming demand for them was sufficient to ensure a high degree of local co-operation. It may be possible to secure funding for this purpose in specific countries. However, generic guidelines will be required. and it is therefore intended to concentrate on these. At a later stage it

should be possible to complete local guidelines with additional input from our project partners and other interested organisations, through a process of local workshops. Involving a cross section of implementing organisations and their partners in this way should result in an end-product that is more likely to be applicable elsewhere.

### 9.3 Capacity of local organisations to meet demand

The investigations completed to date have revealed something of the hidden complexity of meeting demand. As demonstrated by the field visits, the capacity of many local organisations to offer a wide range of appropriate options designed to meet current and future demand, assess demand, and negotiate a preferred design is limited. So too are the financial resources and time available to implement such a strategy.

The concept of using a 'ladder of demand responsiveness' has already been suggested. This could be used as a training tool by implementing organisations and their partners. The ladder would identify where the organisation was, in terms of its approach, and where it wanted to be, taking into account the existing capacity of stakeholders, the policy environment, and the local context of a proposed project. This is shown below:

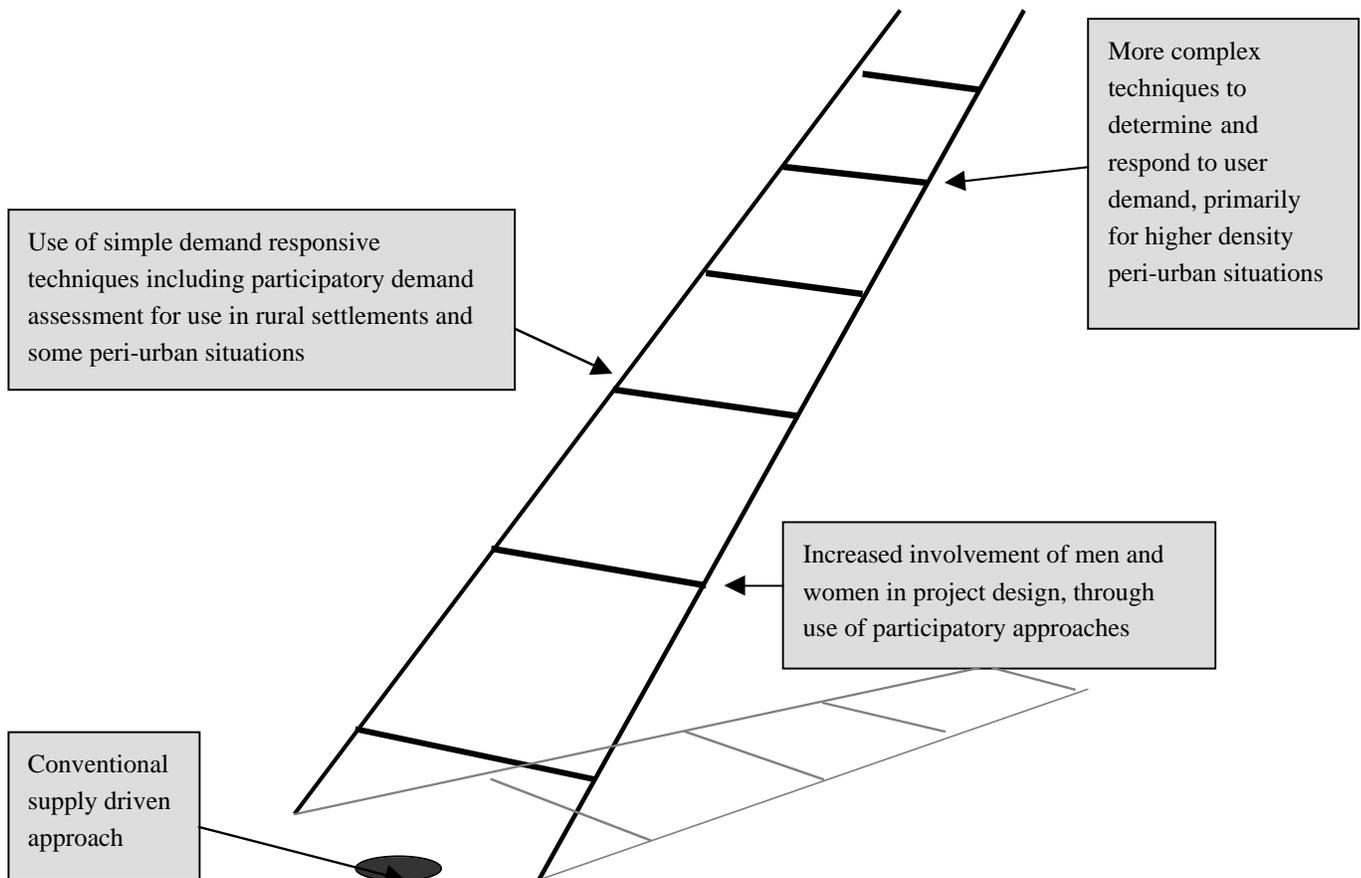


Figure 4: The Demand Responsive 'Ladder'

As indicated, the lower rungs of the ladder are to an extent addressed by an output of another research project: 'Involving men and women in engineering projects'. This is currently being finalised by WEDC.

In this context, it is proposed to produce a simple set of generic guidelines which enable project staff to reach the middle rungs of the ladder. The more complex techniques that are unlikely to be practical in most rural or peri-urban situations will be excluded.

A supplementary product could be produced to describe these: this could be more useful in higher density, peri-urban areas where more resources may be available.

## 9.4 Contents

The proposed content list of the generic guidelines is summarised below. It is intended to produce them in three sections:

### Section 1

Section 1 introduces the concept of demand, what is meant by meeting demand, the types of approach that can be used, and the constraints that should be taken into account. The need to ensure that marginalised social groups are able to participate will be emphasised.

