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Dear Sir/Madam,

In July 1999 I carried out a study of the rope pump in Nicaragua for my Masters degree dissetation, entitled "Financing of rural water supply systems from a rights perspective· a case study of the rope pump in Nicaragua " The Technology Transfer Division of Bombas de Mecate S A (Rope Pump Company Ltd) has asked if I would send you a copy of my report based on the dissertation for your interest

Yours sincerely

Rachel Blackman.

Rachel Blackman

Financing of rural water supply systems from a rights perspective:

A case study of the rope pump in Nicaragua

Rachel Blackman

A report based on dissertation for
MSc Poverty Reduction and Development Management 1998-9

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Abstract

More than one billion people worldwide currently lack access to safe drinking water. This study examines the issue of payment for water supply systems in rural areas from a rights perspective, focusing on the rope pump in Nicaragua. This low-cost, appropriate water-lifting technology was pioneered in Nicaragua, largely by the private sector, and has proved to be something of a success. Indeed, worldwide interest in the technology has now been raised. This study aims to facilitate the transfer of the technology by addressing issues surrounding financing of the rope pump.

As the global effort to ensure that all had access to safe drinking water during the 1980s was slow and wasted resources, the World Bank is now promoting the Demand Responsive Approach (DRA), led by beneficiary willingness to pay The intended result is twofold. First, cost-recovery means that limited government and donor budgets can be spread further. Secondly, a sense of ownership resulting from user-financing encourages user maintenance and repair, which contribute to sustainability of the water supply system. Alongside the promotion of the DRA is growing recognition among development actors of the rights approach to development. These two phenomena could be in conflict.

This study aims to answer a number of questions. How does the rope pump meet the needs of rural Nicaraguans? In what ways is user-financing of capital and recurrent costs beneficial? Is user-financing a precondition for sustainability of the water supply system? Could user-financing result in exclusion of the ultra-poor? Should credit be used to facilitate user-financing of capital costs? Does user-financing conflict with the right to clean drinking water?

This study finds that the rope pump has user and institutional acceptance in Nicaragua. The common belief that sustainability is dependent on recovery of capital costs is brought into question because rope pump users take responsibility for maintenance and repair regardless of whether they paid the capital cost of the pump, facilitated by fact that this is simple and cheap to do. Therefore government donation of rope pumps to beneficiaries should not come under fire, although the study finds that this limits coverage, especially as subsidies are not targeted effectively. Where possible, user-financing of the capital costs of the rope pump should be encouraged, especially as its low-cost is affordable for many. Findings show that credit programmes have been successful at facilitating this, although the importance of a flexible repayment mechanism is emphasised. The study finds that user-financing does not have to conflict with the labelling of water as a basic right. The state has a responsibility to see rights met, but other development actors, including the people themselves, have an obligation to contribute to the practical fulfilment of rights. This study concludes by applying these findings from the experience in Nicaragua to a wider setting. It makes recommendations with respect to payment to those considering transferring, promoting and implementing rope pumps in other southern countries.

CONTENTS

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FIGURES

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ACRONYMS

AT	Appropriate Technology
DAR	Directorate for Rural Areas
DRA	Demand Responsive Approach
ENACAL	State water provider
IDWSSD	International Drinking Water Supply and Sanitation Decade
INAA	Nicaraguan Institute for Water and Sanitation (governmental)
NGO	Non-governmental Organisation
O&M	Operation and Maintenance
PALESA	Potable Water, Latrines and Health Education Project (CARE)
SDC	Swiss Agency for Development Cooperation
VLOM	Village Level Operation and Maintenance
WTP	willingness to pay

GLOSSARY

1C$ = approximately £0.05 (US$0.08) at time of writing

£1 = approximately 20C$ (US$1.60)

1 US gallon = 3.79 litres

Bombas de Mecate S.A. = Rope Pump Company Ltd

Chapter 1

INTRODUCTION

1.1 The International Drinking Water Supply and Sanitation Decade 1980-1990

"The energy crisis of the 1970s will take a back seat to the water crisis of the 1980s and 1990s"
(USDA 1981 20 in MacDonald and Kay 1988 2)

The International Drinking Water Supply and Sanitation Decade (IDWSSD) was launched by the UN General Assembly in 1980, its slogan being "Water and Sanitation for all". The goal of was improved health standards due to the link between water availability and diarrhoea-related deaths (Black 1998; Gorter et al 1991). Although thousands of water supply systems were installed by governments and international agencies, population growth largely masked the gains (SDC 1994). By 1992, 1 billion people still lacked access to safe drinking water (WDR 1992:103).

1.2 The Demand Responsive Approach

Although the IDWSSD saw some improvement in coverage of water supply systems, it has been criticised for being supply-led, which resulted in a wastage of resources (Harvey and Garn 1997). In addition, the expected impact on health was not achieved (Black 1998). As a result, efforts have been made to find a new rationale for domestic water provision, and thus a new framework. The current objective is still the same but with an additional focus on equity: "some for all rather than more for some" (slogan of the New Delhi Global Consultation on Safe Water and Sanitation for the 1990s). The aim is to provide the minimum requirement of 20 litres per person per day for drinking and hygiene within 1 mile of the home (Nigam and Ghosh 1995:194).

The World Bank is currently pushing the idea of a Demand Responsive Approach (DRA), which has had a mixed reaction from water specialists around the globe. At the heart of the DRA is the labelling of water as an economic good at the International Conference on Water and the Environment in Dublin, 1992. Thus the new purpose for water projects is to respond to demand, demonstrated by willingness to pay. This supersedes the pursuit of health or fulfilment of needs. Implicit in the DRA is that the community makes informed choices about their project and how to fund it. The government's role is to build capacity within the community and create an enabling environment for NGOs and the private sector (World Bank 1998a).

The DRA has the potential to exclude those who are unable to contribute financially to their water supply, so it must be treated with great caution. Indeed, Nicol (1999) states that the DRA "best fit(s) their capacities" rather than their needs. However, the idea of responding to demand (which does not necessarily have to be demonstrated monetarily) is important since the fact that the IDWSSD was supply-driven resulted in wastage and unsustainability, and many southern governments lack the tax base to provide even the most basic needs such as water (Harvey and Garn 1997). Thus there is a trade-off between wasting resources and possible social exclusion of individuals or communities who cannot contribute to cost-recovery. Either way, there are negative implications for coverage. It is essential if the DRA is to be implemented, that parallel credit programmes or revolving

funds are offered so that poor communities can attract water supply projects. However, credit could cause more problems than it solves as will be discussed in due course

1.3 Basic right to water?

The human rights approach to development advocated by many non-governmental organisations (NGOs) is gradually infiltrating into government and donor policy (Robinson no date). This study will discuss the issues surrounding the labelling of water as a basic right and implications for the financing of improvements in water supply systems. The notion of water as a basic right could conflict with the DRA, as the former deems that everyone (including the poorest) should be ensured access to safe water, yet the latter focuses on water as an economic good.

For the purpose of this study, "water" is assumed to be clean water for domestic use, including drinking. This is facilitated by the fact that water drawn using the handpumps discussed in this study is used almost exclusively for domestic use. "Access to water" refers to water that is readily available, nearby the home, when required by the household. A sustainable water supply system is defined in this study as being one which is financed, maintained and repaired by its users in order to maximise its lifespan. This is highly dependent on the technology used and can require participation (financial and labour) by the users during project implementation. Water supply sustainability also has environmental and ecological aspects. It is recognised that these are important, but for the purpose of this study, "sustainability" refers to the above definition only.

The study will focus on one particular water supply system- the rope pump, a low-cost water-lifting technology which was pioneered in Nicaragua, largely by the private sector (see annex 1 for diagram). Currently, 10% of the Nicaraguan population use the rope pump either as consumers, or beneficiaries of development projects. To say that they have proved to be something of a success would, it is said, be an understatement. Indeed, the Government of Nicaragua and SDC (Swiss Agency for Development Cooperation) have set up an initiative to transfer the technology to other countries. This study aims to provide recommendations surrounding the issue of financing, to accompany the transfer.

1.4 Research Aims and Objectives

Various evaluation reports have been written about the rope pump. However, these have largely been related to its success as an appropriate technology, its potential in other countries and its impact on health. This present research aims to broaden the available rope pump literature by looking at the technology from an economic perspective. The widespread use of the rope pump in rural Nicaragua is not disputed, but behind this backdrop of enthusiastic uptake is the issue of financing, with consequences for coverage, equity and sustainability.

Rope pumps are funded in a variety of ways. Some rural families buy their own rope pumps using savings. Some are beneficiaries of communal rope pumps donated by government or NGO projects. Others are participants of NGO water projects involving credit schemes. Yet, there are some who would like a rope pump, but cannot afford one and have been unreached or overlooked by development projects.

User cost-recovery is important if water supply projects are to be sustainable, due to limited public funds (Evans 1992). Indeed, a sense of ownership of handpumps is thought

to lead to better user maintenance (Haile 1981). However, the rope pump is cheap and easy to maintain (Technology Transfer Division of Bombas de Mecate S.A. 1997). This may mean that projects where rope pumps (as opposed to other pumps) are donated should not be condemned because the user may more readily accept responsibility for maintenance and repair, regardless of ownership. On the other hand, it is also possible that being low-cost, rope pumps can be within reach of some of the poorest, negating the need for donated pumps at all. This is facilitated by the presence of credit schemes. Thus, a win-win situation could emerge where the issue of user payment makes no difference to sustainability or equity.

First, this study aims to prove that the rope pump deserves the pedestal that recent literature places it on. This will involve a comparison with the Afridev and India Mark II handpumps which are also widely used in Nicaragua and more traditional types of water supply- the rope and bucket, and river. The issue of financing will then be investigated. This has implications for those selling and installing rope pumps in Nicaragua, and will need to be taken into consideration once the rope pump is established in other countries in order to ensure sustainable water provision that is accessible to all. This research therefore attempts to prove the following hypotheses, using findings drawn from 41 household questionnaires, in addition to key informant interviews and observation:

1. The rope pump is an appropriate technology that meets the needs of rural Nicaraguans
2. It is important that rope pump users pay the capital and recurrent costs of their rope pump
3. If it is important that rope pump users pay the capital cost of their pump, credit provision is needed so that rope pumps are accessible to all
4. There is no trade-off between user-financing and the right to water

Chapter 2 will discuss the notion of water as a basic right and the roles of different actors in meeting the right with respect to financing. Chapter 3 investigates some issues surrounding handpumps- appropriate technology, village level operation and maintenance, and sustainability. Chapter 4 is an overview of the current situation concerning water provision by various development actors in Nicaragua. Chapter 5 outlines the methodology used to collect fieldwork information for this study. Chapter 6 presents the fieldwork findings in order to test the above hypotheses. Chapter 7 discusses suggested methods of transfer of rope pump technology to other countries and associated issues. Chapter 8 concludes the study by summarising the key findings and outlining implications of the study in the wider context.

Chapter 2

FINANCING A BASIC RIGHT

2.1 Introduction

This chapter will discuss access to water from a rights perspective and discern who should bear the responsibility of meeting the right to water. It will then inspect the arguments for and against user-financing of water supply systems.

The IDWSSD raised questions about the motives of governments and donors in increasing access to safe drinking water for all. Is such an effort seen as an end in itself to fulfil a basic need or even basic right, or is it simply a means to an end of economic growth? Improving access to water is seen largely by NGOs in humanitarian terms. Governments are gradually adopting this human rights approach, but at the same time are influenced by the World Bank (1992) which promotes the economic benefits of an improved water supply through a multiplier effect. The impact of improved water supplies on economic growth cannot be ignored and is perhaps a good justification for action by southern governments. Although this motive does not conflict with the rights approach to development, there is a danger that people will become mere tools of development if this end alone is pursued. It is imperative with such a fundamental human need as water, that the wellbeing (and indeed survival) of people, be they economically active or not, takes priority.

2.2 Water as a Basic Right

Wants, needs and rights mean very different things. Everyone on earth has wants, and each time they are satisfied, new wants emerge. Needs on the other hand, can be objective and placed in order of priority (Maslow 1954 in Lancaster and Massingham 1993). However, there is much wrangling in the development arena about the universality of basic needs. Needs can vary across space and time and are dependent on many things including culture, social circumstances and technology. The basic rights approach is currently being advocated by many development actors, since the promotion of the most fundamental needs to the status of a right means that a universal legal obligation to protect, respect, promote and fulfil them is created. The approach to development becomes much more positive.

However, the issue of basic rights is even more hotly debated among policy makers than the basic needs approach. Throughout history, the right to water has been implied at various global conferences[1] but many governments are reluctant to openly label water as a right. This weak acknowledgement of the right to water could be due to the fact that "(w)ithout corresponding duties and obligations, rights are a hollow vessel" (Williams 1995:18) and that the means do not necessarily exist to fulfil it. After all, the basic rights approach involves entitlements rather than supply (Oshaug et al 1994). If water is to be classified globally as a right, an ombudsman is required to ensure that the right to water is being met and to hold accountable those responsible. This does not yet exist. In addition, the right to water cannot be fulfilled overnight and thus a time frame for fulfilment would need to be set in place.

[1] For example, the Universal Declaration of Human Rights (1948), the Convention on the Rights of the Child (1989) and the Vienna Declaration and Plan of Action on Human Rights (1993)

Without these measures, perhaps governments are justified in their reluctance to openly recognise water as a right and thus commit themselves legally to fulfilling it. However, the mere fact that the IDWSSD occurred shows that governments' recognition of the importance and value of water exists. No one can contest that access to water is not a basic need. Moreover, it can be argued that as it is essential for the life of every human being across time and space (a universal fundamental need), water should be labelled a right, regardless of whether this is legalised or can be met. This study views the right to water from this perspective. It recognises that the right to water cannot currently be legally enforced, but this does not negate the obligation of the state to work towards meeting the fundamental needs of its citizens.

2.3 Right to water: whose responsibility?

The dawn of DRA and cost-recovery required a shift in the responsibilities of stakeholders. States have been urged to meet basic rights to the best of their ability, but although they have ultimate responsibility, does this mean that they cannot enable other providers to take practical steps to help meet a right?

