Sustainable Handpump Projects in Africa

Report on Fieldwork in Kenya

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P.A. Harvey, P.N. Ikumi and D.K. Mutethia

Water, Engineering and Development Centre
Loughborough University
2002

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

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P.A. Harvey[1], P.N. Ikumi[2] and D.K. Mutethia[3]
WEDC, Loughborough University. UK.

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1 - Water, Engineering and Development Centre (WEDC), Loughborough
2 - Network for Water and Sanitation (NETWAS), Nairobi
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Abbreviations

AMREF	African Medical Research Foundation
CBHC	Community Based Health Care
CBO	Community-Based Organisation
DFID	Department for International Development (UK Government)
DWO	District Water Office
EDWP	Extra Deep Well Pump
EAFW	East African Foundry Works Limited
EHA	Environmental Health Assistant
ESA	External Support Agency
FINIDA	Finish International Development Agency
GoK	Government of Kenya
GTZ	German Technical Cooperation
IDCCS	Inter Diocesan Christian Community Services
IGA	Income Generation Activity
JICA	Japan International Cooperation Agency
KaR	Knowledge and Research
KSh	Kenyan Shillings
LBDA	Lake Basin Development Authority
LBWSP	Lake Basin Rural Domestic Water Supply & Sanitation Programme
MWR	Ministry of Water Resources
MWRMD	Ministry of Water Resources Management and Development
NETWAS	Network for Water and Sanitation
NGO	Non-Governmental Organisation

NOVIB	Netherlands Organisation for International Development
NPWRMD	National Policy on Water Resources Management and Development
PSU	Project Support Unit
PVC	Polyvinylchloride
PWO	Provincial Water Office
ROK	Republic of Kenya
RWD	Rural Water Development, Kisii
RWSS	Rural Water Supply and Sanitation
SANA	Sustainable Aid in Africa
SIDA	Swedish International Development Agency
UNDP	United Nations Development Programme
VAT	Value-Added Tax
VLF	Very Low Frequency
VLOM	Village Level Operation and Maintenance
WATSAN	Water and Sanitation
WEDC	Water, Engineering and Development Centre
WESCO	Western Kenya Water and Environmental Sanitation Consortium

1. Introduction

1.1 Research project

This report has been produced as part of the second phase of a KaR (Knowledge and Research) project (R7817) entitled *Guidelines for Sustainable Handpump projects in Africa*. This research is funded by the UK Department for International Development (DFID) and is being carried out by the Water, Engineering and Development Centre (WEDC) at Loughborough University, UK.

For many years, handpumps have been considered an appropriate water supply option for low-income communities, but in many cases, particularly in Africa, they have fallen into disuse shortly after installation. The project aims to collect data from successful handpump projects and synthesise it into a set of guidelines that can be used by planners, implementers and decision-makers to prepare future handpump projects that have an improved chance of long-term sustainability.

The stated purpose of the project is:
Improved benefits from communal handpumps in Africa through an increased application of factors affecting sustainability in new projects

For the purposes of the research a sustainable handpump project is defined as one in which *the water sources are not over-exploited but naturally replenished, facilities are maintained in a condition which ensures a reliable and adequate water supply, the benefits of the supply continue to be realised by all users over a prolonged period of time, and the project process demonstrates a cost-effective use of resources that can be replicated.*

Full details of the research project and the outputs produced so far can be accessed on the projects web site at
http://www.wedc.ac.uk/projects/shp/index.htm
The outputs so far include:

- A literature review
- Draft guidelines for field evaluation of handpump projects
- A report on a half-day workshop on handpump sustainability
- A report on an electronic conference on handpump sustainability
- Report on fieldwork in Zambia
- Report on fieldwork in Ghana
- Interim report

This is one of four reports on fieldwork carried out in different countries in Africa. Zambia was the first country to be visited for fieldwork during April and May 2002 where the 'Draft guidelines for field evaluation of handpump projects' were first trailed (Harvey and Skinner, 2002). Ghana was the second country visited during May and June 2002 where the main focus was on policy and institutional issues (Harvey et al., 2002).

1.2 The field visit

The field visit to Kenya took place between 30 January and 14 February 2003. The overall purpose of the visit was to learn from successful handpump projects by assessing which factors and structures contribute to project sustainability. The primary focus was to investigate community and social factors that may influence sustainability in more detail than on previous field visits. Institutional and technical issues, however, were also investigated. Due to the wide range of different handpump technologies in Kenya it was also possible to investigate technical issues in more detail than originally planned.

The field trip was planned in collaboration with Rural Water Development (RWD), Kisii and Sustainable Aid in Africa (SANA), Kisumu. The project team consisted of personnel from WEDC, Network for Water and Sanitation (NETWAS), Nairobi and the African Medical Research Foundation (AMREF), Nairobi.

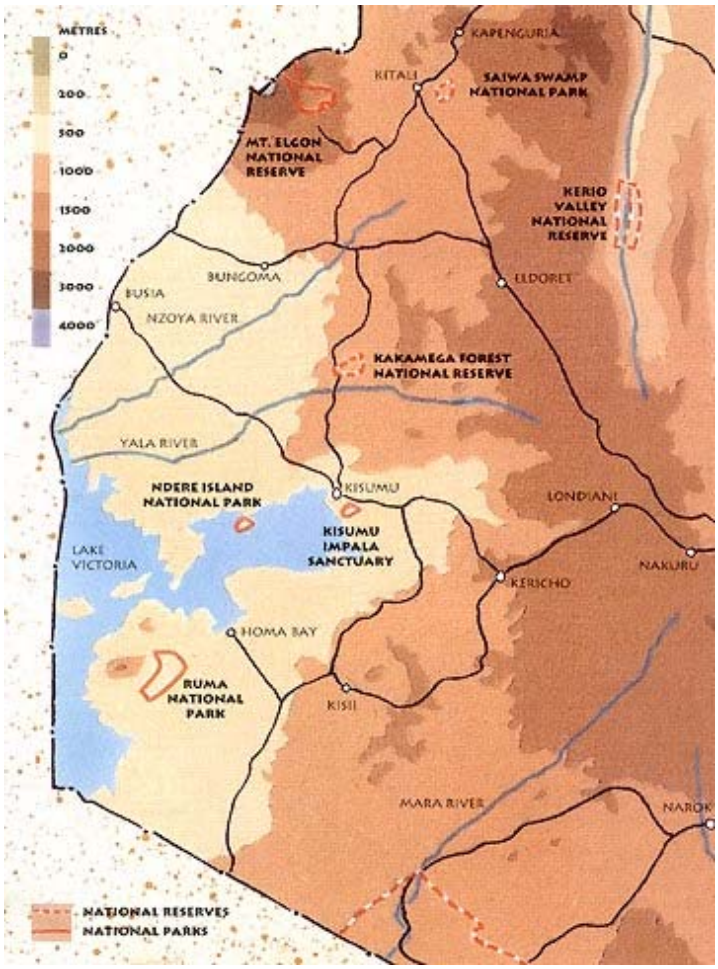

Figure 1: Map of Western Kenya

1.3 Methodology

The visit to Kenya was conducted over a two week period and concentrated primarily on the RWD project in Kisii, although other projects in the area were also visited. This report is based largely on the situation in Nyanza Province in Western Kenya, although many of the visit findings are relevant to the entire country. Since the main focus of the visit was on community and social aspects, a baseline survey of several communities was undertaken, followed up by more detailed visits to a smaller number of selected communities. A number of key informant interviews were also conducted with NGO, Government and private sector staff.