### Section 2:

Section 2 concerns the design process. Water supply and sanitation will be treated together, reinforcing the correct use of social marketing techniques. The need for a multi-disciplinary, poverty-focused approach will also be emphasised.

No case studies will be employed, but two hypothetical scenarios will be developed in parallel throughout the section. This will be peri-urban and rural, each covering water and sanitation.

The combined length of sections 1 and 2 will be approximately 40 pages of A5. A large font and clear style will be adopted. The scenarios may be illustrated by drawings.

### Section 3

Section 3 will be published as a separate, complementary volume. It will be a manual of technical, financial and management options, summarising the characteristics of each.

The contents list of all three sections is shown below:

## **Guidelines for engineers: contents list**

## Section 1

- 1.1 Introduction to demand (focusing on the concept of providing users with choice)
- 1.2 Participation of marginalised groups
- 1.3 Enabling environment (policy, legal and institutional)
- 1.4 Capacity of implementing organisation
- 1.5 Introducing the concept of the 'demand responsive ladder'

## Section 2

- 2.1 The project cycle: overview
- 2.2 Planning
- 2.3 Selection: where to start work, who to work with
- 2.4 Preparation:
  - Determination of local priorities
  - Social marketing and demand stimulation
  - Identification of options
  - Development of options
  - Designing for future demand
  - Costing, subsidies and pricing of options
  - Demand assessment
- 2.5 Implementation
  - Presenting options
  - Negotiating the solution
- 2.6 Management
- 2.7 Evaluation

## Section 3

- 3.1 Technical options
- 3.2 Financial options
- 3.3 Management options

## 10. Further research

At this stage in the research project, it is relatively simple to identify important gaps which need to be filled before practical guidelines can be completed. Opportunities exist to fill these within the project budget and timeframe. The project's international partners can play a key role in this respect.

The identified gaps are detailed in the table below, together with a suggested course of action. In practical terms, these fall into two categories; gaps which can be filled by the project's partners, and gaps which are likely to require 'external inputs'. The latter includes practical examples of demand responsive projects, in which a variety of service levels are identified, developed, offered and negotiated in the way described. Further discussions with the project partners is likely to identify the need for further inputs.