There is a great deal of controversy in the water and sanitation sector with regards to whether water is actually a public or a private good. A public good is defined as one that is non-excludable and involves no rivalry in usage (Reddy and Vandemoortele 1996). It can be said that water fits into this category. However, some believe that clean water for domestic use, including drinking (a relatively scarce resource) should be treated as an economic good so that it is used more efficiently. Rather than relieving the state of responsibility, treating water both as an economic good and a right means that the state has an even greater responsibility to ensure that everyone has access.

Williams (1995) argues that the international community should play a role, since it is international trade and debt that have contributed to southern governments' failure to directly meet rights. Oshaug et al (1994) believe that where possible the obligation to meet rights lies with the individual, the state (or international agencies) stepping in where individuals cannot fulfil that obligation. Classifying a basic need as a right means that individuals are able to make demands on the state to meet those needs or rights. But there are problems with this approach. On the one hand there is a danger that people do not know that they have a "right" to a basic need and continue to live in inadequate living conditions. On the other, the responsibility is conferred on the state and thus individuals refuse to meet the need themselves. This has been a problem inherent in maintenance of rural water supply systems.

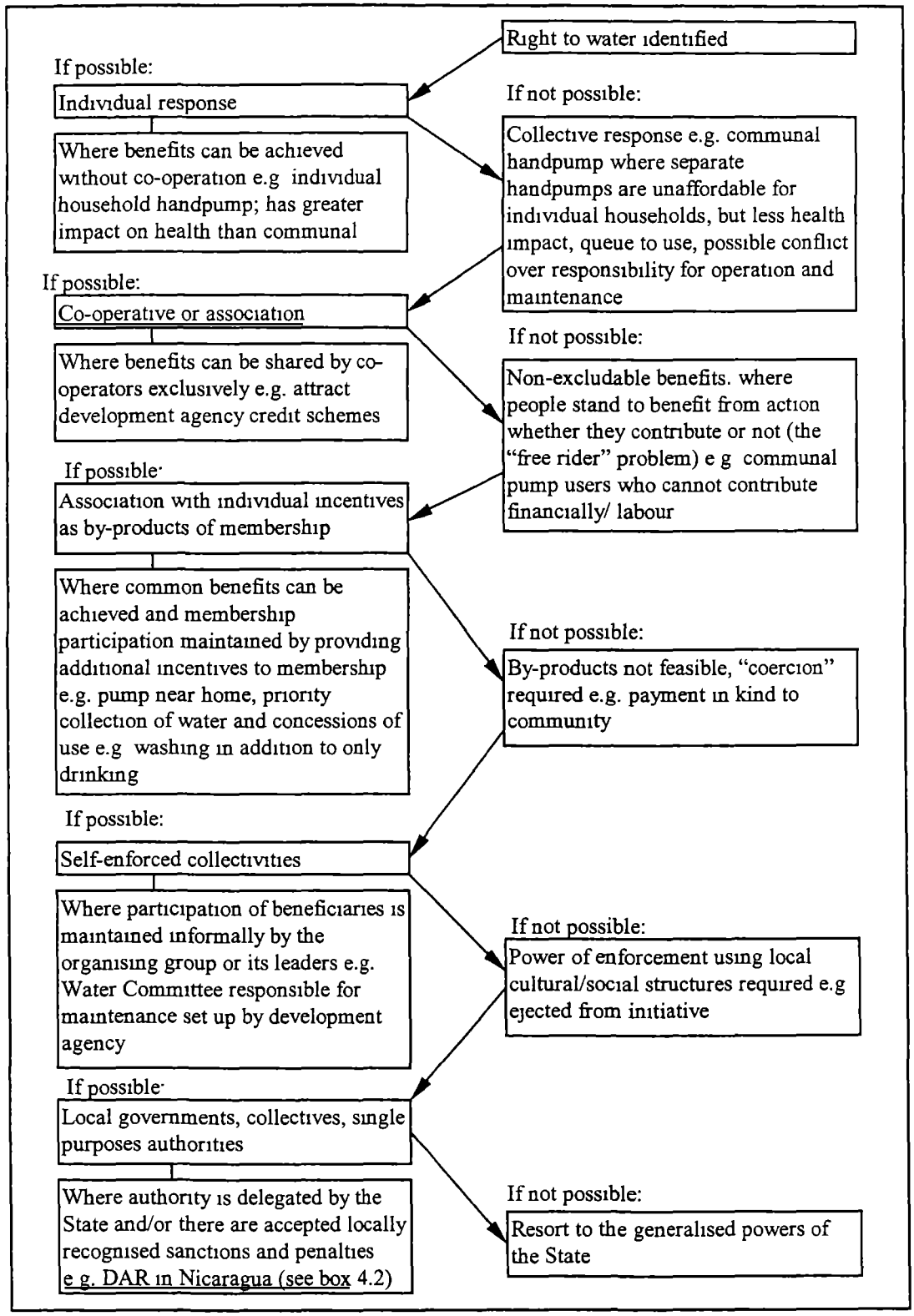
To sum up, the responsibility to see that rights are met lies with the state, but this does not mean that others (international agencies, NGOs, civil society, private sector) do not have a part to play in practically fulfilling those rights.

2.4 Financing of water supply systems

"The days of water being considered a free good in the developing world are numbered"
McDonald and Kay (1988 238)

Fulfilling the right to water requires substantial financing. However, most southern governments are restricted in this capability. Even a restructuring of public finance would

Figure 2.1 **Fulfilling the right to water: a framework**



Adapted from "A Decision Framework" in Curtis (1991:20)
Note: As suggested in the framework, in the case of communal pumps conflict may occur. (See Ostrom 1990 about common property resources). This is an issue but will not be discussed to a great extent in this study

not mean that coverage could be made universal. This raises the issue of whether it is fair to label something a right if it cannot be met. However, a right is an absolute and should not depend on the capacity to fulfil it.[2] Therefore, in an era when governments struggle to decide where to allocate their scarce resources, there is a pressing need for all available resources to be maximised. This signifies a shift in the state's role from provider to facilitator and implies that international agencies, NGOs, the private sector and beneficiaries themselves should contribute financially to water supply systems. This was one focus of the Global Consultation on Safe Water and Sanitation for the 1990s held in New Delhi in 1990 (Black 1998).

During the 1980s, international agencies provided half the funding needed for water and sanitation projects in Latin America, Africa and Southeast Asia (WHO 1992). However, even if the 20/20 initiative of the United Nations (1994) where governments commit to spend 20% of their budget and 20% of donor aid on basic social services is achieved, this does not mean to say that adequate living conditions will be experienced in all countries, due to the differing economic circumstances among them.

Thus, many believe in financial contribution from the beneficiaries themselves (World Bank 1994). This is linked to the perception of water as either a public or private good mentioned above. If the individual benefits the most, then the individual should bear the cost of the water supply system. However, there are also externalities involved in water provision such as a healthier and more productive society (Nigam and Rasheed 1998). If this is believed to be of prime importance, then it is not right that individuals should have to foot the total cost directly. Furthermore, even if water is classified as a private good, there is a welfare argument that to counteract inadequate access to safe water, public funding is required through taxation and targeted transfers. Figure 2.1 summarises the roles and responsibilities of different development actors in fulfilling the right to water. Figure 2.2 outlines the arguments for and against user financing of water.

2.4.1 Willingness to Pay

"Water being life, it is not surprising that people would be willing to pay for it"
(Nigam and Rasheed 1998:6).

Evidence shows that there is a willingness to pay (WTP) for water by users. Figure 2.3 shows the factors that influence WTP. However, methodological problems in determining WTP means that evidence of it does not necessarily mean an ability to pay. Many water projects involving user payment use the contingent valuation method at the feasibility stage to determine WTP. However, asking someone to affix a price to something in a hypothetical situation is a far cry from the WTP if they were actually thrown into the

[2] The Universal Declaration of Human Rights Article 3 "Everyone has the right to life" and Article 25 "Everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including food, clothing, housing and medical care and necessary social services" where water is generally regarded as part of adequate standard of living or food (Hausermann 1998). The right to water is an absolute as it is not possible to survive without it. Indeed, throughout history, water has been an important factor influencing choice of settlement. Although access to water can depend on physical constraints (e.g. in a desert), by-and-large the main obstacle to fulfilling the right to clean water can be overcome by human means as access is primarily an equity issue due to control and distribution factors. There is enough water on earth with which to satisfy the right. The capacity (generally a financial issue) which exists at the present time to fulfil the right is immaterial.

FIGURE 2.2 **Why users should pay for water**

1) public funds are insufficient to cover recurrent costs and increase coverage
2) public provision is inefficient and ineffective
3) subsidies deny choice of water provision
4) subsidies discourage cost-effectiveness
5) benefits of water provision to the user justify payment
6) health benefits have not been proved sufficiently to justify large-scale public funding
7) water is an economic good and thus should be treated as a commodity
8) evidence that there is a user willingness to pay for water
9) user financing enhances quality
10) user financing can enhance downward accountability of the provider
11) user financing can increase sense of user ownership, resulting in increased commitment and participation and thus sustainability

Why users should not pay for water

1) water can have public good characteristics
2) water can be defined as a basic right
3) lack of ability to pay by the poor may result in exclusion and inequity
4) charging for water may result in poorer health and sanitation
5) resource mobilisation costs can be greater than the revenue collected
6) if villagers are already contributing labour for construction and maintenance, they are already providing a form of payment and it can be argued that they should not be expected to pay financially too

Source: Reddy and Vandemoortele (1996); World Bank (1997b); Hartvelt and Deiters (1997), Harvey and Garn (1997); Briscoe and Ferranti (1988); Katko (1990); Evans (1992); International Development Research Centre (1981)

situation. Nonetheless, there are many projects that have been successfully implemented and sustained which used the contingent valuation method during planning. User-financing of delivery of water requires either government taxation and subsequent spending, or user payment at the point of delivery. Resource mobilisation for water supply systems can have a great impact on household spending, but this is rarely accounted for as WTP for a service is often discerned in isolation from other necessities (Reddy and Vandemoortele 1996). In addition to domestic spending patterns, equity and redistributional issues are also at stake.

2.4.2 Access for the poor

"(T)here is an inherent conflict between attempting to recover costs and seeking to protect the poor"
(Reddy and Vandemoortele 1996 50)

There is evidence to show that where users are expected to pay for their water supply, "poor families have little choice but to reduce their food budget, with obvious implications for their nutritional status" (DFID 1998:48). Therefore the benefits of an improved water supply with the hope that health will be improved may be in vain. However, the outcome is also dependent on the opportunity cost of a woman's time released from water collection and the charges relative to those for sources used previously.

FIGURE 2.3 **Factors influencing WTP and size of WTP**

1) time-saving in collecting water resulting in additional time for income-generation, related to value of woman's time as main collector
2) dissatisfaction with present supply
3) existing sources (where the water supply is essential, people put a high value on it and will contribute money to keep it functioning)
4) convenience of supply (e.g. near home)
5) cost of current water supply
6) income
7) level of service (from handpump to piped supply)
8) awareness of health benefits
9) type of payment required
10) recipient of payment (some may refuse to pay the state for a service it is felt should be provided free of charge, but may be willing to pay a private business or NGO)
11) availability of credit
12) perception of ownership/responsibility

Source: WDR (1994); Morgan (1989); WDR (1992); WASH (1987), DFID (1998), World Bank (1997b)

User-financing can worsen equity of water supply rather than promote it through increased coverage, since the poorest may find themselves excluded if they cannot contribute financially. Therefore, it may be necessary to keep some subsidies in place. Water subsidies are relatively easy to provide in rural areas, since they can be used to cover the capital cost of handpumps, which are a one-off investment. Usually poor households are exempted from paying for, or towards, the capital costs of sinking a well and installing a pump. Maintenance costs are often expected to be the responsibility of the users, in which case subsidies can be internalised within the community. However, whether this is done fairly, or even at all, is highly dependent on community dynamics and power relations.

Subsidies have downsides. Since public funds are limited it is necessary to have good targeting of the beneficiaries, something which has not been very successful in many development programmes in the past (Reddy and Vandemoortele 1996). For example, pressure on governments from urban middle classes has meant that subsidies have been diverted away from poor rural or urban areas. Government bureaucracy is often slow and administrative costs can offset the gains generated by efficient targeting. However, a water supply project with involvement from the government and CARE (an international NGO) in Indonesia, which aimed to recover costs from the community successfully managed to target poor communities with subsidies. The subsidy was almost self-targeted since the richer households were unwilling to wait for slow government and donor provision and thus were prepared to pay, leaving the subsidies to those who really needed them (Rahardjo and O'Brien 1994).

2.4.3 Credit

If cost-recovery is to be a reality and if WTP is to become ability to pay, it is perhaps necessary for users to have access to credit so that the payment can be spread over a period of time. Indeed, availability of credit can substantially increase uptake of rural water supplies (ADB/UNDP 1990). For example, the Bank of Bangladesh offered credit for rower pumps and by 1985 10,000 had been sold (Bauman 1985:9).

However, more important than the availability of credit is the ability of the borrower to repay. Credit has the potential to worsen poverty. Microfinance schemes are currently being hailed as a viable alternative to bank credit for the poor. Banks often require collateral and charge high interest, and the inflexibility and inconvenience of repayments do not necessarily suit the rather unpredictable financial position of the poor. Income irregularity is particularly prevalent in rural areas due to the great impact of seasonal variability on livelihoods. There are two ways in which credit can be a realistic option for the poor. Development agencies can act as guarantor with formal lending institutions on behalf of the borrower, or set up a group-based lending scheme with a savings base (Devereux et al 1990). Group lending not only replaces tangible collateral, it also encourages repayment, reduces transaction costs and induces community cohesion (Padmanabhan 1988). The savings enable the borrower to develop an assets base, thereby reducing vulnerability against distress sales in order to repay the loan. However, it is important that the money is recycled rapidly so that the savings do not fall in value (Devereux et al 1990).