A visit diary is presented in Appendix 1 and a list of persons met provided in Appendix 2. A series of checklists was used to guide interviews and discussions with stakeholders, these are presented in Appendix 3 and have been adapted from the original guidelines (Parry-Jones et al, 2001).

The opinions expressed within this report are solely those of the authors and are based on observations made and information collected during the visit only.

2. Handpump provision and maintenance in Kenya

2.1 Government policy

2.1.1 The Water Act 2002

The Government of Kenya (GoK) Water Act was passed in October 2002. Of the 114 pages there is no specific mention of rural water supply and much of the legislation applies specifically to urban water supply and sewerage. There is one reference to community projects which simply states that 'proposed projects should be approved by the persons owning or occupying at least two thirds of the project area' (ROK, 2002).

Under 'Water Resources Management' the Act states that permits are required for use of water from a water resource. However, in the case of groundwater this applies simply to a permit for drilling not abstraction, unless an area has been declared to be a groundwater conservation area. If the source is to provide more than $25m^3$ of water per day for domestic purposes then a licence for the provision of water services is required. The licensee is then responsible for ensuring that water services and facilities are provided, maintained and progressively improved. Since most handpumps provide considerably less than $25m^3$ per day, no licenses are required and hence there is no legal requirement to ensure appropriate operation and maintenance.

The Act establishes a Water Services Regulatory Board whose powers and functions include to issue licences for the provision of water services; determine standards for the provision of water services to consumers; monitor compliance with established standards for the design, construction, operation and maintenance of facilities; to determine fees, levies and other charges to be imposed for water services; and to gather and maintain information on water services.

The Act led to the formulation of a National Water Services Strategy with the key objective of ensuring that 'at all times there is in every area of Kenya a person capable of providing water supply' (ROK, 2002). This wording is interesting since it implies that an individual rather than a community or institution can have responsibility for water service provision. The strategy also provides for national monitoring and information systems on water services.

2.1.2 Regulatory role

The current Government policy for water supply in general is that the private sector or Non-Governmental Organisations (NGOs) are responsible for implementation, the end-user communities are responsible for management of

operation and maintenance (O&M) and the Government is responsible for regulation. The National Policy on Water Resources Management and Development, 1999 (NPWRMD) emphasises the need for enhanced participation in programmes by the various water users, while the Government ensures an enabling environment through appropriate policies and regulations.

Previously the Government was one of the main implementers of new water supplies and the main provider of technical services such as borehole drilling. The role of Government has now shifted to co-ordination and regulation. The national policy stipulates that Government should encourage private sector-led drilling initiatives through competitive tendering procedures, while maintaining some capacity in drilling for emergency interventions only (MWR, 1999). As a result, much technical equipment has been sold off by Government institutions, yet these institutions still have significant capacity for technical support in terms of staff skills. This human resource base appears to be largely ignored within the latest policy documents.

The NPWRMD places much emphasis on the importance of community and social aspects. For example, it asserts that appropriate technology should be vetted to ensure that it is relevant to the needs of communities - especially women, and that the involvement of the beneficiaries at all stages of the water supply development process prepares them for eventual taking over of operation and maintenance. In line with the Government Policy of Cost Sharing communities are expected to contribute 25% to installation costs and finance all operation and maintenance costs. Long-term plans include mobilisation of communities to take over existing water supplies, including small town piped systems as well as rural supplies and point sources.

The NPWRMD policy states that:

- 'The basic solution to the problems in operation and maintenance of water supply schemes … lies in the full involvement of the users'; and
- 'The Government will continue to promote the development of water systems that are self-sustaining and where the beneficiaries themselves are encouraged to take full responsibility for operating and maintaining systems.' (MWR, 1999).

This suggests that the problems of sustaining water supplies are that communities have not been adequately involved in the planning process and that they need to be given total responsibility for O&M issues. The term 'self-sustaining' is slightly ambiguous but implies that communities should be capable of sustaining their water supplies all by themselves. The policy asserts the need to enhance ownership of facilities by communities and assumes that this will in turn enhance sustainability. The overall thrust of Government policy appears to be a 'cop out' to some degree since it does not recognise the support that communities are likely to require.

The Government also plans to develop a comprehensive water sector monitoring system addressing issues of water resource sustainability, water

quality, and water service provision and coverage.

2.1.3 Handpump standardisation

There is no handpump standardisation policy in Kenya and it appears that the Government has taken a very 'hands off' approach to rural water supply in general. As a result, most rural water supply projects have been very much donor-driven and implementing agencies have often imposed their own technologies on different areas and different communities within the country. One positive effect of this lack of policy, however, is that there have been and are no restrictions on local production of different types of handpump.

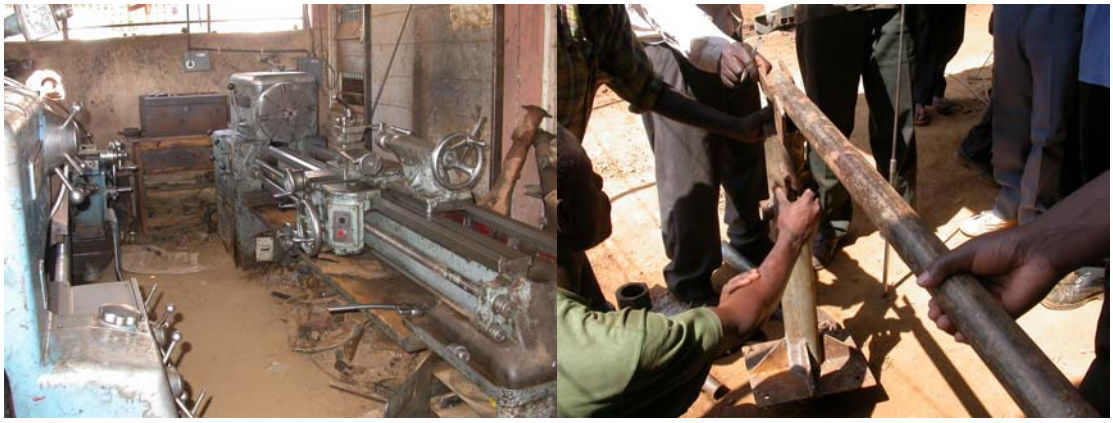

Figure 2: Local manufacturing of handpumps in Kisii

The NPWRMD states that Government will make efforts to 'vet technologies being introduced in the water sector in a manner that will not obstruct the introduction of technological breakthroughs', and that the 'use of traditional technologies will be encouraged with modifications, if necessary' (MWR, 1999). Lessons from the recent past would indicate that little or no vetting of new technologies has been undertaken.

2.1.4 Importation

Most NGOs and bilateral agencies in Kenya are exempted from 5% import duty and 18% Value-Added Tax (VAT) by agreement with central Government. In addition to this, all handpumps imported into the country are exempt from VAT, and importers need only pay the 5% import duty. Spare parts and raw materials, however, attract the full levels of VAT and duty. As a result, at least in part, importing large consignments of Afridev handpumps from India proves much cheaper than manufacturing the same pumps in country even though there is capacity to do this. There is no Government policy to encourage or protect the local manufacture of handpumps.