Serial	Research Area	Details
1	Overall	Examples of 'joined up' demand responsive projects identifying processes, approaches and tools used and problems encountered (esp. in peri-urban scenarios)
2	Identification of priorities	Use of participatory techniques to establish local perceptions and priorities specifically for water and sanitation
3	Development of options	Examples of a design board or similar to participate in development of appropriate options likely to capture demand
4	Technical design	Examples of how to optimise modular designs of pipe schemes so that they are able to meet future demand
5	Intermediate service levels (water supply)	Investigate / collate information on practical application of trickle feed tanks, distributed storage systems, traditional sources and in- house treatment
6	Costing	Investigate ways in which the cost of building in capacity to meet future demand can be included in a pricing policy.
7	Demand assessment	Investigate use of participatory techniques to forecast future demand for higher service levels.
8	Cross subsidy	Identifying case studies demonstrating the use of cross subsidies in projects
9	Negotiation	Evidence demonstrating use of participatory techniques to negotiate demand, resulting in mixed level of service
10	Upgrading/extension	Investigate simple procedures by which communities can be facilitated to upgrade or extend existing piped water supplies or manage consumption with minimal technical support
11	HRD	Investigate implications for training, both in terms of watsan staff and in terms of local management. Suggest possible strategies.

**Table 6: Research Gaps**

## 11. Conclusions

Demand, or more accurately, effective demand, has been defined as an informed expression of desire for a particular service, measured by the contribution people are willing and able to make to receive this service. Whilst this definition will not satisfy all viewpoints, it enables one to proceed and discuss how demand can be informed, stimulated, measured and responded to. In this context, a number of critical points emerge.

Meeting demand requires, above all, the effective participation of a representative range of potential users. The potential for a demand responsive approach to disadvantage or exclude vulnerable groups unable or unwilling to participate in decision making and express their demands has been highlighted. To minimise this possibility, the design of the project must commit time and resources in order to identify those at risk, and develop and apply a range of appropriate measures.

It is important to consider whose demand are we referring to. Whilst the need to deal with households and individuals has been emphasised throughout this report, depending on the circumstances, there may be a need to satisfy what could be termed as 'collective' demand first. This may be expressed by a representative committee, or through traditional or political leaders. As in the case in South Africa, the latter may be associated with local government. In some circumstances, collective demand may contradict household demand, reflecting, for example, different perceptions of resource ownership. Whatever approach is adopted, it should take such perceptions into account.

Much of the information collected during the research focuses on meeting current demand. Previous work has given far less emphasis on meeting future demand. This is a major challenge for project staff and engineers in particular. A number of measures have been suggested in this report that should make this problem more manageable. However, the capacity of community organisations to respond to future demand with little or no external support must be taken into account, and if necessary, complementary institutional arrangements made.

Although much of the evidence presented here is based on case studies, it demonstrates that a sustainable, demand responsive approach requires that demand be managed as well as satisfied. Managing demand will mean managing consumption when water, and indeed other resources be they financial, physical or human capacity, are limited. Sustainable systems are needed that are capable of managing demand.

The issue of capacity is not limited to the community organisations involved, but extends to all stakeholders, including those implementing a project. This applies in particular to the capacity of project staff to: 1) offer potential users a meaningful choice of options; 2) to use participatory techniques effectively, and 3) to assess and respond to demand. The overall design of the project should take such factors into account. In some circumstances, for example, this may result in demand assessment being necessarily limited to consultation during a project's preparation phase.

Whilst this interim report has focused on the engineer's role, meeting demand requires a range of skills that are unlikely to be found in any one individual. In other words, a multi-disciplinary approach is likely to be needed, and this should be reflected in the composition and organisation of the project team. Team members must also be able to communicate ideas and concepts effectively, not only with each other, but with all stakeholders and potential users in particular. In fact, this has major implications for all our project partners.