Where credit is provided by a development agency, the interest rate should be kept as low as possible (once the rate of inflation and costs of loan disbursement and administration have been accounted for) because, in the case of water, the provider should not be making a profit from people who are trying to provide a basic need for themselves (ADB/UNDP 1990; Hartvelt and Deiters 1997). Indeed, it is the issue of interest which is used as an argument against the involvement of NGOs in credit programmes, since it exposes the vulnerable to risk.

Another contentious issue is that of default. There is evidence to show that borrowers are more likely to default if the money has been lent by a development agency rather than commercially. However, if the development agency is too strict in its treatment of defaulters, it may push them to use credit from the institutions which the development agency sought to replace (Devereux et al 1990). A vicious circle can be created where the defaulter takes out another loan in order to repay an outstanding loan, thus becoming worse-off. This is particularly marked where the loan was not for the purpose of investment and income-generation but, for example, for a village water supply system. Furthermore, repayment can be linked to the priority given to that which the loan was used for. For example, money which was to be used to repay a loan for a handpump may be diverted to pay for medical fees if a family member becomes ill. To sum up, "(b)oth credit and savings schemes can overcome difficulties due to income instability if likely problems are recognised in advance, and if the institutions concerned are prepared to be flexible" (Devereux et al 1990).

SUMMARY

Water *should* be seen as a basic right. However, governments are reluctant to label it so, perhaps due to a lack of public resources to meet the right. In this chapter it has been argued that although the state has an obligation to ensure that rights are met, this does not mean to say that other institutions (international agencies, donors, NGOs, civil society and the private sector) do not have a part to play in practically fulfilling rights. It has been suggested that, provided subsidies and credit are offered, beneficiaries themselves should contribute financially towards their water supply systems.

Chapter 3

HANDPUMPS

"The ideal handpump does not (yet) exist" (Bauman 1985 1)

Given the dispersed nature of rural populations, economies of scale dictate that handpumps are far more cost-effective than piped water systems (Wishart 1997). Therefore, handpumps have been given centre-stage since the 1970s, and especially during the International Drinking Water Supply and Sanitation Decade (IDWSSD) of the 1980s, in the effort to secure access to safe water for all rural dwellers (SDC 1994).

This chapter will look at some aspects of handpump provision. First, the notion of the handpump as an appropriate technology will be introduced. User participation in maintenance and repair and the impact on sustainability will then be discussed.

3.1 Appropriate Technology

"Technology applied in ignorance of its consequences in human terms is counterproductive."
(Stern 1989·2)

It was not until the 1960s and 1970s that the failure of western technology at solving the problems of southern countries was significantly acknowledged. Schumacher's influential book "Small is beautiful" outwardly challenged the status quo and put forward ideas of appropriate technology (AT) (Schumacher 1973). Since then, various institutions promoting AT have been founded all over the world.

At the heart of AT is relevance to the local situation, both physical and social. The technology must be simple to use and maintain and thus be socially acceptable, in addition to being locationally apt and environmentally-friendly. Figure 3.1 which summarises definitions of handpump AT shows that there are many aspects which one should strive for in its development.

During the 1970s the assumption that handpumps needed little maintenance, and that quick repair, ready supply of foreign spare parts and sufficient government resources were a reality was questioned (Wood 1993). Indeed, donors estimated that during the 1970s there was a failure rate of at least 70% of handpump projects (Churchill et al 1987). Thus in 1981 the World Bank and UNDP set up the Handpumps Project in which 70 pumps trials were carried out in order to overcome such problems (Arlosoff et al 1987). To complement the practical designs was the introduction of Village Level Operation and Maintenance (VLOM).

3.2 Participation and Village Level Operation and Maintenance

"(I)t is the system that keeps the technology functioning which is important, not the actual technology"
(Mudege 1993 12)

Evidence shows that community participation is closely associated with effective projects (Harvey and Garn 1997; Nigam and Rasheed 1998). This is because beneficiary involvement in the management of a project results in efficiency, equity and cost-recovery

FIGURE 3.1 Aspects of Appropriate Technology for rural areas

Physical	appropriate for local hydro-geology, environment-friendly, durable and robust, non-corrodible, reliable, efficient, easy to install, lightweight, replicable, local production, simple to produce, readily available, small-scale
Human	demand-responsive, aimed at needs of beneficiaries, social/cultural acceptability, flexible/adaptable to local circumstances
Operation	user friendly, renewable energy
Maintenance/repair	local availability of spare parts, low skills requirement, simple training, Village Level Operation and Maintenance (VLOM)
Finance	affordable, low-cost
Technological development	continuous development of technology, improve local technologies, no patent, learn rather than blueprint,

Source IRC (1995), Van Hamert et al (1989), McGowan and Hodgkin (1989), Asian Development Bank and UNDP (1990), ITDG Water Panel (1989), Wood (1993), Segal (1992), Schumacher (1985), Wishart (1997), McJunkin and Hofkes (1982)

(World Bank no date). Participation in a rural water project can reduce recurrent costs and enhance reliability. Moreover, "(b)ecause of their simplicity there is a danger that those [water supply] systems that do not require staff, fuel, added chemicals or other obvious recurrent expenditure may be installed and forgotten" (Wood 1989:248). Thus, sustainability is a key objective of participation. In addition, the transfer of responsibility for financing and carrying out of maintenance and repair to the community means that government effort and resources can be assigned to other needy communities and hence coverage increased.

The general purpose of VLOM is to maximise the time the pump is running through simple community maintenance and quick community response to breakdown (Reynolds 1992).

Thus the community gains from VLOM as it does not have to rely on the government to send out repair teams which can mean that their pump is out of action for an unnecessary amount of time. The VLOM concept also reduces dependence on external institutions, thus empowering the community by giving them control over their water supply. However, despite the transfer of responsibility for operation and maintenance (O&M) from government to community, the government should provide backup to the community when it does not have the capacity to carry out major repairs (McGowan and Hodgkin 1989). This depends very much on the handpump technology adopted.

The requirements for VLOM are an easily maintainable handpump, a trained villager responsible for maintenance and repair, locally available spare parts, a local authority prepared to come to the rescue if needed and regular payments into a village fund in order to cover recurrent costs (Tschannerl and Bryan 1985). The India Mark II pump is not particularly VLOM-friendly as the pump is too heavy for the parts to be easily maintained by the community (Baldwin 1989). The Afridev pump involves VLOM and is still widely used today. However, it has its limitations (e.g. the need for imported parts) and as it has become a standard design chosen by donors rather than beneficiaries in many development projects, many local technologies are overlooked (McGowan and Hodgkin 1989; Vaa 1993).

3.3 Sustainability

As stated in chapter 1, for the purpose of this study, sustainability refers to the operation of a water supply system for the longest period of time possible, requiring maintenance, repair and recurrent financing, ideally by the user. However, despite the benefits of VLOM for water provider and user, one should not assume that maintenance will actually be carried out by the user regularly, let alone indefinitely. For this reason, many water projects have failed to be sustainable. If VLOM is to be successfully implemented, the user needs to be made aware at the beginning of the project of the contributions, both physically and financially that they must make in the future. It is hoped that user involvement in water projects will create a sense of responsibility and eventually ownership (Haile 1981). However, sometimes the user continues to believe that the institution that installed the handpump has ownership and therefore ultimate responsibility, thus threatening the project's sustainability. This can be related to the past history of water provision (Morgan 1993).

That cost-recovery results in sustainability is not necessarily causal. A well-documented experience is of a project in 1970s Lesotho where as people had contributed time, money, labour and materials towards construction, they felt they had done enough and expected the government to take on maintenance (Feachem et al. 1978). On the other hand, there have been sustainable projects that have not involved cost-recovery because users have valued their supply so highly that they will stop at nothing to see it continue.

SUMMARY

The design of a pump that reaches optimum satisfaction in both the AT and VLOM camps is the ultimate goal. User maintenance and repair contribute to sustainability. Cost-recovery can enhance sustainability but is by no means a precondition.

Chapter 4

RURAL WATER SUPPLY IN NICARAGUA

4.1 Background to Nicaragua

Nicaragua, situated in Central America consists of three distinct regions: the sparsely populated Caribbean region, the cooler north-central mountains, and the Pacific lowlands on which live the majority of the population. The country's economy has been crippled in recent years by civil war (until 1979) and Hurricane Mitch (1998), destroying infrastructure and meaning that bringing its population out of poverty has been a struggle. In 1997 it was estimated that GNPp.c. was US$410, one of the lowest in the Latin American region (World Bank 1998b). Despite its size, Nicaragua has a relatively low population of 4.4 million. In 1995, the time of the last national census, 29% of the economically active population were involved in agriculture, reflecting the fact that 45.6% of the population were rural dwellers (urban areas defined as concentrations of more than 1000 people). As in many countries, the rural areas do not enjoy the same level of services as the urban areas. In 1995, only 25.6% of the rural population had electric light, 30.7% were using water collected from a river or spring, 37% had access to a well and 6.3% were part of a public or private domestic water supply network. However, significant advances had been made since 1971 when the figures were 47.5%, 43.4% and 3.1% respectively (Instituto Nacional de Estadisticas y Censos 1996). Despite this, it is estimated that currently only 27% of the rural population have access to safe water (UNICEF 1998).

The strategy of the water sector is to improve the rural water supply in order to divert users away from rivers, since river water can be heavily contaminated. This involves digging wells and installing pumps. In addition, it is thought that there are already as many as 100,000 hand-dug wells in Nicaragua, which could be upgraded using handpumps. However, lack of knowledge of actual numbers or whereabouts makes it difficult when devising a strategy.

4.2 The Rope Pump

The rope pump is operated by rotating the handle which pulls water up a PVC tube between pistons on the rope (see annex 1). There are two widely used types. The family rope pump design is used on wells used by individual households. The communal rope pump is stronger and designed for use by a number of families. In 1995 the rope pump was adopted by the government as the national standard handpump technology due to its high level of social acceptance.

Box 4.1 **The Rope pump: a history**

"With the use of a rope pump, there is an increase in the amount of water available with less effort, and quality is maintained thus preventing diseases and improving the quality of life "

(Bombas de Mecate S A 1998)

The rope pump was developed by a Belgian technician named Jan Haemhouts in Nicaragua using the principle of the chain-and-washer pump. The first prototype was installed in 1983 with the aim of improving irrigation In 1988, the government became interested and invested in developing the rope pump for supplying drinking water When Hurricane Juana struck that year, the first large-scale implementation of the rope pump took place. Despite being installed in an emergency situation and in their technological infancy, 75% were still functioning in 1990. However, despite government and international agency interest in installing more rope pumps, the co-operative which was producing them later collapsed This prompted Bombas de Mecate S.A (Rope Pump Company Ltd), a private enterprise free of any bureaucratic government or development agency framework, to be set up in 1990 with funding from the NGO Fundacion DESEAR (Foundation for Social and Economic Development of the Rural Areas). There was a strong belief among its founders that with good administration and technological improvements, the rope pump had great potential in providing rural areas with a safe water supply.

At the start, the enterprise only assembled and installed the pumps, but as the market grew, the enterprise began to produce all the components. Great emphasis was placed on promotion, something to which the 1995 IRC evaluation report attributed the rope pump's success. Indeed, it has been estimated that half of Nicaragua's rural population has heard of the rope pump, and since 1990 the enterprise has sold over 10,000 rope pumps. As a result, the enterprise is now making a profit and operates without subsidies. Although producing low-cost pumps for rural Nicaraguans has always taken priority over profit, it is important that Bombas de Mecate S.A has reached this stage as its supporters are now able to concentrate their efforts and finances elsewhere. Since the 1980s, other workshops producing rope pumps have been set up. These are very small-scale, and none solely produce rope pumps. However, they have benefited from the promotion of the technology advanced by Bombas de Mecate S.A. and some produce parts for the enterprise.

Source: Alberts et al (1993), Sandiford et al (1993), IRC (1995), van Hamert et al (1992)

4.3 Government Provision

Since the 1970s, coverage of water supply systems has expanded significantly in Nicaragua. Box 4.2 outlines the government approach to improve Nicaragua's rural water supply. ENACAL believes that part of the success of the projects is due to word-of-mouth of beneficiaries, resulting to some extent in demand-responsive projects. In addition, ENACAL worked hard to make the local authorities aware of their work in order to gain their support. Without the support of the SDC, the government of Nicaragua would not have been able to improve coverage to the extent that it has, due to the necessary costs that this activity demands

Hurricane Mitch in 1998 destroyed a number of wells, many of which are still being rehabilitated. One good thing that arose from the devastating circumstances was that central government, local government, international agencies and local NGOs learnt to work together. This is an important hurdle to have jumped if future development efforts in Nicaragua are to be effective, including improving the water supply. There is, however, still a long way to go.

Box 4.2 **Government Project Management**

The INAA (Nicaraguan Institute for Water and Sanitation) was set-up in 1979 as the state water and sanitation provider in Nicaragua. In order to offer a better service to the population, it has recently undergone government reforms and has been divided into 3 agencies: an autonomous regulator, a planning body in the Ministry of Infrastructure, and a service provider (ENACAL). The Gerencia de Acueductos Rurales (formerly DAR) represents the rural component of ENACAL. With the help of the Swiss Agency for Development Cooperation (SDC), DAR has been executing projects constructing wells with pumps- primarily Afridev, India Mark II and rope pumps on communal wells since the early 1990s. The goal of the projects is to achieve wider coverage and sustainable water supplies, which requires community participation. Community committees that organise maintenance of water systems are believed to be important. In addition, there is an emphasis on education about pump maintenance and sanitation. Since 1996 community water committees have been educated by the newly-created Department of Sanitary Education so that the population gains knowledge about managing clean water without contaminating it in order to improve their health.

Source: World Bank (1997a), Nunez, J (pers comm), Guzman, R (pers comm), IRC (1995)

4.4 Non-governmental provision

Development projects carried out by institutions other than the Nicaraguan government have been instrumental in expanding water coverage in Nicaragua. This is demonstrated by the sheer number of NGOs, donors and embassies that have bought rope pumps alone. Since 1991 at least 50 such institutions have bought rope pumps from one enterprise. In addition there are organisations that buy rope pumps from other workshops, or install other types of pump. Their contribution to improving the rural water supply should not be underestimated.