2.2 Institutions

2.2.1 Government

Following the recent change of Government, the Ministry of Water Resources has been restructured and renamed the Ministry of Water Resources Management and Development (MWRMD). MWRMD has staff at the central Ministry in Nairobi, and representatives at provincial, district and divisional levels. One of the nine key responsibilities of the Ministry is rural water development and supply policy. The government Provincial Water Offices (PWOs) for Nyanza province are in Kisumu.

District Water Offices (DWOs) are present in every district of Kenya and, in general, have a highly qualified and skilled staff base. Each DWO is responsible for co-ordination of water supplies in the district, technical support to implementing agencies (e.g. NGOs), proposal writing to central government, and monitoring of water quality and operation and maintenance issues. DWOs also grant permits for drilling, and normally provide geophysicists and hydrogeologists for borehole siting services who are paid an allowance by the implementing agency. Drilling is conducted by private drilling contractors who are requested to give notice to DWO of when construction will commence so that DWO staff can be present to supervise drilling and ensure appropriate construction and development. It is not certain how often this actually occurs.

There are also Divisional Water Officers responsible for divisions at sub-district level and who should act as the primary contact point for communities, and undertake training and capacity building. However, not every division has a water officer and many Divisional Officers reside at the District Water Office rather than base themselves in their respective divisions.

New requests for improved water supplies normally come from communities through DWO and then onto implementing agencies, although communities may bypass DWO and approach NGOs directly. District Water Offices may also assist communities and individuals with pump repairs and inform them where to go for the procurement of spare parts. Some DWO staff have been trained under bilateral aid programmes and are familiar with specific pumps or a range of handpump models. Due to lack of DWO finances communities are expected to pay transportation and lunch allowances for visiting staff. In general this amounts to KSh3-5,000 (US$40-65), although costs can be reduced for poorer communities.

Among the main duties of the District Water Offices is monitoring of rural water supplies, yet at present this seems to be undertaken on an ad-hoc basis, normally in conjunction with other agencies, if at all. Lack of financial resources is the stated reason for this. Most DWOs own vehicles but are unable to afford adequate fuel. Water officers also complain of a lack of equipment for the collection of hydrological data. At present, there are no district-level databases on operation and maintenance of existing water

points, or on groundwater data.

2.2.2 External Support Agencies

Almost all rural water supply implementation in Kenya is funded by External Support Agencies (ESAs). These include Swedish International Development Agency (SIDA), Finish International Development Agency (FINIDA), Japan International Cooperation Agency (JICA) and Netherlands Organisation for International Development (NOVIB) among many others. Some bilateral programmes have worked through Government institutions entailing considerable capacity building activities, while others have taken a more isolated approach using external private sector companies. In addition, many church based organisations and public-funded International NGOs are active in the country.

Following allegations of widespread corruption under the political regime of the previous Government administration many donors withdrew or considerably down-sized aid during the 1990's. With a new Government in place, making obvious efforts to curtail corruption, the early signs are that donor funds for Kenya are likely to increase again.

2.2.3 Non-Governmental Organisations

There are many NGOs throughout Kenya (both local and international) and in most areas they are the primary implementers of new rural water supplies, including those using handpumps. NGO approaches vary although many appear to operate in isolation without close liaison with local government. Several NGOs were visited as part of this study the main two being Rural Water Development (RWD) and Sustainable Aid in Africa (SANA).

Rural Water Development (RWD), strictly speaking, is not an NGO but a church organisation, and is funded roughly fifty-fifty by CORDAID in the Netherlands and MISEREOR in Germany. In effect, the Bishop of each of the three dioceses in which RWD operates is the legal holder of RWD in that diocese. The three dioceses are Homa Bay, Kisii and Ngong. RWD has a project support unit (PSU) in Kisii, which co-ordinates all activities, and three field offices at Migori, Oyugis and Kilgoris for each of the three dioceses respectively. It also has a support point and Water and Sanitation (WATSAN) shop in Rongo. RWD is made up of a community mobilisation team and a technical/construction team in each of its offices.

RWD has been operational in the project area since 1985, the main activities being provision of improved water supply through spring protection, hand-dug well construction (generally equipped with a handpump), handpump-equipped boreholes and rainwater harvesting. They are also involved in the provision of San-plats for household sanitation and have recently branched out by becoming involved in household water treatment through the development of the Kisii Water Filter. RWD has moved from a supply led

technical-centred approach to a demand led community-centred approach in recent years.

Rural Water Development is the only NGO/implementer working in the water sector in many of the districts covered and is seen by many as a permanent institution. However, RWD is wholly dependent on its two donors despite the fact that its activities are seen as those of the church. Current administrative, financial and personnel problems, both internal and external, threaten the long-term sustainability of the organisation.

Sustainable Aid in Africa (SANA) is an NGO based in Kisumu which was born out of a bilateral programme between the Kenyan and Dutch Governments. The bilateral programme known as the Lake Basin Rural Domestic Water Supply and Sanitation Programme (LBWSP) began with a pilot study in 1983 and was completed in 2001, after the drilling of more than 1500 boreholes and installation of (predominantly) SWN handpumps. Originally the LBWSP worked through the Lake Basin Development Authority (LBDA) based in Kisumu but this arrangement was terminated following corruption allegations.

SANA has been in existence under its current structure since 2001 and is based at the Ministry of Water Resources Management and Development in Kisumu. Many of its staff are previous employees of the Ministry who worked under the bilateral programme and there is a close working relationship between the two organisations. Since the end of the bilateral programme SANA has sustained itself through individual proposals for funds from different donors for specific projects. However, it has now moved to a five year plan of intervention working on the basis of a basket fund from different donors to facilitate a more stable and consistent programme.

The current activities of SANA are similar to those of RWD, involving spring protection, hand-dug wells and boreholes equipped with handpumps and rainwater harvesting. It is also involved in capacity building and strengthening of local NGOs and Community-Based Organisations (CBOs).

2.2.4 Community-Based Organisations

With the current nationwide policy of promoting community management of water supply systems the role and commitment of community-based organisations has become more important. Community management of rural water supplies began in Kenya in the 1980's, although it was as recent as the late 1990's that the approach became the norm throughout the country. Most handpumps currently installed under aid programmes are accompanied by some level of community mobilisation to try to ensure that CBOs, generally WATSAN committees, are in place and capable of managing operation and maintenance issues. This mobilisation commonly involves training of (voluntary) committee members selected by the community in financial management, book-keeping and maintenance procedures.

The success of community management structures varies greatly from community to community and depends on many factors such as quality of training/mobilisation, community cohesion, issues of trust and transparency, and willingness to manage/pay. Several communities visited had active women's groups which were responsible for handpump maintenance among other responsibilities and income generating activities. Many of these groups in particular demonstrated high levels of organisation and commitment.

See Section 3 for more information on community and social aspects investigated during the socio-economic study.