As the last paragraph implies, the adoption of a more demand responsive approach to water supply and sanitation is not just about the application of new tools and techniques, but has major implications for how project teams are formed. Possibly the greatest challenge is for implementing organisations and project agents to manage the change from being supply orientated to demand responsive. The concept of a ladder of demand responsive approaches has been introduced with that in mind. Implementing organisations can gradually move up the ladder towards a fully demand responsive approach.

## Description of approaches adopted by collaborating organisations

### The Mvula Trust

The Mvula Trust was established in 1993 to improve the health and welfare of disadvantaged rural and peri-urban South Africans through increasing access to safe domestic water and sanitation services. The Trust works in collaboration with the Department of Water Affairs and Forestry and other national institutions which are working towards the same goals (Mvula Trust, 1996 a).

Despite its relatively short history, the Trust has an international reputation for innovation. Its policies and procedures reflect world-wide experience and current theories about how to improve sustainability through demand driven, community managed approaches, applying them on a relatively large scale. The approach adopted by the Trust in 1994 has been continuously developed and refined. In early 1997, the policy outlined below was adopted by Trust. This was still in use at the time of the field visit in May 2000:

- Mvula Trust supports the provision of basic services<sup>15</sup> to disadvantaged communities. Grant funds are provided for a basic level of service. For water supplies, a cost ceiling with a sliding scale is applied. This reflects the increased unit costs of implementing water supply projects in smaller communities.
- Sanitation is subsidized by the Government with a flat rate of R 600 (about US\$100) per household. The Trust requires a minimum household contribution of 8% of the capital cost for a household toilet, 10% for an institutional toilet.
- Communities have to apply for funding by completing a number of steps that includes forming a properly constituted committee, opening a bank account, arranging a pre-feasibility study and completing a detailed application form.
- Communities contribute to a project emergency maintenance fund during implementation. The fund is collected monthly during implementation and is equivalent to the tariff for operation and maintenance. This has replaced cash and labour contributions towards the capital cost of the project, totalling about 8%. The fund should be used to pay for unexpected expensive breakdowns, for example, to replace an electric motor or overhaul a diesel engine.
- Communities select and contract project agents (including engineering and social consultants).
- Communities are required to control project funds and manage implementation.
- Communities are required to fund operation and maintenance costs.

(Mvula Trust, 1996 b)

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<sup>15</sup> For water, this is 25 litres per capita day at a maximum of 200 metres, for sanitation, basic is taken to

A series of participatory evaluations of water supply projects undertaken during 1998<sup>16</sup> investigating the sustainability of Mvula funded projects revealed a number of shortcomings. Among its conclusions it was reported that communities were rarely involved in the design of the scheme or choosing the technology used. In addition, a significant number of households were unable to afford O&M charges, and many seemed unsatisfied with a basic level of service. This evaluation, and major changes in the organisation and responsibilities of local government, led to the development of a 'New Model Approach' which has yet to be formalised.

Under the New Model Approach, projects will be selected by local government. A water service provider, with responsibilities for managing implementation and O&M, will also be appointed. This may or may not be a community water committee. A separate planning phase will follow, the emphasis being on participatory decision-making based on informed choices on roles and responsibilities, level of service, scheme design and layout, and level of contributions. This process will be led by a social consultant supported by an engineer. Following project completion, a mentorship phase of 12 months will apply, focusing on further training, the transfer of assets and monitoring visits (Rall, 1998).

The approach has yet to be adopted in full. Meanwhile, the Government of South Africa has decided to provide all South Africans with a free basic level of service, based on 6 kl per household per month (Muller, 2000).

## **Nepal Water and Health: NEWAH**

Since its foundation in 1992, NEWAH has grown rapidly and in 1997 was WaterAid's largest partner in South Asia. The organisation is decentralised with a number of regional offices. NEWAH operates in the foothills of the Himalaya and also in the Terai (the Nepalese Gangetic plain that forms the south of the country). There are considerable geographical, demographic, social and cultural differences between hill and plain villages.