4.5 Private provision

Many families and communities have improved their own water supply, from building a spring catchment, to digging a well, to buying their own pump. This is either because people perceive this as their duty- if they want clean water, they must work to provide it; or because they are tired of waiting for projects to reach them. On the whole, those who have not improved their supply cannot afford to as generally people take pride in their water supply and can see the benefits, be this convenience, health, quantity etc. As will be discussed in due course, people's perceptions of, and attitudes towards water supply are important in shaping the provision they have.

Chapter 5

METHODOLOGY

5.1 Introduction

Ensuring access to drinking water is an important issue in the effort towards reducing poverty. It was therefore decided that the opportunity offered by Bombas de Mecate S.A. to study the rope pump in Nicaragua should be accepted. Bombas de Mecate S.A. is the main producer of the rope pump in Nicaragua. The Technology Transfer Division of Bombas de Mecate S.A. has been recently established with the help of the Government of Nicaragua and the SDC in order to promote the transfer of rope pump technology to other countries. This study was carried out with the aim of facilitating the transfer of rope pump technology.

The focus of the study is the financing of the rope pump from a rights perspective. As discussed above, the rights approach to development is becoming increasingly recognised by development actors. The financing of water supply systems is a major issue in the light of structural adjustment, debt and emphasis on good governance. Both the rights approach and financing of water raise questions about whether users themselves should pay towards their supply systems. This will need to be taken into consideration by those institutions which transfer or adopt rope pump technology in other southern countries.

To test the hypotheses outlined in chapter 1 the fieldwork methods set out in box 5.1 were used.

Box 5.1 **Fieldwork methods**

1. ***The rope pump is an appropriate technology that meets the needs of rural Nicaraguans*** and ***4. There is no trade-off between user-financing and the right to water***

Questionnaires with users, observation and key informant interviews were used to investigate the trade-off between user-financing and the right to clean water, and satisfaction with the rope pump at the household and institutional levels.

2. ***It is important that rope pump users pay the capital and recurrent costs of their rope pump***

Whether users should pay was determined through household questionnaires with users who did, and users who did not pay for their rope pumps, observation, and interviews with representatives of institutions involved in rope pump projects.

3. ***If it is important that rope pump users pay the capital cost of their pump, credit provision is needed so that rope pumps are accessible to all***

Questionnaires with users and non-users of rope pumps and key informant interviews were used to investigate the issues surrounding credit.

5.2 Selection of field sites

As at least 10% of the Nicaraguan population has access to a rope pump, it was not difficult to find study villages. Due to the varied nature of the material to be collected, it was not possible to use only one village to study. Therefore five villages or areas were chosen, depending on their characteristics using the advice of staff at Bombas de Mecate S.A. (see box 5.2, and annex 3 for map).

Box 5.2 **Field sites**

Los Romeros: Los Romeros, situated about 3km from Los Cedros was not an ideal village to study, since it is within the sphere of influence of Bombas de Mecate S.A and therefore some of the questionnaire answers may be biased. However, this was the first village studied, the aim being to gain an idea of the positive and negative aspects of the rope pump as perceived by the users themselves, and through observation. In addition, it was easy to reach by foot at a time when vehicles were not available to go further into the bush. Being easily accessible meant that return visits were possible and that time was available for interviewing those without rope pumps in order to gain an understanding of alternative water provision and associated issues.

Malpaisillo: Malpaisillo is a municipality situated to the northeast of the city of León. In order to investigate ownership and sustainability it was decided to study projects where pumps had been donated to communities The ENACAL-SDC office in Malpaisillo has installed many handpumps in the region, including rope pumps. Therefore with the help of a knowledgeable ENACAL representative it was possible to visit villages in the region where various types of communal pumps had been installed and to interview the users

La Gloria: Some families in La Gloria, situated near the coastal resort El Velero have received family rope pumps from INAA-SDC. Of particular interest in this area is the importance of a groundwater source as most surface water is salty. In addition, sea air can cause corrosion of the frame of the rope pump if not maintained properly.

La Goyena: Goyena is a village a small distance from León where CARE is implementing a project which enables people to pay for their rope pumps in instalments.

Calle los Besos: Calle los Besos is situated about 10km from Los Cedros Here, families bought their rope pumps using savings, or credit provided by local NGOs. This enabled a comparison with the CARE programme to test whether credit in general should be promoted, or whether the CARE programme has its own particular strengths.

5.3 Sampling

As the data had to be collected in a short timeframe of four weeks, it was not possible to interview more than 41 families. This sample was further diluted as although the questionnaire used was the same, each village had a very different background with respect to the rope pump and thus some questions were not relevant. Selection of those surveyed was purposive. In no village were more than 12 questionnaires carried out. It is acknowledged that this is not a large enough sample from which it is possible to draw confident conclusions, but this study should be seen as illustrative. It was possible to collect enough information to gain a good understanding of the issues, and to prompt further, more thorough research in the future.

Households were selected randomly in Los Romeros, although the aim was to interview as many without access to rope pumps as those with. In Calle los Besos, La Goyena and La Gloria, only households with access to a rope pump were randomly selected. In Malpaisillo the INAA-SDC representative ensured that communities with different types of pump were visited.

5.4 Household questionnaires

Household questionnaires were used to obtain a wide array of information. Following a preliminary study in villages near Los Cedros, where villagers were questioned informally about their water supplies, it was possible to pinpoint issues to investigate, and design the

questionnaire. Where possible, the female household head was interviewed as water collection is traditionally assumed to be a female occupation. It may have been beneficial to also question the male heads as they are often the principle financial decision-maker. However, time did not allow for this, and as it turned out, women were generally involved in financial decisions about the rope pump.

The questionnaire was divided into four broad sections (see annex 4 for English translation). The first was to identify the household's socio-economic characteristics, which could determine access to water. The second section investigated household water sources, uses, collection and consumption patterns. The next section recorded the type of maintenance given to wells and pumps, if used. The last section related to payment for the pump- whether donated or bought using savings or credit. The original intention was to incorporate a contingent variation exercise whereby people stated their WTP for pumps. However, this was not socially acceptable and therefore was substituted by an open-ended question. Even then, some respondents found the idea of answering a hypothetical question difficult to grasp.

Some closed questions were asked, although due to the small sample size, any statistical interpretations would need to be treated with caution. The remaining questions were largely open-ended to enable people to comment freely. As stated above, the rope pump is said to have high social acceptance in Nicaragua. In order to gain an understanding of the qualitative aspects of the rope pump it was necessary to focus on the perceptions of the users themselves. Richly contextualised case study material could then be developed. Each interview lasted approximately 30 minutes.

5.5 Key Informant Interviews

Formal interviews were held with Jaime Nuñez of ENACAL-SDC, Malpaisillo; Maria Auxiliadora Urbina and Neyda Pereira of CARE, León; and Carmen Pong of SDC, Managua. The aim of these interviews was generally to find out about the handpump projects of each institution, their view of the rope pump and opinion with respect to user payment. In addition, Henk Alberts and various employees of Bombas de Mecate S.A. were interviewed informally in order to gain background information.

Chapter 6

FINDINGS AND ANALYSIS

This chapter will present, discuss and analyse the fieldwork findings in order to test the hypotheses outlined in chapter 1.

6.1 *Hypothesis 1 The rope pump is an appropriate technology that meets the needs of rural Nicaraguans*

To test this hypothesis the physical characteristics, including O&M requirements will be outlined. User and institutional acceptance discerned from questionnaires and key informant interviews will then be examined.

6.1.1 Physical characteristics

6.1.1.1 The rope pump as an appropriate technology

Referring back to the physical and technological aspects of an AT in chapter 3 it would seem to an outsider that the rope pump in Nicaragua boasts many AT characteristics (see box 6.1).

Box 6.1 The rope pump as an appropriate technology

- It is appropriate for depths up to 60m and thus is applicable in many areas of Nicaragua.
- It can be installed on hand-dug wells, or drilled wells with a little adaptation.
- The rope pump is relatively simple for the workshops to produce, and the presence of many workshops means that the pumps and parts are readily available.
- Installation takes only one hour, compared with days for the Afridev and India Mark II, and some users even install the pumps themselves.
- It is lightweight and therefore possible for young children to use.
- The rope pump is more reliable than some other pumps as although they may break down more often, they are easier and quicker to repair and thus more reliable in the long-run.
- Although efficiency is difficult to estimate, field observations show that the pumps could produce a larger quantity of water in a shorter time than other pumps.
- In its early years, indigenous knowledge was used in its development.
- Bombas de Mecate S.A. has had a flexible approach to the technology and demand, since different models of the rope pump are for sale, e.g. pumps for drilled or hand-dug wells, double-crank pumps, arial pumps (to fill tanks), bici-bombas (bicycle-powered pumps), motor-powered pumps. At present, technological improvements to increase the depth reached are being investigated.

Source: Alberts et al (1993), Sandiford et al (1993), Bombas de Mecate S.A. (1993), DEMOTECH (1986), IRC (1995)

One negative aspect of the rope pump is that it is not particularly durable. A communal pump may last only between 3 and 8 years, a family pump, 12 years. However, installing the right type of pump depending on amount of usage and environmental conditions would minimise the risk of a short pump life. There should be no reason for corrosion to occur if the frame is painted yearly as instructed as part of the maintenance. However, although improvements could be made to the quality of the structure, the lifetime is more dependent on maintenance than usage (IRC 1995).

6.1.1.2 Operation and Maintenance

The rope pump is a true VLOM pump, and with simple training users are able to give frequent, simple maintenance. Required maintenance is to secure the axle and grease the wheel and handle each week, paint the metal frame once a year in humid areas or where the groundwater is corrosive, and to replace the rope and pistons every two years or so. WASH (1992 in IRC 1995) estimated that annual maintenance for a communal handpump costs US$25, yet rope pump maintenance is a fraction of that price at around US$0.5 per year for grease, US$4 every two years for rope and US$2 for the pistons on an average length rope (IRC 1995). No special tools are needed. The majority of repairs required are related to the rope which sometimes snaps. However, new rope can be acquired from outlets other than the rope pump workshops, meaning that they can be repaired extremely quickly. Bombas de Mecate S A. produces additional spare parts for its pumps, should they be needed.

The rope pump "is democratic because practically everyone has the right to participate in the installation and reparation, including the women and children" (Concepcion Mendoza Castro, social promoter in van Hamert et al 1992). Although handpumps are primarily used by women for domestic use, keeping them functioning is often seen as the domain of men. However, being easy to use and maintain, women are able to take part in maintenance and repair of rope pumps, giving them control over the project which ultimately affects them.

When rope pumps are used in government projects, community water committees of three or four people are set up to organise cleaning, maintenance and administration of O&M payment. Usually this is about C$2 (US$0.17) per month per family for a communal well serving up to 30 families. However, more often than not expenses are paid as they arise since the pumps rarely break down and the small amounts needed for regular maintenance do not justify collecting monthly payments.

6.1.1.3 Cost

In 1999, a family rope pump from Bombas de Mecate S.A. costs US$69, a communal pump less than US$100 and installation, US$8.62. This costs three to ten times less than imported pumps (Bombas de Mecate 1998). Its low cost means that the acquisition of a rope pump is within the affordability of many rural Nicaraguans.

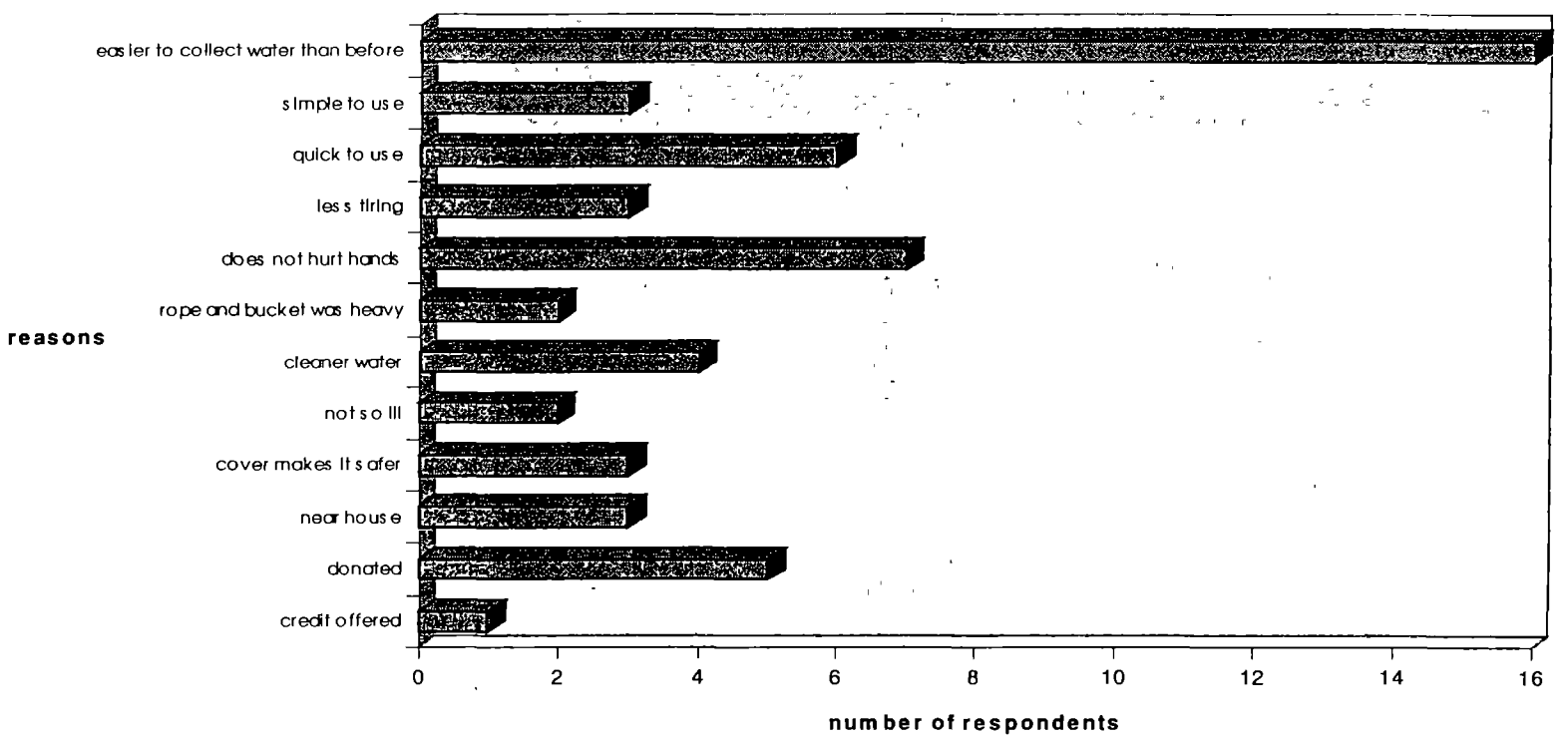
6.1.2 Pump Choice

6.1.2.1 User Acceptance

It is user acceptance of the rope pump due to past ill experience with other pump types and the view that the rope pump is the most applicable to their circumstances that is really at the root of its success. This is demonstrated by the fact that 40% of Bombas de Mecate S.A.'s clients are individuals independent of any project. The above characteristics of the rope pumps paint a bright picture. Given such information one would think that the rope pump should be adopted enthusiastically. But as the test of the pudding is in the eating, how do the users themselves perceive the rope pump?