2.2.5 The private sector

The National Policy on Water Resources Management and Development promotes the involvement of the private sector in water supply provision and service delivery. Although drilling contractors are mentioned specifically in the sessional paper (MWR, 1999) there is no mention of local enterprises or equipment manufacturers. East African Foundry Works Limited (EAFW) in Nairobi manufactures the Afridev handpump to international specifications following the public domain design. Handpump manufacturing is only a small aspect of EAFW's activities and the commercial viability of continued manufacturing is questionable due to low order quantities. It is unsure whether the company will continue it's involvement in handpumps in the long-term or whether it will focus attention on more profitable activities. Other companies in Kenya such as Kenya Water Handpumps Ltd. and Aprotech have also manufactured handpumps in the past, but have experienced problems sustaining manufacturing.

The main threat to EAFW is that donors and NGOs are increasingly purchasing pumps through pump retailers which import handpumps, including the Afridev, and are able to sell these at considerably cheaper prices. Davis and Shirtliff (Dayliff) is a pump retailer in Nairobi which sells Afridev pumps at approximately 75% of the cost of those from EAFW. Some NGOs make a point of purchasing pumps directly from EAFW, despite the price difference, in order to promote local manufacturing. It is, however, a small minority of organisations that do this.

There is limited or no quality control on all pumps, both local and imported, although Dayliff claims that some pumps are inspected by Société Générale de Surveillance (SGS) in India. Since EAFW pumps are more expensive and the company offers no distribution service (see Section 2.7) it is not surprising that many organisations choose to purchase imported pumps in country or import them themselves. However, Government is in a position to change the status quo if only the necessary lobbying and political will is in place.

There are also some private individuals who manufacture their own locally designed handpump models such as the Kiare pump and the Rope and

Washer pump (see Section 2.4).

Figure 3: Locally produced Rope and Washer pump

There are several companies in Kenya which sell and distribute various models of handpump. Dayliff is by far the biggest and most widespread of these and its activities include marketing visits to potential customers (e.g NGOs) in country and the supply of both pumps and spare parts. In addition, it also sub-contracts handpump installation services to local artisans if required by the purchaser.

Among the informal private sector involved in water supply are several handpump mechanics who offer repair and maintenance services to communities and individuals for a fee, and assist in the procurement of necessary spares. Many of these individuals have been trained under NGO or bilateral water projects and have then decided to set up their own businesses. One such mechanic in Migori District makes his entire living out of repairing handpumps and his client list includes communities in Tanzania. There is no regulation of such individuals and prices charged are decided by the mechanic based on his/her perception of client ability and willingness to pay. Some mechanics have a monopoly on repair in some areas and hence are free to exploit communities if they choose.

Other private sector organisations involved in the rural water supply sector in Kenya include drilling contractors, groundwater survey companies and community mobilisation consultants.

2.3 Funding

2.3.1 Costs

The cost of implementation of handpump projects in Kenya is high with the typical cost of a borehole being approximately KSh500,000 (US$6,500), and the cost of a typical Afridev handpump about KSh45,000 (US$600) or the India Mark II about KSh30,000 (US$400). This makes the total installation cost of about US$7,000 far beyond the means of most poor rural communities. Additional 'hidden' costs include the cost of feasibility studies, hydrogeological surveys, community mobilisation and training. RWD, for example, now spends a large proportion of its budget on community mobilisation.

Government policy aims to promote the generation of revenue from improved water supplies and develop a tariff structure that both ensures adequate cost recovery on the water supplies and yet protects the rural poor (MWR, 1999). At present there are no Government guidelines for implementing organisations or communities

2.3.2 Government and donor funding

At present, the Government of Kenya (GoK) is almost wholly dependent on the support of external donors for national water supply. Some ESAs, such as SIDA, have provided funds for rural water supply through central Government whereby districts apply for finances directly from MWRMD. Other ESAs have funded specific projects operating through local (provincial or district level) government structures. Other donors have worked outside government structures completely, in general by funding NGOs working on specific projects.

All PWO and DWO staff salaries are paid directly from central Government, i.e. from the MWRMD budget. This is, however, the primary mode of Government funding for rural water supply with an apparent lack of funds for implementation, monitoring or rehabilitation.

2.3.3 Community financing

Under the Government cost-sharing policy communities should pay 25% of the project cost for any new water supply. The findings of this research trip indicate that this is rarely (perhaps never) the case for handpump installations, since communities would be expected to pay approximately US$1,800. In most projects visited communities contributed labour and raw materials (sand, gravel etc.) for construction or nothing at all. In some cases cash contributions were required but these amounted to no more than a few thousand Kenyan shillings, i.e. tens of dollars rather than hundreds or thousands. In many projects where initial cash contributions were required these were not used towards the actual installation cost but paid into a

community bank account for future maintenance needs.

Communities are also expected to meet all on-going maintenance and repair costs. Some communities raise maintenance funds by charging a levy at the point of delivery (e.g. 2KSh per jerrican) but in most cases communities charge a monthly household contribution or raise money only when repair is necessary. The use of bank accounts to store maintenance funds has been promoted by some agencies but the bank charges imposed on many accounts often deter communities from doing this.

Most communities are unaware of the true cost of maintenance of a handpump installation and in most cases are not informed of likely annual maintenance costs prior to technology choice. Where private pump mechanics operate, the charges for their services often vary enormously despite attempts by implementing agencies to standardise.

2.4 Technical and environmental issues

2.4.1 Groundwater issues

Nyanza province is typified by basement aquifer with a high degree of variation in weathering and fracturing. The hydrogeology is further complicated by the presence of volcanic intrusions in some areas. In many of the project areas visited groundwater levels are reasonably high and most handpumps are installed on hand-dug wells. However, there are many local variations and in other areas boreholes predominate, with recorded static water levels lower than 70m in some cases. There are a small number of reported cases where boreholes have 'dried up' or water levels drop below the handpump cylinder in the dry season, but such cases are not widespread.

Borehole siting is generally carried out by DWO hydrogeologists and geophysicists using electrical resistivity survey techniques. Communities usually select three potential sites, including a preferred site, and the survey team conduct a constant separation traverse (transect) through the village followed by at least three depth profiles (vertical electrical soundings) along the transect. Many District Water Offices possess a terrameter and have a qualified member of staff in residence. Rural Water Development also possesses a Very Low Frequency (VLF) electromagnetic receiver (WADI) which can be used for locating shallow water-bearing fractures but is not used by the project at present.

Drilling permits are required from DWOs for the construction of any borehole or hand-dug well beyond 20m. Local private drilling companies are usually contracted by NGOs, although some bilateral programmes have used external consultants and contractors. Drilling success rates vary greatly and can be as low as 50 or 60%. The cost of dry boreholes is usually met by the implementing agency.

Drillers are required to conduct pumping tests and take water quality samples immediately after construction. The Catholic Diocese of Nakuru Water Programme undertakes drilling for RWD and usually conducts constant rate pumping tests over 5 hours and recovery tests over 24 hours. Water quality samples are analysed for approximately 30 physical parameters including pH, turbidity, hardness, total dissolved solids, chloride and fluoride. RWD also has capacity to test samples for bacteriological parameters such a total coliforms and faecal coliforms.

Aggressive groundwater is a problem in some areas, which has led to corrosion problems, particularly with the India Mark II. Since the Afridev uses PVC rising mains and stainless steel rods it is largely unaffected by this problem, as are other existing technologies.