The approach adopted by NEWAH has been continuously refined. NEWAH is particularly well known for its broad-spectrum health education policy which goes beyond hygiene awareness, establishing a Health Motivator as a resource person in each village<sup>17</sup>. Typically, 50 new projects are initiated each year, entering a 18 month time bound project programme. Projects are therefore implemented in batches.

More details of NEWAH's approach are set out below:

- NEWAH provides funds for a basic level of service for water supply. This corresponds to community taps in a typical hill village (each shared by 5 to 10 households), and community tube wells or protected dug wells in the Terai.
- NEWAH promotes a number of toilet options. The materials used to build toilets are subsidized; the value of the subsidy depends on the type of toilet, with the highest subsidy (worth 50% of the materials used) for the most basic designs.

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<sup>16</sup> During the Mvula Trust/AusAid Revisiting Schemes Programme, participatory evaluations were carried out in 21 DWAF and 56 Mvula projects. For more details see Breslin, 1999.

- The sanitation project may in theory continue after the water project has been completed, managed by the project management committee.
- The majority of construction funds for water supply are managed by the local NEWAH office and its project agent, rather than by the project management committee.
- Users contribute labour and local materials towards the capital cost of the project. In hill villages, the former is typically 30 - 40 man-days per household.
- Users are also required to contribute 500 Rupees per tap stand as a maintenance fund. This money is collected during implementation. The community is responsible for raising further funds for O&M.
- Projects are evaluated systematically approximately one year after the water supply has been completed.

Internal evaluations of longer-term sustainability<sup>18</sup> highlighted weaknesses in the approach as it stands. The following issues concerning community management and sanitation were highlighted:

- Community management of maintenance and finances was poor, with many projects (especially those involving hand pumps) having no effective management. The limited availability of spare parts for hand pumps was a problem in the Terai.
- The main reasons given for building a latrine were for cleanliness and convenience, although NEWAH had actually emphasised health benefits.
- The simple unlined pit latrine built with local materials once promoted by NEWAH was not durable. A significant proportion had been abandoned after being damaged by Monsoon rains. However, most surviving latrines were in constant use.
- There appeared to be unmet demand for toilets in many villages, as people began to appreciate the associated benefits after project completion. However, the lack of subsidy and limited availability of materials was preventing this demand being met.

These and other issues are now being taken up by NEWAH. The organisation is also considering new types of partnership, for example, with CBOs and local government, in order to be able to extend operations into more remote regions.

## **Rural Water Supply and Sanitation Development Funding Board**

The Rural Water Supply and Sanitation Development Funding Board or Fund Board was created in 1996, based on the experience of JAKPAS<sup>19</sup>, a pilot project established by the World Bank in 1993. The Board, based in Kathmandu, has developed a set of project rules and clearly defined operating procedures which reflect the DRA model

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<sup>18</sup> See NEWAH (1997) and (2000) for more details.

<sup>19</sup> Janata Ko Khanepni Ra Sarssafai Karyakram – meaning People’s Water Supply and Sanitation

proposed by Water and Sanitation Programme. The Fund Board implements projects through its project agents (local NGOs), and uses private consultancies to provide technical support as and when required<sup>20</sup>.

Like NEWAH, the Fund Board has adopted an integrated approach to water supply, sanitation and hygiene, as well as providing facilitation and start up funding for the development of small scale enterprises specifically aimed at women. The Board follows a time bound project programme of 36 months, implementing projects in batches. The project programme is based on that used by Jakpas in hill villages. The Fund Board is now developing a new project programme for Terai villages.

The scale of Fund Board activity is considerable, with 85 project agents working in over 500 communities. The third batch of projects, which were initiated in 1999, involves over three hundred and thirty projects in three of Nepal's five regions.