None of the questionnaire respondents were unsatisfied with their rope pumps. Indeed, many were surprised that asking such a question had been considered. When prompted in an open-ended question to justify their answer, a variety of reasons were given. These,

Figure 6.1 Reasons for rope pump uptake and satisfaction



along with reasons for uptake are illustrated in figure 6.1. The majority said that the water is easy to collect, some elaborating that the pump is simpler, quicker, less painful, lighter and less tiring than previous collection, mostly using a rope and bucket, but also from rivers. Thus time (principally of the female head of household) is released for other activities. "I now have time to do other things in the house. My life is much easier" (Dorica León, Calle los Besos). In no household was it felt that children were unable to use the rope pump. In contrast, a user of an India Mark II pump said that her children were not tall enough to reach the handle.

Some remarked that the water is cleaner and less illness had been experienced since using the pump. Indeed, the installation of a rope pump has drawn four of the respondents away from drinking river water. River water is now only used by respondents for watering animals and on occasions washing clothes, justified by the large quantities of water needed. Some commented that the well cover both stops children falling in, and lessens contamination of the water. Indeed, the majority of respondents used a rope and bucket on an open well before the installation of a rope pump. "The well cover means that the water is healthier" (Reina Olivas, La Goyena). The short distance of the pump from the house was also valued by some users, compared with other, open wells or rivers used in the past. Some respondents mentioned that if it was not for the donation of their pump, or access to credit they not have a pump of any sort. "I am grateful to God for my 'bombita' (little pump)" (Dorica León, recipient of donated pump, Calle los Besos). This highlights the need for such projects if access to water is to be achieved for all rural dwellers and will be further discussed in section 6.2.

What is most interesting is that the aim of the IDWSSD and Bombas de Mecate S.A. is to raise health standards through improved quality and quantity of water. The use of a rope pump stops the need for a dirty bucket and rope to be placed in the well water whilst collecting, and the cover stops foreign bodies falling in. This does not appear to be particularly high on the respondents' agendas, unless cleaner water was so obvious that they felt it was not worth stating. However, Van Hamert et al's study of the rope pump in Nicaragua (1992) found that water quality came at the bottom of a list of preferences after distance from home, cost and ease of drawing water. Indeed, it seems that it was the latter that induced the users' satisfaction. It is fortunate from a health point of view that the rope pump is so popular. However, for the optimum impact on health, general household hygiene education is required in addition to a rope pump. Although government and some NGO rope pump projects involve hygiene education, private consumers (40% of rope pump users) may not receive it. This needs attention if the desired improvement in health is to be achieved.

There seems to be little conflict over use of communal pumps. Very few people ever have to queue and if they do, they take it in turns to collect buckets of water. There is no limit set on the amount of water which households can collect from the wells. Angelita in La Gloria said that the number of households using the communal rope pump treble in winter when the rivers dry up. However, there is little tension in the community as there is always enough water in the wells for those who need it. Thus altruism exists within the communities whereby regular users take on responsibility for regular maintenance and repair, but allow outsiders to user the pumps when needed.

This also relates to the value which is placed on clean water. Despite these findings, the issue of conflict surrounding rope pumps needs to be further researched.

6.1.2.1.1 Maintenance and repair

Social acceptance can also be attributed to easy maintenance and repair. All users carry out their own maintenance, even those with donated pumps. Of the 31 rope pump users interviewed, 24 said they grease the pump regularly. The incidence of this may be higher than signified as many do not count preventative measures as maintenance. None of the 31 respondents said they had ever painted the pump, but the majority of pumps are no more than two years old. Some are as old as ten years, but there is little sign of rust.

In over a third of cases, maintenance is carried out by a male family member. Women are half as likely to be solely responsible for maintenance, possibly due to socially constructed gender roles and norms surrounding male responsibility for "dirty" tasks. In a third of cases maintenance is carried out by any family member, including children, showing ease of maintenance.

The majority of users said that maintenance costs are negligible. Those who use communal wells donated by the government put C$5 (US$0.40) per month into a maintenance fund which they feel to be a reasonable amount.

Only seven respondents reported that the rope had ever broken, but these are users of older pumps. Ropes lasted between six months and three years. Some pumps had broken ropes on a number of occasions, which could be due to high usage or an incorrectly aligned pump. "The rope has been replaced many times, but it is easy for me to do" (Conny Vasasillo, Los Romeros). Only two of the pumps had ever needed repairing after installation (aside from replacing the rope), showing the high quality of the technology. Repair was carried out by the users themselves and was felt to be easy, cheap and quick. "There was rubbish in the well which blocked the pipe. My husband fixed it as he had been given training when the pump was installed" (Cruz Palasi, La Goyena). In one community the government had replaced a problematic communal India Mark II pump with a rope pump. One beneficiary commented that they no longer had to rely on the government for carrying out repairs and now the community felt it had control over pump management.

6.1.2.2 Institutional Acceptance

Over recent years, the rope pump has become the favoured handpump in many development projects in Nicaragua. Bombas de Mecate S.A. is now selling a higher proportion of pumps to institutions than ever before.

6.1.2.2.1 Government

DAR Region V (Nueva Guinea-see Annex 3) has had an interest in rope pump technology for a number of years and many have been installed in the region. Gradually, other Regions have started to see the benefits of the rope pump. In Region II (which includes Malpaisillo), ENACAL with support from the SDC are now installing only rope pumps, except where the depth of water exceeds 60m, when an India Mark II pump has to be used. One community rejected their Afridev pump as it was supplying yellow water due to oxidisation. Therefore, a decision has been taken to

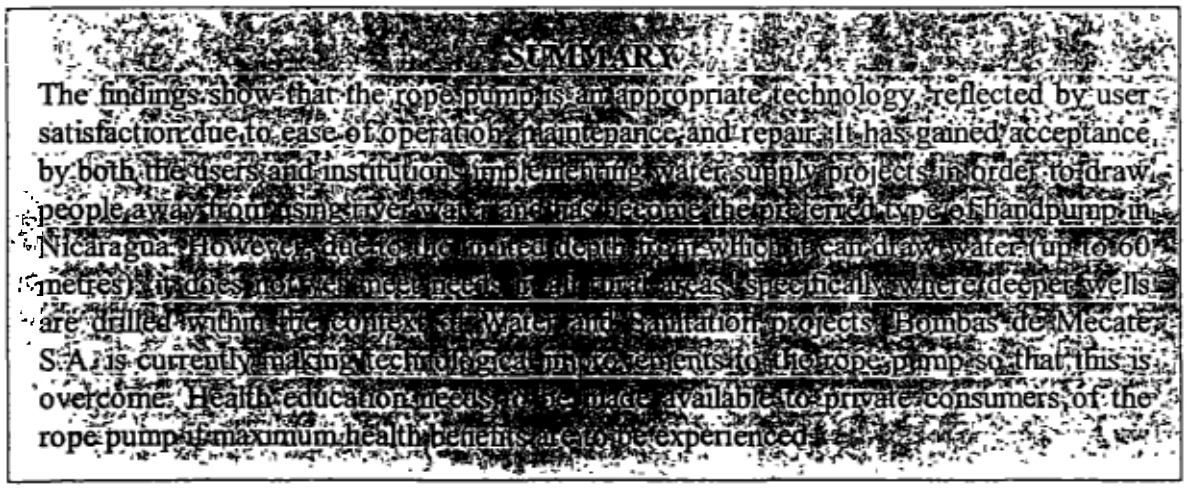
replace all Afridev pumps on wells with less than 60m depth with rope pumps, which do not contain metal parts that come into contact with the water.

Supporting rope pump enterprises has meant that the SDC and ENACAL can better respond to project beneficiaries since the technology is more suited to local capacity. As rope pump maintenance is easier and cheaper, it is hoped that the projects will be sustainable, something not achieved with the Afridev as social acceptance was low. Afridev and India Mark II pumps are imported which is expensive, and means that they are not readily available for projects. In addition, as the government donates pumps, communities often depend on ENACAL-SDC to carry out maintenance and repair. However, with the rope pump, communities are more willing to take on the responsibility as it is a low-maintenance technology.

It is estimated that a hand-dug well (dug by the community using donated tools) with a rope pump costs ENACAL-SDC US$725. To drill a well in rocky ground costs over US$2500. Ten years ago an Afridev or India Mark II pump would have been installed on these wells which would have added approximately US$500 to project costs.

6.1.2.2.2 CARE

CARE is just one of many NGOs which is installing rope pumps in rural Nicaragua. CARE has set up a pilot project - Potable Water, Latrines and Health Education Project (PALESA) in the departments of León and Chinandega. Rope pumps are being installed in order to improve family wells, as they are cheap and can be easily maintained and repaired by the user. They are preferable to electric pumps, since the recurrent costs are much lower, making the project more sustainable.



6.2 *Hypothesis 2 It is important that rope pump users pay the capital and recurrent costs of their rope pump*

To test this hypothesis, the attitudes of the government and CARE with respect to user payment for capital and recurrent costs will be outlined. The impact of their philosophies on the users themselves will then be analysed.

6.2.1 Institutional attitudes towards cost-recovery

Boxes 6.2 and 6.3 show that although the government of Nicaragua and CARE both believe that user-financing of recurrent costs are important for sustainability, they have very different attitudes towards cost-recovery for the capital costs of the rope pump.

Box 6.2 Government of Nicaragua's attitude towards cost-recovery

Representatives of ENACAL believe that the spirit of a government water project should be to donate pumps, as such projects work with extremely poor communities. Donation of pumps is justified by the fact that communities are asked to contribute something to the project in a non-monetary manner such as digging wells or installing pumps, thereby encouraging some sense of ownership and thus sustainability. However, it is believed that sustainability requires some financial contribution once the system has been installed in order to finance maintenance and repairs. In especially poor communities such as those hit by Hurricane Mitch, these requirements are waived.

Box 6.3 CARE-PALESA's attitude towards costs recovery

CARE-PALESA is financed by the SDC, a strong believer that sustainability of projects lies with user-payment. Therefore it is expected that the people themselves make a financial contribution to the project by funding the rope pump (US$70), CARE paying around US$200 towards such things as improving the well, installing the pump and training the user. The project enables beneficiaries to pay in instalments if they cannot pay the whole cost at once. CARE believes that the result is a partnership which empowers the community rather than an uneven one between donor and beneficiary.

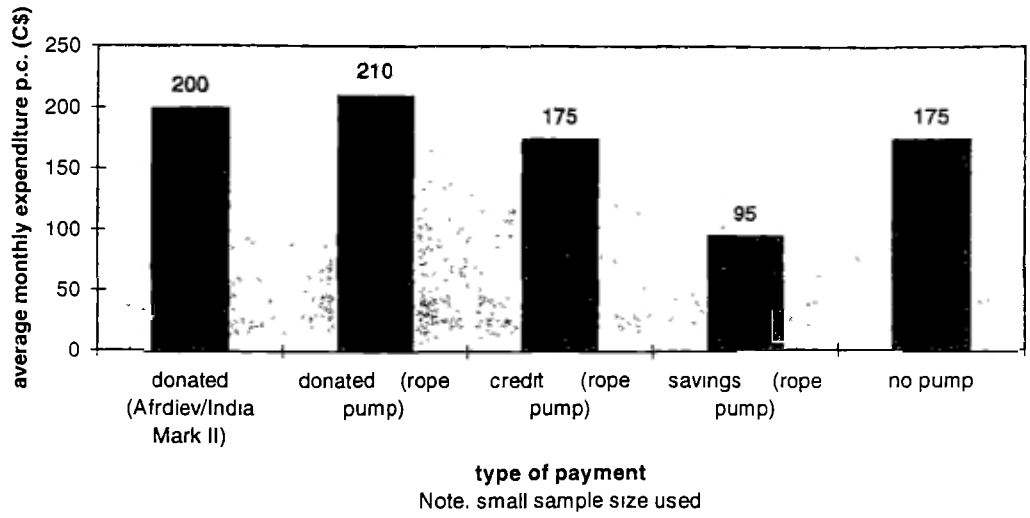
6.2.2 Impact of cost-recovery

This section will use questionnaire data to assess the importance, feasibility and impact of cost-recovery of the rope pump.

6.2.2.1 Capital cost-recovery

Figure 6.2 shows the average monthly per capita expenditure of households and the payment method for the water-lifting technology used (being a sensitive issue, income data was difficult to obtain, so household expenditure, which is a good indication of income, has been used). It uncovers interesting results, although it must be remembered that a small sample size of 41 households was used. It seems that those who are recipients of donated pumps have the highest household expenditure. This brings into question the issue of targeting for government donated pumps, especially as those with no pump have a lower household expenditure. As it is difficult with rural water supply systems to impose user charges at the point of delivery, using taxes to buy pumps is really the only way of subsidising water supplies for the poor. Equity is at stake if the ultra-poor are paying taxes but not benefiting from subsidies. Cost-sharing could be an alternative to using taxes to fund handpumps, but even recovering only some of the cost could exclude the poorest, with implications for coverage.