Records of drilling permits granted are maintained at District Water Offices (DWOs) using centrally allocated reference numbers. Hydrogeological/geophysical survey reports are also stored. Where DWO supervisors are present during drilling, a progress report is produced containing borehole log details and observed static water level. In general, pumping test records are not kept at DWOs and there is no ongoing monitoring or collection of groundwater data.

2.4.2 Handpump technologies

Due to the lack of any official policy to limit the number of models of handpumps in the region there is a large number of different manufacturers and models to be found in Western Kenya and throughout Kenya as a whole. Despite the fact that there is no formal handpump standardisation policy, the Afridev pump is by far the most widespread low-lift manual pump in Kenya. This was introduced through a World Bank / UNDP pilot study in the early eighties when East African Foundry Works Ltd. began manufacturing in Nairobi.

For deeper boreholes, where the water level is beyond 40m, the Afridev does not function well, pumping becoming increasingly arduous and increased load leading to rapid wear of piston seals. For this reason a different handpump model is required, but with no widespread preferred choice, there are many different models in the region. The Western Kenya Water and Environmental Sanitation Consortium (WESCO) held a workshop in Kisumu in October 2001 entitled ‘Standardisation of Deep Well Pump Technology in Western Kenya’ which brought together representatives of the Department for Water, implementing agencies in the water and sanitation sector and manufacturers and suppliers of manual water pumps. The purpose of this workshop was to see if a standard deep well pump could be selected for use in the region.

An initial desk and field study was prepared by the WESCO secretariat and funded by RWD and SANA in preparation for this workshop (WESCO,

2001a). This involved detailed analysis of different pump technologies including SWN 81, AFRIDEV, India Mark II, Vergnet footpump HPV 100 and 60, and the Duba Tropic II, from available documentation and a short field study.

The workshop considered the above mentioned pumps and the Rope and Washer Pump. The participants concluded that the AFRIDEV should be made the standard handpump in Western Kenya in wells and boreholes up to a water level of 40m (WESCO, 2001b). However, for deeper wells it was agreed that a more extensive comparative desk study on different extra deep well pump (EDWP) types worldwide should be conducted. This was to be followed up by a comprehensive field study in Western Kenya to evaluate the following pumps: SWN 81, India Mark II, Vergnet HPV 100, Volanta, UPM and other EDWP with proven performance. It was also agreed to conduct a desk study of existing O&M systems worldwide and hold a workshop on developing an appropriate O&M system for Western Kenya. WESCO agreed to apply for additional funding to continue these activities, but these have not been implemented to date.

Afridev – the primary constraint of the Afridev is the limited depth of operation. The need for replacement of seals is by far the biggest maintenance problem. Although pumps and spares are widely available in country awareness and access still remain constraints.

SWN – there are believed to be approximately 1500 SWN pumps installed in Western Kenya but with the end of the Kenya-Netherlands bilateral project spare parts are no longer formally available and there is a lack of trained/competent technicians available for repair. Although some pumps are still operating, largely due to improvised repairs, many in the region are no longer functioning.

Figure 5: SWN pump, Akala

Vergnet – the Vergnet pump was introduced in 1999 and during the initial pilot study many women expressed dissatisfaction, particularly concerning the difficulty and inelegance of operation. Although the pumps have experienced only minor operation problems so far there is only one company able to conduct repairs and provide spare parts, based in Kisumu. The cost of repairs, particularly more serious ones, is also a major constraint to sustainability. The price of a Vergnet pump is approximately KSh80,000, more than double that of an India Mark II.

Figure 4: Vergnet footpump

India Mark II – the India Mark II and component parts are available through the Davis and Shirtliff network although it is not present in large numbers in Nyanza province. The problem of aggressive groundwater remains the biggest limitation to its widespread use, unless versions with plastic riser mains are introduced.

Volanta – a small number of Volanta pumps have recently been introduced but the cost and problem of spares availability do not make this an appropriate long-term solution.

Rope and Washer Pump – for shallow wells the Rope and Washer pump is an excellent solution even though it has not been proven as a community pump in Kenya (see Section 2.4.3).

One District Water Officer commented that he would find it difficult to prevent a donor or NGO introducing their own handpump model, even if this was imported, totally new to the area and there was no long-term strategy for spare parts supply, since he considered any implementation better than none

at all. If this attitude is widespread there is a danger that the maintenance problems of the past (e.g. SWN) may be repeated, unless there is clear Government policy regarding technology.

2.4.3 Local innovation

One distinct advantage of the lack of standardisation is the lack of constraints on local design and manufacture of handpumps. Since Kenya has a fairly high level of industrial development in comparison to many other African countries there is significant potential for local manufacture from small to large scale. Most major towns have small enterprises with equipment capable of fabricating simple devices (e.g. handpumps) and components. There are some examples of enterprising individuals developing their own pumps but there is a need for incentives and support for artisans if these initiatives are to lead to more widespread sustainability.

Kiare Pump

John Kiare is a Public Health Technician working for the Ministry of Health in Kisii. During the Lake Basin Programme (LBWSP) he was trained in maintenance procedures for a number of handpump models and therefore became conversant with reciprocating handpump technology. As a result of this he later became interested in developing his own handpump model known as the Kiare pump.

'*The only problem with this pump (the Kiare pump) is that it never breaks down!'*
Ernest Oduor, DWO, Kisii

The Kiare pump is loosely based on the India Mark II design but is completely fabricated from local materials using metalwork equipment in Kisii. The design is solid and heavy and the finish somewhat crude but the result is a functional, durable and appropriate pump rather than an example of fine engineering. Rubber seals are cut from old car tyres and have long life expectancies. The pipes and foot-valve are standard components available on the local market.

Although the Kiare pump is essentially a shallow well pump suitable for installation on hand-dug wells, it has not been tested at depth and can be modified if necessary. At present the Kiare pump is predominantly purchased and used by individuals rather than communities and has not been tested by continued heavy usage, however, none of the Kiare pumps installed so far (since 1995) have required repair. The typical cost of the pump is about KSh20,000 (US$260). The beauty of the pump is that it is durable, locally produced, relatively cheap and all components can be found readily. The disadvantages are that at present only one individual manufactures, installs and is competent to repair the pump, and in order for it to become a viable community pump it requires institutional support to promote and modify the product.

Figure 6: Kiare Pump, Kisii

Afridev Bushpump

The 'Afridev Bushpump' (i.e. 'African-developed bush pump') is an initiative of Rural Water Development PSU in Kisii. The rationale behind producing this pump was that handpump design should be changed towards a more simple design that needs no outside special spares, but is made from locally available standard parts. If this is the case there is no need for a special spare parts distribution network which is, in general, far from sustainable and also too expensive. In the end the users must pay for such a network which causes affordability problems among the rural poor.

The 'Afridev Bushpump' is made locally from local materials and therefore RWD encourages local small-scale production. The local blacksmith manufactures the pump using standard plumbing components, standard bearings, galvanised iron and PVC pipes which are all available in country. The pump pedestal is made of concrete to minimise the need for metalwork. At present the only material imported specifically for the pump is the specialised nylon used for the seal-less 'Beers piston' and universal foot-valve which is imported in lengths and cut and fashioned in Kisii. At present the nylon is imported by RWD but if demand is sufficient this could be ordered through an existing import company. Alternative materials could also be investigated in time. There is no need for the use of moulds and the design can be easily replicated.