Other than its scale, a number of other points distinguish the Fund Board's approach:

- Potential projects must satisfy a number of criteria in order to be approved, based on need, economic viability and technical feasibility. This includes a minimum benefit/ cost ratio, the value of potential time savings being taken into account. A per capita cost ceiling that depends on the technology used is also applied.
- The Fund Board provides funding for a basic level of service. The community contributes all unskilled labour, local materials and porter fees, as well as a fixed cash contribution of 2.5% in the hills, 20% in the plain. The total contribution typically amounts to 30% of capital costs.
- The Fund Board actively promotes higher service levels, subject to environmental constraints. However, the community must contribute all the additional costs required.
- A water user group, comprising all beneficiary households, is formed and registered. A committee, with representatives from each cluster of households including two women, is elected from the water user group to manage implementation and O&M. The water committee and the project agent maintain project accounts of income and expenditure. The formation of tap stand committees is also encouraged in order to collect monthly O&M payments.
- Communities are required to make satisfactory arrangements for O&M, including engaging a village maintenance worker, establishing a system to collect regular payments, and paying the first year's O&M in advance. This is estimated as 3% of the scheme's total construction cost in the hills, 4% in the Terai.
- Toilet construction is not subsidized, but a sanitation rolling fund is established to give households a second payment option. Approximately 55% of toilets are completed using this facility.

No long term review of Fund Board projects had been undertaken at the time of the visit. However, a number of points were highlighted by a recent external evaluation of Jakpas projects<sup>21</sup>. These are summarized below:

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<sup>20</sup> Further details of NEWAH and its approach are found in Whiteside and Shreshta (2000)

- Additional community tap stands had been added by several committees after their project had been completed, without flow control valves. Tap flows in many schemes were not being regulated or balanced, resulting in low pressures and low flows at some taps.
- Long term sustainability was being compromised by ineffective water user committees who were failing to collect funds or organise routine maintenance. Village mechanics were deserting projects because they were not being paid.
- A lack of an overall O&M plan (setting out requirements for preventative maintenance, how to deal with breakdowns and manage cost recovery) and limited access to spares and tools was also contributing to poor operational performance.
- Just over 25% of households had constructed latrines during or after the project. This was despite the availability of a limited subsidy and technical assistance.
- The Fund Board's current rules and procedures address many of the lessons identified in the Jakpas evaluation which it commissioned. The Board is conscious that some of its policies may disadvantage the poor. The Board is also constrained to work in areas favoured by its project agents, in particular, the Pokhara - Kathmandu corridor. The Board is planning to expand its activities to low income groups in the Terai, as well as establish programmes in the Mid and Far West Regions.

## **Shinyanga Urban Water and Environmental Sanitation Project (Oxfam GB)**

Oxfam's presence in Tanzania, with a country office in Arusha, now moving to Dar es Salaam, is often associated with relief work in refugee camps along the border with Burundi. However, since 1986, Oxfam has maintained a regional office in Shinyanga, a medium sized town and administrative centre for Shinyanga Region. Shinyanga is located about 100 kms South of Mwanza on Lake Victoria. The population of about 160,000 lives in 14 wards, the majority of which are effectively peri-urban, in terms of infrastructure, settlement patterns and civil administration.

Shinyanga suffers from severe seasonal water scarcity, and many of the shallow wells in the town tap saline water, some of which is undrinkable. The Shinyanga urban water and environmental project, funded by DFID, focuses on improving health in 6 of the poorest wards. A similar project funded by Irish Aid is active in a seventh ward, Ndala, which is acting as a pilot project.

The purpose of Oxfam's project is to reduce the incidence of disease related to water and environmental sanitation. Objectives and related activities include the following:

- increasing the capacity of Shinyanga Urban Water and Sewerage Authority (SHUWASA) and the Health Department to improve access to water and sanitation;
- increasing hygiene awareness and activity related environmental sanitation among target communities;

- improving the infrastructure and capacity to deal with solid waste disposal and drainage (especially during the rainy season); and
- increasing access to safe water through the provision of protected wells.

(Oxfam, 1997)

The link between Oxfam and *Designing to Meet Demand* concerns the participation of the poor in a demand responsive project. The project is still in its first year and is currently agreeing roles and responsibilities and developing operational procedures. Many useful lessons have been learnt in Ndala ward and have been referred to in earlier sections of this report.