Figure 6.3 Type of pump and payment by average household expenditure



Significantly, figure 6.2 shows that the two groups which have the lowest expenditure are those who bought their own pumps using savings or credit. It could be possible that those have a low household expenditure simply because they have had to buy their pumps. However, the majority of pumps have been fully paid for, and this is unlikely to still have an impact on household spending.

When asked if they would have been prepared to pay a contribution towards their donated pumps, questionnaire respondents (ten) had a variety of reactions. Three refused to comment, possibly because they did not understand the question, were scared that they may have to pay, or felt it was an irrelevant question. Two said they would not pay anything because they could not afford to. It is uncertain whether any of these five believed that financing water systems is the government's responsibility. The remaining five said that they would pay. One reason given was that "people need water- it is a valuable resource" (Angelita in La Gloria). Two of those commented that they would need credit.

Only one out of the five questioned who did not have access to a rope pump said that they did not want one. "We are satisfied with the way things are" (Delgado Cruz, Los Romeros). Two did not have enough money to buy a pump, but two others said they would use a credit scheme if it was available.

These results show that even the poorer families have the ability to pay for rope pumps. However, for some, a lack of finances is holding them back from buying a rope pump. This very much reflects the personal perception of the usefulness of a rope pump and the priority it is given over other household necessities. To ensure such families acquire a rope pump either requires effective subsidies (for the ultra-poor), or a facility which enables payment over a long period of time.

6.2.2.2 Recurrent cost-recovery

As stated in figure 2.2, the strive for sustainability is used as justification for encouraging user-financing of water supply systems. However, further analysis of the findings set out in section 6.1.2.1.1 shows that in the case of the rope pump, maintenance (which can contribute to sustainability) is carried out whether users have bought their pumps or not, facilitated by the fact that rope pumps are cheap and easy to maintain and repair. This is particularly significant as all users have to fund maintenance costs themselves. This shows the high value people place on the pumps they use, regardless of ownership. Thus, the philosophy that the user should pay for the capital cost of the pump if the system is to be sustainable is brought into question.

SUMMARY

There is a potential for many, including recipients of donated pumps, to contribute financially in part, if not in full towards their rope pump. Resource mobilisation should be encouraged. The results demonstrate the need for effective targeting so that non-pump users are reached, and that credit could be instrumental in increasing access for at least the rural less-poor. However, user-financing of capital costs is not a necessary determinant for maintenance and thus sustainability.

6.3 *Hypothesis 3 If it is important that if rope pump users pay the capital cost of their pump, credit provision is needed so that rope pumps are accessible to all*

Taking into account the demand for credit among rural Nicaraguans stated above, this hypothesis will be tested by analysing information collected from those users who used credit to buy their pumps in order to ascertain whether this is a viable option.

6.3.1 Credit programmes

As discussed in chapter 2, the real test of a credit programme's success is to ask the borrower whether they managed to repay, and how much it affected the household economy. Of the fifteen questioned who had used credit to buy their rope pump, only one (who used a local revolving fund) had been required to provide collateral (house and land). The other respondents did not have to pay interest, provide collateral or save as is common with microfinance programmes.

Box 6.4 **CARE-PALESA project**

The CARE-PALESA project was initiated in 1996 in order to improve the health conditions of rural families through health education and expanding coverage of latrines and drinking water. With experience of installing rope pumps on three communal wells, a pilot project was set up in 1997 to test the success of family rope pumps in two communities. By 1998 there were 158 families and nine communities with rope pumps. Now that the project is established, it is hoped that many more families will have pumps installed.

As the majority of families are unable to pay out the full amount at once, a US$10 deposit is paid and then the participant can decide how long it will take them (up to a year) to pay the remaining US$60. In each community is a Drinking Water Committee with a treasurer responsible for collecting the money from individual families for their pumps. Due to a flexible repayment mechanism, there have been almost no defaulters. There is no required collateral, but anyone who cannot repay a number of times is ejected from the PALESA project. In addition, no interest is charged. In order to ensure repayment, CARE does not work with a family or community where there is no income. At least 60%, and ideally 80% of a community must be willing to participate in the project. Many communities have raffles and other activities in order to raise money for their individual family pumps, which can also be instrumental in enhancing community cohesion.

Ten respondents were involved in the CARE-PALESA project (see box 6.4). One paid the cost of the rope pump all at once, another in two instalments. For the remainder, the period of payment lasted from three to twelve months. Only two stated they had paid without difficulty, due to the fact that there was plenty of time to repay. The remainder all admitted to varying degrees of belt-tightening. This included sacrificing the purchase of some things, selling pigs, eating less and working harder.

Four other respondents live in Calle los Besos and had received credit from PROTIERRA, a national NGO, or the European Union through the Local Authority of Nagarote. These credit initiatives had set up water committees of six to eight people which met and collected money from borrowing households every month. Instalments were around C$100 (US$9) per month, which amounted to up to one sixth of the households' income. Only one of the respondents said that her household spending on food was not affected, but her household income was at least 30% higher per capita than the other respondents'. When lack of work meant they were unable to pay an instalment, it was possible to postpone payment until the next month. "If we could not

pay on the right day, we had to wait until we could" (Rosa Salgado, La Goyena). Therefore all of them managed, or are managing, to repay the loan.

All fifteen respondents who had used credit said that if the credit had not been offered, they would not have bought rope pumps. It is likely that the person who paid the amount in one instalment was interested in benefiting from other aspects of the CARE-PALESA programme. It is possible that interest-free borrowing was significant in the impressive repayment figures, especially in view of the fact that inflation was high, at 7.25% in 1997 (EIU 1999:17). In addition, the majority of the respondents were involved in agriculture and primarily self-employed, which can result in an irregular income. "When we have money we eat well. If not, we eat badly, or eat our animals" (Dolores Ordeñana, Calle los Besos). The flexible payment mechanism could therefore have been instrumental in ensuring high repayment rates.

Despite the success of the credit projects, those who do not already have a well and those who cannot pay for the pump are excluded. CARE directs such people who want a rope pump towards the local authority or other NGOs that have an ability to construct wells or facilitate income generation. This would require a presence of such organisations in the vicinity, and some degree of co-ordination with CARE.

SUMMARY

Credit can be instrumental in facilitating uptake of the rope pump. This may result in a degree of belt-tightening in the short-term, but in the long-term the borrower realises it was a sacrifice worth making. A negligible number of families were unable to service the debt. Success could have been facilitated by flexible repayment mechanisms. However, these credit programmes were only for those who already had a well. Therefore, although it has been shown in figure 6.2 that the poorest could have the capacity to successfully take part in credit programmes to buy a rope pump, their capacity to dig their own well is debatable and needs further study.

6.4 *Hypothesis 4 There is no trade-off between user-financing and the right to water*

This hypothesis is inter-related with that above. Rather than being directly tested using field data, a conclusion will be drawn using an analysis of the data already put forward.

Neither of the water providers questioned denied that everyone should have access to water, as all are committed to expanding coverage of water supply systems. However, they do have different views with regard to cost-recovery.

As suggested in chapter 2, the present financial climate in many countries commands the need to solicit some degree of cost-recovery. However, in Nicaragua financial necessity does not seem to be the prime motive for user-financing. As stated in box 6.2, the government still upholds the need to provide water systems free of charge, despite the strain on public funds, although one of the strengths of using the rope pump is that it is cheaper to provide than other pumps. Thus, the right to water can be said to be a driving force. In the case of CARE's project, although there is cost-recovery, the prime motive is sustainability and not lack of financing. CARE believes that there is a capability among the poor to pay for their pumps and that this should be tapped in order to enhance sustainability. The CARE-PALESA project can be interpreted as enabling people to meet their own rights.

As for recurrent financing, both the government and CARE require the users to carry out maintenance and repair in their rope pump projects as this is seen to enhance sustainability. This complements the right to water, as if rights are met, it should be for the long-term.

SUMMARY

Cost-recovery and the right to water are not necessarily conflictual. CARE recognises that people can meet their own needs and merely acts as a facilitator. Although the government does not recover the costs of rope pumps from beneficiaries, it was suggested above that many of those could in fact have contributed towards capital costs. Therefore people could meet their own right to water. What is important is that for those who cannot afford to finance their rope pumps, their right to water is ensured. As mentioned above, in this case it is vital that subsidies are in place.

Chapter 7

ROPE PUMP TECHNOLOGY TRANSFER

7.1 Introduction

In 1995 the IRC produced an evaluation report of the rope pump in Nicaragua which assessed its performance and potential for application in other countries. The findings were overwhelmingly positive. It was found that private local manufacture of the rope pumps should be realised in other countries. This is reinforced by the results of this study. There is no reason why the technology should not be transferred elsewhere with a few adaptations, although it is highly dependent on hydrological factors and the presence of a developed private sector.

Some call for better quality control (UNICEF) and standardisation (COSUDE) of the rope pump before they are to be fully convinced of its sustainability in Nicaragua (IRC 1995). That these are realised before the technology is applied in other countries is perhaps important. Since 1995 the rope pump has been accepted as a national standard and ENACAL is at present attempting to officially standardise the pump.

7.2 Standardisation

"It is relatively easy to make one good pump, but it is very difficult to make a large number of good pumps." (Bauman 1985 2)

It has been argued that standardisation is required for optimum coverage of quality public handpumps, due to the associated reduction in costs. Local production is encouraged by standardisation, which in turn lowers the cost through competition. Maintenance and repair are facilitated by standardisation, since parts and training courses are more readily available. Thus reliability is increased. However, some degree of quality assurance would need to be built in so that standard of handpumps remain high (Kjellerup and Ockelford 1993). Indeed,

> "(e)xpectations are aroused with the introduction of handpumps and if these hopes are shattered through bad handpumps confidence and goodwill of the users will be damaged. It is therefore important that the handpump project is planned and executed with prudence Any attempts to take short-cuts in the development, testing or production will only increase the danger of failure " (Bauman 1985·11)

Standardisation also has its downsides. As discussed above, certain technologies may not be applicable in all areas of a country. The element of appropriate choice is therefore denied the beneficiaries and project implementers. Thus, water projects may fail to meet demands. "(S)olutions need to be available that are as innovative as and varied as the demands are different" (Allen 1999). In addition, competition can actually be discouraged, since large-scale local initiative is restrained (Mudege 1993).

Perhaps one of the greatest challenges faced by advocates of standardisation is the necessity to achieve a general consensus among government, international agencies, NGOs and local industry on the types of pumps which should be standardised (Kjellerup and Ockelford 1993). The sheer number of pumps used within countries and

across the world demonstrates that each institution has its preferred equipment, and convincing them that another type should be standardised could create the first bottleneck of many. In addition, experience in Africa with Afridev pumps promoted by the UNDP-World Bank initiative shows that encouraging private sector involvement in manufacture has been easier said than done (Wood 1993).

Ideally, the fulfilment of basic needs should not be privatised as prices can be pushed up. However, until good governance is realised, private sector manufacture is really the only feasible option. There is growing recognition that the private sector can play an important part in water provision, even in rural areas, since it can provide such services more cheaply and efficiently than the state. For example, in Zambia the cost of boreholes has halved since the private sector became involved (Nigam and Rasheed 1998). In addition, a wide coverage of workshops results in easy access to maintenance equipment for users. In order to promote the private sector it is necessary for the government to provide technical assistance, loans and information (Churchill et al 1987). However, it must also be ensured that private sector provision is regulated so that the poor are not discriminated against.

If the rope pump could be improved and implemented to the stage that the Handpump Technology Network (e.g. UNDP, UNICEF, WB, SKAT, which represents all handpumps in the public domain) recognises it, its transfer could be advanced. However, it has to be acknowledged that rope pump technology may have to be adapted for use in some countries, as it has been identified as an AT. Therefore, is there room for standardisation at the global level? In addition, if there are variations of the technology in different countries, who would be ultimately responsible for quality control? If the rope pump is to retain its AT identity, perhaps such a process cannot be realised above the country level. International commitment is required in the actual transfer of basic rope pump technology, but the implementation and associated standards should perhaps apply to each individual country.

7.3 Technology transfer

A number of articles have been written for water publications about the success and acceptance of the rope pump by users and institutions in Nicaragua, arousing world-wide interest. In 1996, the Swiss and Nicaraguan governments sponsored the documentation of rope pump technology, seeking to promote and facilitate its transfer at the international level. The Technology Transfer Division of Bombas de Mecate S.A. has been given responsibility for the implementation of this initiative. Parties interested in rope pump technology include water and sanitation organisations, NGOs, governments, bi-lateral donors, UN agencies, Peace Corps volunteers and public health engineers. The map in annex 5 shows the countries from where further information about the rope pump has been requested. Attempts have already been made to install rope pumps in a number of these countries using a photo manual produced by the Technology Transfer Division. It is important that this AT is adapted to local circumstances. Therefore there needs to be a willingness to experiment with designs and materials so that social acceptance results. A variation of the Nicaraguan rope pump has been developed in a small Senegalese enterprise. Experience shows that it is important to at least follow the basic design displayed in the photo manual. Some adaptations have been too complex and resulted in failure, but advice sought from the

Technology Transfer Division to correct the problem has been forthcoming. Indeed, communication is vital.

Small-scale efforts have been made in the past to transfer rope pump technology to other Central American countries. For example, the Red Regional de Agua y Saneamiento para America Central (Regional Network of Water and Sanitation for Central America) produced a video in order to support the spread of the rope pump throughout the region (Gago et al no date). However, the more recent initiative aims at a massive technology transfer across continents and has support at government level. Thus there is much potential. However, transfer of the technology will require a joint commitment from governments, international agencies, local NGOs and the private sector. Being so large-scale, it is imperative that these work together to fulfil the objective, which may be challenging to achieve simply because it is so large-scale.