Figure 7: 'Afridev Bushpump', Kisii

RWD is also doing some piloting by putting handpump pipes into boreholes without casings, and installing two 'Afridev Bushpumps' on one borehole to double the production and security of water supply when the aquifer is good.

The cost of the 'Afridev Bushpump' is about half of that of the Afridev and yet it should be able to operate successfully at depths up to, and possibly exceeding, 80m since it has no wearing seals. Further field testing is required, which RWD hopes to be able to undertake in the near future. If successful this could provide a real sustainable alternative to existing deep well handpump technologies.

Rope and Washer Pump

Africa Now is a UK-based NGO which has been working in the Western Kenya since 1983 from its main office in Kisumu, focussing on small enterprise development and water and environment programmes. One of the main activities of Africa Now in recent years has been the promotion of local production and installation of the Rope and Washer pump. This began with the recognition that many existing handpumps on hand-dug wells in the area had broken down over time and been replaced with rope and buckets. The Rope and Washer pump was seen as an improvement on the rope and bucket and yet cheaper and easier to maintain than other handpumps.

The programme trained 100 artisans from five districts in Nyanza province on how to make and install the pump. Artisans were generally existing tradesmen such as masons or blacksmiths and each attended a one week training course. Africa Now trained course participants to manufacture the pump using local materials such as old car tyres, rope, bicycle chains and PVC pipe. The Rope and Washer pump is intended primarily for household

use for installation on a family well. However, some pumps are used by significant numbers of people and the potential for community use has not been investigated fully.

Figure 8: Rope and Washer pump, Kisumu

Each artisan was encouraged to sell the pump for KSh3,500 (~US$50) yet some have sold them for considerably more and have produced promotional materials to generate further sales. One pump maker was reported to have sold more than 100 pumps and to have given up his old profession to concentrate on the Rope and Washer pump. Repairs can also be conducted by the pump makers and any spare parts required are readily available on existing markets.

The pump is capable of pumping from about 30m depth but some artisans are experimenting at greater depths. The Rope and Washer pump is an excellent solution for shallow wells, and sustainability is virtually guaranteed. What remains to be seen, however, is how far the technology can be developed at a local level to meet deeper and more continuous pumping needs.

2.4.4 Technical problems and solutions

The main problem encountered with Afridev pumps are worn U-seals. This appears to increase with depth of cylinder installation and where pistons operate in dry conditions due to falling water levels. This may be in part due

to poor quality seals and there is certainly a need for improved quality control. However, there is also a need to find alternative solutions, particularly for deep wells.

One solution to the U-seal problem adopted by local pump repairers is to fabricate seals from tyre rubber rather than replace them with the specified Afridev seals. These fabricated seals appear to last longer in many cases and may be appropriate where access to spare parts is difficult.

Another solution is to replace the Afridev piston with the 'Beers piston' which has a diameter of 49.3mm to fit in the Afridev cylinder, the diameter of which has been found to vary slightly between 49.7 and 50mm. RWD has developed the piston so that it can be clicked and glued on existing Afridev rods. The big advantage here is that the Beers piston has no seals and works on the principle that water forms the necessary seal between the internal wall of the cylinder and nylon piston as it moves. It also has a tapered top which acts as a 'sand trap' to prevent damage from siltation. Using this design the floating foot-valve can also be easily lifted out of the rising main by the use of a hook attached to the piston. This eliminates the need for separate fishing tools to remove the Afridev foot-valve for repair.

'We recently installed an Afridev on request, but found that the seal was wearing out within a week. After studying the reason it appeared that there was little water, so often the piston was pumping dry with excessive wear. We then put the Beers piston inside and now at least they can continue to pump. This also opened my eyes to the dry pumping problem with conventional pumps where the seals wear out much faster. Anyway, you can imagine that I was quite pleased to find out that our piston apparently scores very well, also for these cases.'

Paul van Beers, Project Co-ordinator, RWD

Figure 9: Demonstrating the Beers piston to Kuoni women's group

Another common problem encountered with handpump installations is swinging rising mains, especially in deeper boreholes, due to inadequate or no borehole centralisers. This may lead to damage of the pump cylinder, pipe joints or borehole screening. A solution to this is to introduce the handpump bottom support whereby the PVC riser pipes continue to and rest on the bottom of the borehole and the pipe is screened between this and the handpump cylinder above to allow water into the rising main. This has also been introduced by RWD and requires wider dissemination to minimise such unnecessary problems.

2.5 Project implementation

2.5.1 Past approaches

In the past, rural water supply projects have been very much donor-driven and supply-led. Projects have been technically-centred, particularly where tied bilateral aid has demanded the introduction of new externally imposed technologies. A classic example of this is the Lake Basin Rural Domestic Water Supply and Sanitation Programme (LBWSP) for Nyanza province which entailed the introduction of the SWN pump, a huge borehole drilling programme and was implemented largely by consulting engineers from the Netherlands.

Communities have had little or no involvement in prioritising their own needs, selecting appropriate solutions or planning and managing their own facilities. Various NGOs and government institutions have often installed handpumps with minimal consultation with the beneficiary communities or with other donors and institutions. Consequently, implementation approaches have varied greatly and a wide variety of different handpumps have been installed nationwide. There has been a clear lack of co-ordination of implementing agencies.

In general, there were no clear design criteria concerning selection of communities or number of users per handpump. Formerly, scant attention was paid to sustainable maintenance to the extent that spare parts and technical competency were sometimes not even available in-country.

2.5.2 Current approach

The current approach promoted by the Government places much emphasis on the role of the community and is typified by the following key elements:

- Demand responsive approach in which a project is initiated at the request of the community;
- Technology choice made by community;
- Community contribution to capital cost of installation;
- Community collection and management of maintenance funds;

- Community level maintenance and local technical backup; and
- Private sector provision of spare parts and specialist services.

It should be noted, however, that not all implementing partners adhere strictly to this and there still remains much variation due to inadequate dissemination and enforcement of policy.

An example of recent approaches is the Self-Help Initiative which began in 1996 whereby the Government provides qualified staff, management, technical support, funds for capacity building, monitoring and evaluation; the Community provide 25% of project cost, management of water point and source training for their own needs; and SIDA provide funds and technical support. This 'community-centred' approach should be 'demand responsive' in that communities should first apply to their DWO for an improved water supply. However, current rural water supply coverage in some districts such as Migori is still less than 20%, DWOs use criteria such as quality of and distance to existing water source to select beneficiaries but lack capacity to truly meet demand.

At the WESCO workshop in Kisumu in 2001 (WESCO, 2001a) the challenges facing pump sustainability were identified as follows:

- Lack of a clear sense of pump ownership among communities;
- Lack of water tariffs;
- Mismanagement of fee collection and misappropriation of funds; and
- Lack of organised spare parts distribution and long distances to outlets.

Possible solutions identified included:

- Mobilisation and re-mobilisation at community level to promote ownership and sustainability;
- Co-ordinated effort by stakeholders to continue monitoring post installation aspects of handpumps;
- A suitable spare parts distribution system should be put in place; and
- Communities should be trained on management aspects such as setting realistic water tariffs, book keeping and safekeeping finances.