Oxfam does not work directly but through a number of project partners including three local NGOs, a government-training organisation and SHUWASA and the Health Department. The NGOs in turn work with the Ward chairman, street committees and local youth and women' groups.

A number of additional points merit consideration at this stage:

- The capacity of Oxfam and its partners to identify and develop options is largely restricted by the limited human resources available. At the time of the visit (August 2000), SHUWASA engineers were fully occupied with the seasonal water crisis, whilst Oxfam's only local engineer had to balance his technical inputs with his responsibilities as project manager.
- Participatory techniques such as PHAST were being used to sensitize communities in terms of health and hygiene awareness. During the visit it appeared that PHAST was being used as an educational rather than a developmental tool by Oxfam's project agents and street committees, and that opportunities to identify local priorities and possible solutions, and assess people's willingness to contribute, were not always being taken.
- Although the project has a geographical focus on the poorest wards, the priorities, capacity and coping strategies of the poor had not been fully investigated. Instead, there was a reliance on traditional welfare systems under the assumption that communities would 'look after their own'. The validity of this assumption has yet to be tested. A separate study has been commissioned to investigate this further.
- Domestic sanitation, an important aspect of environmental sanitation, does not appear to be a priority in the project proposal. Opportunities to stimulate demand for household toilets were however identified.

Oxfam and its project partners are currently developing a project implementation strategy. Considering the scale of the project, the local water crisis, the capacity of both Oxfam and its local partners and the limited support available, developing a demand responsive, poverty focused strategy is not going to be simple. People's expectations are high, and it may not be possible for Oxfam and its partners to fulfil them. This reinforces the need to develop an effective partnership with the Wards and the street chairpersons so they can address problems together.

## **WAMMA<sup>22</sup> (Tanzania)**

WAMMA is both a water supply, sanitation and hygiene awareness programme and a uniquely successful partnership between four government departments and WaterAid, the British NGO. The process was conceived over ten years ago in the central Dodoma region, and has been used to inform the development of WaterAid initiatives in Kiteto and Tabora.

The WAMMA process is based on small multidisciplinary teams of government field staff drawn from the water, health, education and community development departments. The WAMMA team is responsible for motivating, informing and facilitating integrated water supply, sanitation and hygiene projects in predominantly rural communities. One of the principle reasons for WAMMA's success is the combined capacity and synergy of these teams. This greatly facilitates the implementation of a demand responsive approach, by ensuring that communities and households are empowered, organised and informed to express demands, and cope with technical, financial and managerial issues<sup>23</sup>.

The following points have also contributed to the success of the WAMMA programme

- The concept of community participation and decision-making is emphasised in government policy and guidelines.
- As national policy, rural communities own their water supplies and are responsible for operation and maintenance. The current policy<sup>24</sup> requires that communities contribute 10% of the capital costs for a basic supply<sup>25</sup>, and 50% for rehabilitation and expansion.
- National policy is also relatively flexible regarding technical standards. This has allowed WAMMA to consider and develop a variety of appropriate options including protected wells and small scale piped water supplies. As many villages are in water scarce areas, this is an important issue.
- The availability of trained government field staff, including community development workers, at District and Regional level. This is becoming a problem due to the retrenchment of government staff.
- The concept of village committees and collective decision-making is well established in many areas throughout Tanzania. This is complemented by a high level of literacy. Both advantages are somewhat tempered by the lingering perception that basic services should be provided free by government.

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<sup>22</sup> WAMMA is an acronym for WaterAid, Maji, Maendeleo ya Jamii and Afya, the names of the original partner organisations.

<sup>23</sup> For further details of the WAMMA process, see Jarman and Johnson, 1996

<sup>24</sup> The latest draft rural water policy, dated February 1999, reflects many characteristics of a demand responsive approach (Government of Tanzania, 1999).