The introduction of the rope pump in other countries would take a very different path from past transfers of handpump technology. The India Mark II/III, the Afridev and the Tara were all promoted by international agencies, and through the implementation by these agencies in a plethora of countries, the pumps have become a well-known technology which have been adopted by other development actors. However, transfer of rope pump technology would be directly from south to south rather than north to south (Alberts no date). Furthermore, transfer needs to be directed at the private sector. This must therefore be strengthened to encourage rope pump enterprises to be set up, and to ensure that enterprises exist which can manufacture the necessary materials such as PVC. This does not mean to say that international agencies do not have a role to play. Their role will be different from the past, but just as significant.

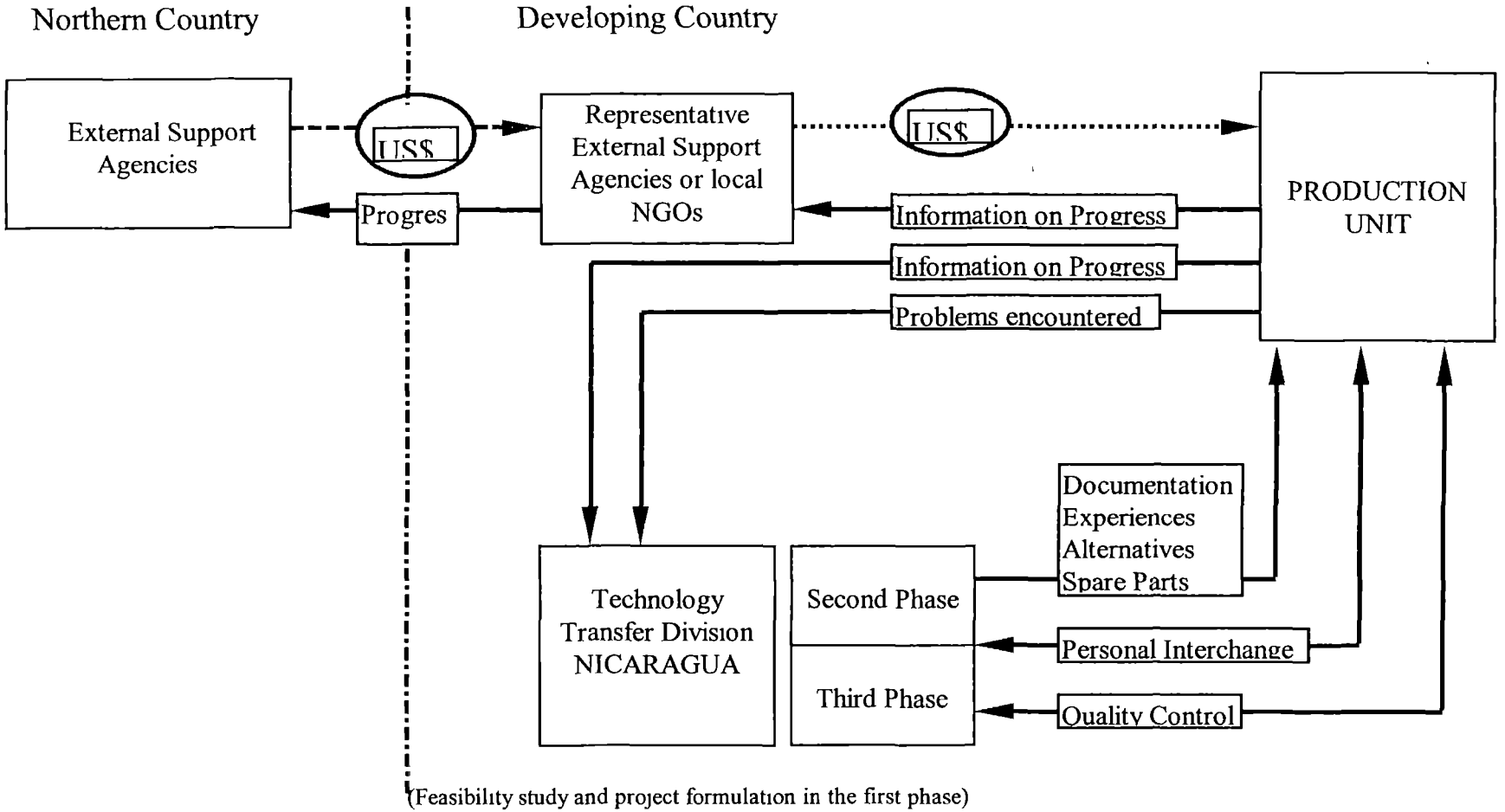
A four-phase strategy for introducing the pump is recommended by the Technology Transfer Division of Bombas de Mecate S.A. After an investigation of technical, economic and social feasibility with a positive outcome, production should occur. In order to be feasible, hydrological factors are important (i.e. depth of water) and infrastructure needs to support client access to the workshop. In addition, (non-returnable) seed capital needs to be found to buy a building, equipment and vehicles. In Nicaragua, this is estimated to be around US$60,000. After the third phase of promotion and commercialisation has been initiated, it is hoped that the workshop gains sustainability and independence. Until this final stage, external actors (e.g. government and international agencies) have an important role to play. For example, support is needed before production starts and profit can be made. This includes the feasibility study, importing demonstration pumps for promotion, seed capital for setting up the workshop and training workers. In addition, it is necessary for a quality control mechanism to be set up and an evaluation to be carried out once the workshop is established before the technology should be further promoted (Technology Transfer Division of Bombas de Mecate S.A. no date). After production has started, governments and international agencies need to be committed to supporting the enterprises through purchasing pumps for projects.

An interesting relationship between the private sector and external agencies therefore results. The latter needs to be willing to provide the former with unrecoverable seed capital, while at the same time the former needs to be prepared to be supervised and even scrutinised by the latter as the technology becomes established within a country.

Alberts (no date) notes that a possible bottleneck could be the transfer of information to potential clients in order to create demand for the rope pump. Therefore, it is suggested that local NGOs play a part in order to link the organisations interested in promoting the rope pump with the people it will eventually benefit. After all, only when interest has been realised at the grass roots is the project worth carrying out. The NGO would then help in the formulation of project proposals. Other intermediate organisations would be required to select projects to be financed for technology transfer and implementation (See figure 7.1).

In September 1998, SKAT and IRC suggested that in order to instigate interest in rope pump technology, people should be brought to Nicaragua from different countries for a one-week familiarisation workshop with the technology and finalisation of feasibility study design. There is currently a debate about who the participants should be and who would fund this stage of the initiative. It has been suggested that representatives of water and sanitation resource centres take part. However, the Technology Transfer Division of Bombas de Mecate S.A. was recently visited directly by some representatives of the Ghanaian government through referral by the World Bank. This was felt to be a fruitful visit by both parties. In addition, interest (judging from the letters received requesting further information) also lies with local NGOs. Since it is governments, NGOs and the private sector that will be the most instrumental in setting the project up it may be more beneficial if they come to the workshop for direct dissemination of information, rather than waiting for representatives of a resource centre to circulate it.

Figure 7.1 IMPLEMENTATION OF TECHNOLOGY TRANSFER



Source. Alberts (no date)

Chapter 8

CONCLUSIONS

The aim of this study was to ascertain the importance of user-financing of rural water systems within the framework of a rights-based approach and focusing on the Nicaraguan rope pump.

8.1 Project Constraints

Due to time constraints, the questionnaire sample size was not large enough to produce statistically significant results. However, case study material collected was a valid basis for indicative findings and for generating further research questions. Language barriers meant that the semi-structured nature of the questionnaires was not utilised to its full potential. The ability to further investigate the views of key informants was also limited.

Many of those questioned had been using their rope pumps for only a short time. Therefore they may be overly positive about their pumps as they are less likely at this early stage to encounter problems. In addition, the earliest rope pumps in Nicaragua have not yet reached their expected lifetime. If this study was to be carried out in two years time very different results may be experienced. Further proof of social acceptance will be the investment of another pump once the lifetime of the present one has been reached.

8.2 Key findings and recommendations

The case studies investigated three different types of financing - rope pumps donated by the government and international agencies, pumps bought privately using savings, and pumps bought using credit in order to test the hypotheses outlined in chapter 1. The results will now be summarised and recommendations made:

1. The rope pump is an appropriate technology that meets the needs of rural Nicaraguans.

The study compared the rope pump with the Afridev and India Mark II pumps, which are also present in Nicaragua. Many of the rope pump's characteristics are favourable. However, one limitation of the rope pump is the depth from which it can pump water. Until technological improvements are made, the rope pump cannot replace the Afridev or India Mark II in all circumstances, as desired by the government. Hygiene education to complement rope pump technology should be made accessible to all Nicaraguans (who may become private consumers), not only to beneficiaries of government or NGO projects.

The rope pump has overwhelmingly reached both social and institutional acceptance. This can be attributed to the way that the government, donors, NGOs and the private sector have worked together. Each has played a part in the successful uptake of the technology. In particular, private sector promotion, and the quality of its product have instilled a high degree of confidence on the part of providers and users of the rope pump. If the technology is to be successfully transferred to other countries, a good working relationship such as this is required.

2. It is important that rope pump users pay the capital and recurrent costs of their rope pump

As rope pumps are easy and cheap to maintain, the government has been able to pass responsibility for O&M over to its users without problem. It makes no difference whether users "own" their pumps or not- maintenance is still carried out. Thus, in the case of the rope pump, capital cost-recovery alone does not lead to sustainability of the water supply system. Social acceptance of the technology is paramount. However, both capital and recurrent cost-recovery can be instrumental in empowering the rural poor as they no longer have to rely on external agencies. Although it seems that a large proportion of the rural population of Nicaragua can afford to pay the capital costs of their rope pumps, those who cannot should not be forgotten. Many do not even have their own well. If clean water is acknowledged as a basic right, assistance should be given to all who cannot provide it for themselves. The targeting of beneficiaries by the government of Nicaragua is questionable. This is an issue for further investigation.

3. If it is important that rope pump users pay the capital cost of their pump, credit provision is needed so that rope pumps are accessible to all

A WTP for a rope pump can be transformed into ability to pay through the availability of credit. Although CARE-PALESA scheme was the focus of the study, it seems that other, similar credit schemes have also been successful. The CARE- PALESA credit scheme is particularly unique as it is run solely for the rope pump project, the rope pump being, in effect, the loan. No interest is charged and therefore the project participants are not exposed to unnecessary risk. However, the need for flexibility of repayments cannot be overemphasised if credit is to be a viable option, as some respondents did divert money to other priorities, such as food.

The CARE scheme requires that borrowers already have a well. A well is a major investment compared with a rope pump. Therefore the ultra poor who can afford neither are doubly excluded. However, it is likely that given a well, some such people may be able to afford their own pump. Therefore perhaps the government and other agencies should concentrate on increasing the presence of wells near the home rather than increasing coverage of rope pumps. Although rope pumps may improve health through the quality and quantity of water, the importance of drawing people away from drinking river water is greater.

4. There is no trade-off between user-financing and the right to water

In the light of the present demand-responsive approach promoted by the World Bank, water is increasingly being seen as a commodity. However, in the eyes of water providers in rural Nicaragua, it seems that water is still perceived as a basic right. The government itself still feels responsible for fulfilling this right by donating pumps to communities aided by bi-lateral funding. Although it recognises the benefits of cost-recovery, it believes that if it was not for such support, poor communities could not afford to improve their water supply. The aim of increasing coverage seems to be for human rather than economic development. It is possible that this attitude stems from rehabilitation efforts after the recent war and hurricane.

CARE's rationale for the PALESA project is to improve health. Again, this appears to be humanitarian rather than purely economic. Unlike the government, user-financing is

believed to be important for sustainability. Therefore user-financing does not seem to conflict with the labelling of water as a basic right.

As for the people themselves, a WTP demonstrated by the number of families that have bought their rope pumps privately, shows that they have accepted the need to meet their own rights. Neither the rope pump users or non-rope pump users interviewed accused the government of neglect in the belief that it alone should provide water for its citizens.

It seems that user payment does not conflict with the identification of water as a basic right. As discussed in chapter 2, the government has an obligation to see rights met, but does not itself have to provide. So long as people can afford to, it is in the interests of all if they improve their own water systems. The survey shows that more people are able to finance their own water systems than the private, voluntary and public sectors might think.

8.3 Issues for further research

As already mentioned, targeting of beneficiaries in government projects needs investigating. In addition, a study could be carried out to look at the exclusion of those who cannot pay for communal rope pump capital and recurrent costs. Family and communal rope pump issues should also be further explored and compared. A gender perspective on the rope pump could also be interesting research.

8.4 Application in other countries

This study has focused on the rope pump in Nicaragua: a relatively new water-lifting technology in a relatively small country. It has been shown that the rope pump is an appropriate technology in the Nicaraguan context. There is no reason why this should not be the case in other countries as the positive characteristics of the rope pump experienced by rural Nicaraguans tend not to be specific to variables such as culture and level of economic development. Minimal adjustments to the technology may be needed, which depends on a flexible private sector. Unlike the Afridev and India Mark II pumps, which are widely-used in southern countries, "ownership" of the rope pump is not necessary for sustainability of the system, and maintenance and repair is easy for the user to carry out. Rope pumps should therefore be considered a potential alternative. Table 8.1 summarises the roles that would be required of development actors for a smooth transfer of rope pump technology.

Although a global accountability framework does not yet exist to enforce the right to water, it cannot be denied that water is a basic right. Therefore development actors should strive to fulfil it. Improving access to wells in order to draw people away from using rivers should be a priority before wells are improved using rope pumps. From a health point of view this is the most effective use of resources. Thereafter rope pumps could be installed. Bearing in mind figure 2.1 and the above conclusions from the experience in Nicaragua, and incorporating the issues discussed in chapter 8, table 8.2 outlines the recommended roles and responsibilities of development actors in the implementation of rope pumps.

Some interesting findings have resulted from this research. It is hoped that these will be of use to rope pump producers and providers as they strive to provide a facility that improves the quality of life for all in Nicaragua and other countries of the south.