Again, the workshop points to the community as the key to sustainability suggesting that spare parts supply and monitoring are the only 'external' constraints. Many Government documents and staff speak of 'empowering communities', 'promoting ownership' and 'handing over supplies to communities' in order to achieve sustainable water supplies. Although co-ordination of all stakeholders in the rural water supply sector still needs to be strengthened, the rhetoric at least is fairly consistent among Government, NGOs and donors. The question remains, however, as to whether the chosen approach will really result in enhanced levels of sustainability and benefit the poor and disadvantaged groups in society.

2.6 Operation and maintenance

As has been explained, the concept of community responsibility for ongoing operation and maintenance of handpumps is the norm in Kenya. However, there remain different approaches that can be taken in achieving this.

2.6.1 Community maintenance

Many recent handpump projects using the Afridev handpump promote the use of community voluntary caretakers (commonly six per community) who are responsible for routine maintenance and repair of the pump. In the initial community mobilisation phase of the project selected community members are trained in basic operation procedures and should be capable of changing seals, valves, bearings and rods etc. Since the Afridev is a VLOM pump most of the necessary procedures are simple and require a single spanner. However, in many communities the selected caretakers may leave the village, pass away or simply forget what they were taught over a prolonged period of time since they have had no need to repair the pump.

Some communities have been successful in maintaining their own pump by conducting simple repairs but often do not know where to find spare parts. Should major breakdown occur or the need for rehabilitation arise communities would be unable to solve the problem themselves and would turn to DWO or NGO staff. (See Section 3 for more details on community and social aspects.)

2.6.2 Government and NGO staff

Most District Water Offices have some staff members competent in handpump repair and are willing to provide a maintenance service providing that communities agree to pay fuel and lunch allowances for visiting staff. Some DWOs claim that they will provide this service free of charge if they have the necessary resources at the time of the request. All expect the communities to purchase any spares required. This is essentially a repair system rather than a maintenance one and is conducted on an ad-hoc basis, if and when communities approach the DWO. The concept of preventative maintenance is largely unheard of or simply ignored.

For many communities the implementing NGO is the first point of contact if anything goes wrong with their pump. Many NGOs will assist communities with repairs even if they are supposed to have a pump caretaker. However, much of this assistance is informal and NGO staff may sometimes use their position and skills to make additional money from communities by charging for repairs.

2.6.3 Private handpump repairers

Although there is no formal system of handpump repairers in the region

several ex-employees of NGOs or Government have set up their own businesses as private handpump repairers. Such individuals generally advertise their services and obtain customers by word of mouth and sometimes operate in surprisingly large areas. Most repairers have been trained on one or two pump models but often familiarise themselves with additional models. Most know where to find spare parts for the different models while some fabricate parts such as Afridev U-seals.

Private handpump repairers decide themselves what they wish to charge and may vary their fees depending on whom they are working for. Where communities have pumps such as the SWN, for which spares are not readily available, pump repairers often improvise to keep the pump going. This, however, often proves very expensive for the users since they must pay the repairer each time s/he visits even if the repair does not last long.

Inefficient sustainability
Akala Market, near Kisumu, has a community owned SWN pump which was installed on a hand-dug well in 1989. The pump breaks down once or twice every month, usually because the riser pipes come loose or break at the joints. Each time a local handpump repairer visits and gets the pump up and running again, by using improvised parts and methods, for a fee of about KSh3,000 (US$40). The community do not know of any alternative repairer that they could call upon and hence it is in the repairer's interests that the pump breaks down regularly. Since this is the only source of water for the market and the WATSAN committee charges KSh2 per jerrican collected they are able to afford these repair charges. However, the amount of money that they are collecting could be used to pay for longer-term repairs or to purchase a new pump if the community were provided with alternatives.

2.6.4 Membership scheme

In recent years RWD noticed that generally after 5 years, many of their handpumps were not effectively used or were out of order, in spite of focus on community training for maintenance. On the other hand, it was recognised that RWD donor funding is gradually decreasing and that it is possible that RWD will no longer exist in the near future. This led to serious concerns within the organisation about the long-term O&M needs of existing water points. An extensive evaluation of the project in 1998 also recommended a 'systematic process towards the evolution of a private sector type system of operation and maintenance' (Kiogora et al., 1998). In response to this RWD is now promoting a pilot 'membership scheme'.

Under this scheme any community (with new water points and existing ones) can become a member of RWD in order to receive continuous support for pump maintenance and community mobilisation, from one of the three field offices. Included in the membership fee are two visits per year, free spare parts (RWD has access to the suppliers and can maintain a stock) and one bacteriological analysis of a water sample. Communities will also receive advice on water treatment products, like household ceramic filter-buckets

(which can be purchased for about US$6) and chlorine for treatment of household drinking water.

The caretaker in each community still has a crucial role in maintaining the contact between RWD and the users of the water point. Institutional support is also included in the membership, so that continuous support is not limited to technical issues only. Most communities in Western Kenya are aware of the O&M problem and that they cannot solve it themselves without external support. Therefore, the membership system has been received warmly by several communities. Under the membership agreement each household in the community pays US$2-5 per year for a safe and adequate supply of water. This is perceived to be affordable by most communities.

The membership scheme is currently in the early stages and it remains to be seen how many communities will join, which will be a major factor in determining the overall success or failure of the initiative. The long distances between some water points is likely to have an influence both on financial viability for RWD and affordability for the communities, and this must be investigated carefully. Should the scheme prove successful, however, it may, in the long-term, sustain both the water supplies of the member communities and the RWD organisation itself.

2.7 Spare parts provision

Compared to the other countries visited so far during this research project Kenya has the most sustainable spare parts supply and distribution system, at least for the Afridev handpump. This is despite the lack of any standardisation policy and is largely due to a higher level of industrial development and commercial enterprise than many other African countries. For other handpumps, however, the sustainable supply and distribution of spare parts remains a major problem.

2.7.1 Supply network

Davis and Shirtliff (Dayliff) is a private company specialising in water pumps, borehole services, swimming pools and water treatment equipment (http://www.dayliff.com). It has its headquarters in Nairobi, four pump centres in Kisumu, Mombassa, Eldoret and Nairobi, and approximately 50 agents/stockists in all major towns, covering most but not all districts. It also has branches in Uganda, Zambia and Tanzania. Dayliff is primarily a pump retailer and stocks a wide range of pumps including electrical submersibles, solar pumps, fuel driven centrifugal pumps and handpumps. Since the company sells pumps, it automatically stocks a full range of spare parts for all of its products. For handpumps this includes every individual pump component from a hexagonal bolt (KSh20) to the pump head (KSh5,000). Rising main stablisers, and specialist tools such as fishing tools are also kept in stock.

Dayliff began stocking the Afridev pump and spares as the marketing agent and distributor for East African Foundry Works (EAFW). However, over a period of time the business relationship between the two companies broke down and Dayliff started to import Afridev handpumps and spares directly from companies in India, rather than from EAFW. Among its product list it also has the India Mark II and the 'Popular' (GangaSagar) handpump, and respective spares, all procured from India.

The larger pump centres stock a full range of handpumps and spares while many agents keep only very small stocks of fast moving parts. At all Dayliff pump centres and stockists, however, any spare part for any of its pumps can be requested and delivered within 24 hours.