<sup>25</sup> The basic level of service is defined as a protected, year round supply of 25 lpcd through public water points located within 400 m from the furthest household, serving no more than 250 persons per

One of the greatest challenges for many communities with an improved water supply is how to cope with a rapidly growing population caused by in-migration. This can result in a local population doubling within five years of the provision of reliable, safe water (Mather, 2000). The presence of a sustainable water source is acting as a magnet to many families, the majority of which are poor and often unable to afford the prices charged for water. At the same time, the quantity of water available is often limited. In Dodoma region, there is concern that the long-term impact of pumping on ground water resources is not known.

An associated challenge for WAMMA teams is how to extend implementation to include marginalised communities. This will inevitably require the development of different technical, financial and managerial options.

## **UNICEF Child Environment Programme (Orissa and Madhya Pradesh)**

The UNICEF Child Environment programmes in Madhya Pradesh and Orissa were visited. The strategies being currently adopted in both States include:

- improving sustainability of project outputs, enhancing community participation;
- shifting from a supply driven welfare approach to a demand driven approach; and
- encouraging innovation to enable unserved communities to access safe water.
- promoting inter-sectoral convergence, in other words, facilitating the expression and communication of demands for other services.

Valuable lessons were learnt from consultations with UNICEF staff, NGO and government partners and from community members themselves. It was interesting to compare the approaches adopted in each State. Key points are summarized below, and further detail has been included in the following sections as appropriate.

The Child Environment programme in Gangam District was inspected during the Field Research in Orissa and has been used to illustrate UNICEF's approach.

- UNICEF first identifies and trains a suitable project agent, usually a local NGO. In Gangam, selection criteria are relatively transparent. In Gangam, a nodal NGO has been appointed to co-ordinate the activities of 14 NGOs. Each NGO is made responsible for a Block of about 100 villages.
- A pilot village in the Block is then selected, using a number of criteria including need but also the interest shown in participating in the scheme, its location (near or on a road side) and its strategic significance as a development node. The selection process is largely driven by the programme's scale up strategy.
- Participatory techniques<sup>26</sup> are used to develop a community action plan. A village map becomes a key planning tool and is used to discuss options for water supply and environmental sanitation. Typically, users determine which wells should be protected, which hand pumps repaired, and where a street drain is most needed.

- UNICEF stipulates the size of contribution towards capital costs: typically 25% for a well or handpump, rather more for street drainage or washing slabs. The community decides how the contribution is to be raised. Household toilets are subsidized for households designated as 'Below Poverty Line', and a number of options are promoted, with demonstration models being built in a local production centre.
- UNICEF's broad view of sanitation as an environmental and domestic issue seems to reflect perceptions of pollution and cleanliness. As such, the programme may be in a better position to stimulate and capture demand for household toilets.
- A self employed mechanic is employed by the government to maintain hand pumps. Typically he or she would be responsible for 25 pumps spread over a number of villages. The government also supplies spares. Eventually users will be responsible for funding operation and maintenance; this is being piloted by the Sector Reform Programme in other states.
- The plan is implemented by the water and sanitation committee in partnership with the project agent. The committee also monitor progress and the use of facilities. It would seem that many households prefer to opt for the same sanitation option which becomes a village 'standard' even if other alternatives are available.
- Once completed, surrounding villages can apply for a project. In October 2000, each NGO is responsible for 14 villages. The plan is to scale this up by a factor of six and cover most of the district.

The apparent success of the Gangam programme to date can be attributed to a number of factors, including the effective use of PLA to empower the community and engender a sense of community ownership; strong support from the District Collector reinforced by the presence of a programme officer in the District HQ; effective project agents; and the relatively small scale of the programme.

Time will tell if that quality can be maintained as the programme continues to expand. This has been recognised as a problem in UNICEF's programme in Madhya Pradesh. An important factor is that the villages are all quite similar. Very poor communities have not as yet been included in the programme. Neither have better-off villages, where there may be demand for higher levels of service. In fact, only a limited range of technical and financial options are being considered, probably related to the limited technical capacity of UNICEF's NGO partners.

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