Table 8.1 Roles of development actors in the transfer of rope pump technology

Development Actor	Role
Donors (bi-lateral and international NGOs)	- provide non-returnable seed capital to set up rope pump enterprises and train workers
Specialist water organisations (e.g. IRC or ITDG)	- quality control; - select feasible projects
Transfer Technology Division of Bombas de Mecate S.A.	- provide support, information and problem-solving and host familiarisation workshops for potential implementers of rope pump projects
Southern government	- send representatives to Nicaragua for familiarisation workshops; - feasibility study; - import demonstration rope pumps; - create enabling environment for private enterprise e.g. loans, information
Local NGOs	- send representatives to Nicaragua for familiarisation workshops; - create demand at grass roots; - help formulate project proposals
Private sector	- produce pumps; - willing to make technological improvements in order to respond to demand
Rural dwellers	- show demand/social acceptance

Table 8.2 Roles of development actors in increasing coverage of rope pumps in a southern country

Development Actor	Role	Result
Rural dwellers	willing to contribute towards capital costs of rope pump if possible (mobilisation of savings or involvement in credit programmes)	- ownership of pump - freedom from external agencies - release pressure on public resources
	willing to maintain and repair rope pump	- sustainability - reliability
	willing to pay recurrent costs of rope pump	- independence from implementing agency - sustainability
Rope pump enterprises	willing to make technical alterations to design of rope pump	- flexible so respond to needs
Local and international NGOs	provide information to communities	- create demand
	credit provision with flexible repayment mechanisms	- access for poor
	health education	- optimum health impact
Southern government	- provide loans and information to encourage set-up of private enterprises	-increased availability of spare parts - increased competition resulting in lower prices
	- regulate private enterprise	- keep prices low - keep quality high
	- standardisation?	- quality control -increased availability of spare parts BUT - AT? technology not applicable in some areas - DRA? denies choice
	- provide physical infrastructure	- user access to enterprises
	- use rope pumps in projects	-support enterprises
	- effectively targeted subsidies	- access for ultra-poor
	- health education (for all) to complement (potential) installation of rope pumps	- optimum health impact

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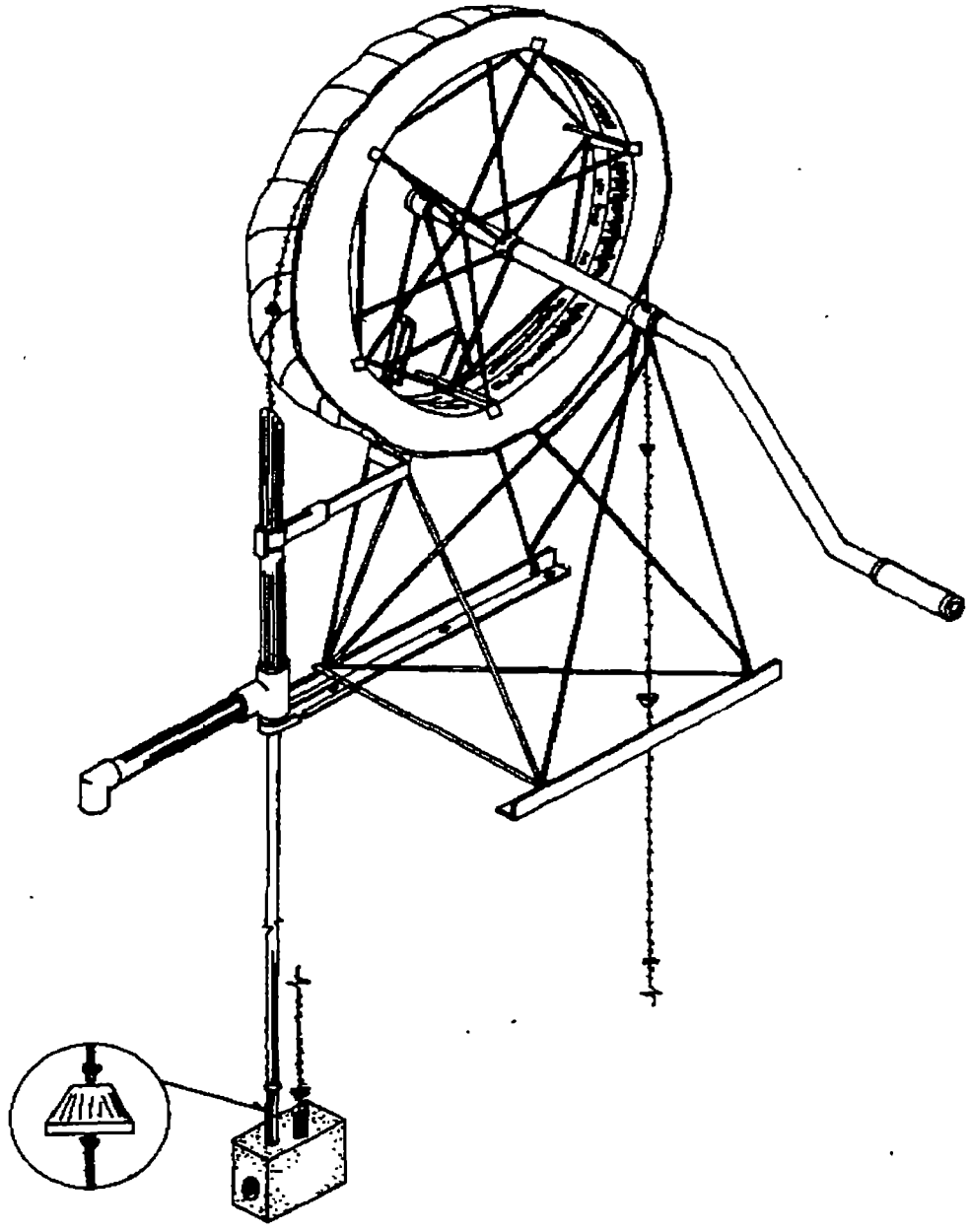
ANNEX 1

Diagram of the family rope pump.



Source: Technology Transfer Division of Bombas de Mecate S.A (1997)

Family rope pump on a hand-dug well being operated by a young child in Los Romeros village.

The Bombas de Mecate S.A. workshop. Family rope pumps background right and communal rope pumps in the foreground (with white hoods)

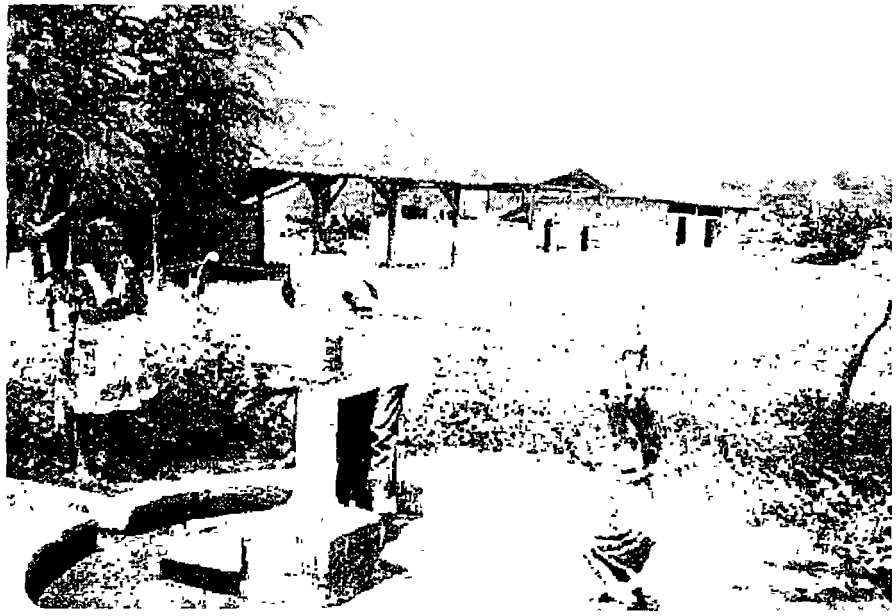
ANNEX 2

Some rural water supply systems used in Nicaragua other than the rope pump.

Rivers (Photo: La Goyena village, banks subsided due to Hurricane Mitch)

Communal hand-dug well with rope and bucket (Photo: Reyer de Sul village near Los Romeros)

Afidev handpump (Photo: Malpaisillo)



India Mark II handpump (Photo: Malpaisillo)

ANNEX 3

Map of Nicaragua showing Regions, major towns and cities and field sites

ANNEX 4

HOUSEHOLD QUESTIONNAIRE

Date **Location**
Surname

A. Identification of household:

A1. Marital Status 1. Married 2. Living together 3. Single 4. Widowed
5. Divorced

A2. Number of people living in house

Adults Male _____
Female _____

Children Male _____ Ages _____
Female _____ Ages _____

A3. Education

Male head _____
Female head _____
Children M _____
F _____

A4. Employment

Male head Primary activity _____
1. Salaried 2. Self-employed
Is this activity 1. Permanent 2. Seasonal 3.Temporary

Secondary activity _____
1. Salaried 2. Self-employed
Is this activity 1. Permanent 2. Seasonal 3.Temporary

Female head Primary activity _____
1. Salaried 2. Self-employed
Is this activity 1. Permanent 2. Seasonal 3.Temporary

Secondary activity _____
1. Salaried 2. Self-employed
Is this activity 1. Permanent 2. Seasonal 3.Temporary

B. Housing Characteristics

B1. Type of housing structure 1. Brick 2. Half-brick 3. Wood
B2. Number of rooms 1. One 2. Two 3. Three 4. Four +
B3. Type of floor 1. Mud 2. Tiled 3. Brick
B4. Electricity 1. Yes 2. No
B5. How many of the following do you own?
1. Cow 2. Sheep 3. Poultry 4. Horse 5.Pig
B6. Which of the following do you own? 1. TV 2.Radio 3.Fridge 4.Bicycle
B7. Cooker 1. Firewood 2. Kerosene 3. Liquified gas

B8. What is your monthly household expenditure?

1. in summer _____ 2. In winter _____

B9. Who decides how to spend it? 1. Man 2. Woman 3. Together 4. Other

C. Household water consumption

C1. How frequently do you use the following water sources?

1= once a day 2= twice a day 3= thrice a day 4= more than thrice a day
5=<once a day 6= when other sources not available 7= seasonally 8= never

- ☐ a) Public tap
- ☐ b) Public well
- ☐ c) Public handpump
- ☐ d) Private well
- ☐ e) Private family handpump
- ☐ f) Private communal handpump
- ☐ g) River
- ☐ h) Well near river
- ☐ i) Neighbour's source
- ☐ j) Other

C2. What do you use each source for?

1= drinking/cooking 2= washing clothes 3= bathing 4= watering animals
5= agriculture 6= other

Source 1 _____
Source 2 _____

C3. How deep is your well? _____

C4. If you use more than one source, can you justify your choice of different sources?

	Source 1	Source 2	Source 3
The water is cleaner			
The source is nearer the house			
The source provides more water			
The water takes less time to collect			
Other water sources presently unavailable			
Other			

C5. How much water do you use every day?

Volume of container_____ Number of containers_____

C6. Who collects the water? How many containers per day?

1. Female head _____
2. Other adult females _____
3. Males _____
4. Children (how old?) _____
5. Other _____

C7. How far away from your house is each water source that you use? (in varas)

Source 1 _____
Source 2 _____

C8. How long does it take to collect water from each source? (in minutes)

Source 1 _____
Source 2 _____

C9. If you use a communal source,

Do you ever have to queue? 1. Yes 2. No

How many other households share the source? _____

C10. Did you have to pay to have any of the sources installed? 1. Yes 0. No

If so, which? 1. Well 2. Pump 3. other

How much did it cost? _____

When was it installed? _____

D. Maintenance

D1. How often is each source maintained?

1. Well _____
2. Pump _____
3. other _____

D2. What type of maintenance does it require?

1. Well _____
2. Pump _____
3. other _____

D3. Who is responsible for maintenance?

1. Well _____
2. Pump _____
3. other _____

D4. How much does maintenance cost for each source?

1. Well _____
2. Pump _____
3. other _____

D5. How often does each system break down?

1= once a week 2= once a month 3= every six months 4= once a year 5= less than once a year 6= never

1. Well
2. Pump
3. Other

Was it easy to repair? 1. Yes 0. No

How much did it cost? _____

Who repaired it? _____

E. Rope pump

If you use a rope pump

E1. What type is it? 1. Family 2. Extra-strong 3. Communal 4. other

E2. What water sources did you use before? _____

E3. Which do you continue to use and why? _____

_____

E4. Why did you decide to get a rope pump? _____

E5. Are you satisfied with your rope pump? 1. Yes 0. No

Please explain why _____

_____

E6. Have you had any problems with your rope pump? 1. Yes 2. No

Please explain _____

_____

E7. Did you buy your rope pump? 1. Yes 0. No

If no, who gave it to you? _____

If you had been asked to pay a contribution, how much would you pay? _____

If you bought your rope pump, do you think rope pumps are cheaper than alternative pumps? 1. Yes 2. No

E8. How did you pay for it? 1. savings 2. credit

If you do not use a rope pump, is this because

1. You do not want one 2. You cannot afford one 3. Other

If 2. Would you use a credit scheme if it was available? 1.Yes 2. No

F. Credit

F1. Who gave you the credit? _____

F2. How much interest did you pay? _____

F3. Were you required to save? 1. Yes 0. No

If yes, how much? _____

F4. What collateral did you use? _____

F5. Did you obtain an individual or group loan? 1. Individual 2. Group

F6. How often did you have to make repayments? _____

F7. How long was the loan for? _____

F8. Was it ever difficult to make a repayment? 1. Yes 0. No

F9. Did the use of a loan affect your household expenditure? 1. Yes 2. No

If yes, how? _____

F10. If you had not had this credit system, would you still have bought a ropepump?

1. Yes 2. No

Why? _____

ANNEX 5

Map of the world showing countries from which information about rope pump technology has been requested from the Technology Transfer Division of Bombas de Mecate S.A. and in which rope pump trials are known to be occurring