Despite the Dayliff commercial network, staff at the Ministry of Water Resources claim that some areas are still poorly served, and it was observed that within the RWD project area many communities have to travel more than 100km to the nearest outlet. Access therefore still remains a constraining factor for the more remote communities. In addition, lack of awareness appears to be a problem, all communities visited in the RWD area were unaware that there was a spares outlet in Kisii and reported either that they would approach the implementing agency (RWD) or that they would not know where to go to find spares.

The Dayliff agent in Kisii, A. Jiwa Shamji Ltd., reported that they receive almost no requests for handpump spare parts, the last being six months ago, and therefore they do not keep any in stock. However, they are still able to provide any component for the Afridev within 24 hours. Previously, when RWD purchased pumps directly through the local agent they ensured a range of spares were immediately available, however the profit on handpumps (~5%) is much lower than on other products (~40%) and there is little incentive for marketing.

In addition to Davis and Shirtliff there are several smaller companies that also stock the Afridev and India Mark II spares, such as Kenya Handpumps which has outlets in Nairobi and some major towns. For other models of handpump, however, spares supply is a much more difficult issue. The Vergnet pump has been introduced in the Kisumu area in recent years and spare parts are available through a single stockist WASDEV Consultants Ltd. in Kisumu. WASDEV was provided with an initial stock of pumps and spares by the manufacturer as part of an aid programme and although they currently have a large stock it is unclear how this supply will be sustained. The cost of some spare parts is also restrictive to many communities, and WASDEV staff remain the only people able to undertake difficult repairs due to the need for specialist tools and knowledge.

Spare parts for SWN handpumps have not been available in country since the end of the Lake Basin bilateral project, since there was no provision for commercial supply. RWD has made some attempts to keep a small stock of

SWN parts but most communities with SWN pumps remain unaware of this or are unable to access these easily. SWN pumps and spares are available through the private sector in neighbouring Tanzania but there is a need for Kenyan institutions to promote and facilitate importation if this is to have a positive effect in Western Kenya. A small number of Volanta pumps were recently imported by RWD for deep borehole use and it is likely that spares for these will only be available through RWD.

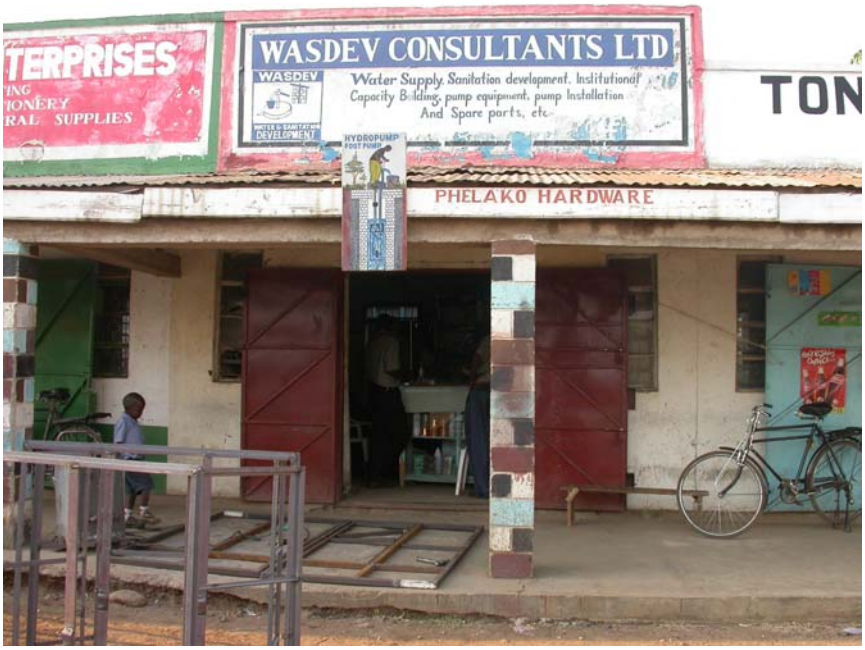

Figure 10: WASDEV Consultants

2.7.2 Cost of spares

Dayliff spare part prices are fixed nationwide by working back from prices for end users through the distributors, to the Dayliff pump centre. Dayliff makes more profit if selling direct to end users (through one of its four pump centres) but recognises the importance of promoting a supply chain network. Some smaller companies sell spares at cheaper prices in the larger towns, although it is not known from where these are sourced. The affordability of spares for the Afridev is not a major issue although for some deep well pumps such as the Vergnet and Duba communities have greater difficulty paying. The cost of imported Afridev pumps and spares is considerably lower than those purchased from EAFW for reasons discussed.

2.7.3 Quality of spares

The quality of spares available through Davis and Shirtliff is generally good and Dayliff claim that their competitors provide low quality spares which is why they are able to sell at cheaper prices. There is no external quality control of local or imported pumps and spares, and there have been widespread complaints concerning the quality of Afridev seals in particular. Dayliff stock

polyurethane as well as rubber U-seals and although these are three to four times the cost, their durability is significantly greater. There is a lack of awareness of this among consumers and many return time and time again to replace worn seals.

'*One school used to visit us every month to purchase replacement U-seals for their Afridev handpump, which they said became worn rapidly due to heavy use. Each time they came they would buy two or three rubber seals. Eventually I said to them why don't you buy a polyurethane version, it's more expensive but much more durable? They agreed to try it and purchased two polyurethane U-seals. Since then they have not come back.*'

A. Jiwa Shamji Ltd., Kisii

2.7.4 Commercial viability

Davis and Shirtliff are a successful company specialising in water pumps, and although handpumps represent a relatively small part of their overall business they still generate significant profit. Since they already have the necessary infrastructure and systems in place for the provision and distribution of various pumps and related spare parts, it is a relatively easy option to add particular handpump models to their product list.

At the Dayliff pump centre in Kisumu handpumps account for 30% of all sales and therefore there are strong incentives to stock handpumps and respective spare parts. Most customers are NGOs or other external support agencies and by buying locally they sustain the distribution network.

Figure 11: Davis and Shirtliff Pump Centre, Kisumu

The Dayliff agents appear to have far less interest in handpumps since they rarely make sales of actual pumps and demand for spare parts is generally low at district level. Even where there is demand for faster moving spares there is negligible profit and the provision of spares is more a service than a commercial interest. For example, if a community requires an Afridev U-seal at a cost of KSh250 and the agent does not have it in stock, the cost of the phone call to Nairobi and transportation will eat into the small profit that the agent could make. So much so, that the agent will actually make a loss.

This indicates that the provision of spares in all districts and at divisional level will not be commercially viable. The current strength of Dayliff and its agents is that they specialise in water pumps but handpumps are not their only business. However, there is a limit to the level at which they are able to sustain such a business, for example in poorer rural areas there is insufficient demand for any type of pump or related components.

3. Community and social issues

3.1 Objectives

The purpose of the field visit was to investigate factors influencing sustainability and determine which issues are most critical. The major objectives of the socio-economic study included:

1. To investigate how decisions were made and involvement of various groups (men, women, elders, village management groups, key individuals) in the:
- Planning;
- Implementation;
- Operation and Maintenance.

2. To assess the socio-cultural issues that have influenced the sustainability of handpumps.
3. To assess the capacity of the community to generate and manage financial resources for operation and maintenance of handpumps.

3.2 Methodology

3.2.1 Baseline survey

The team met RWD project staff and explained the purpose of the study. The RWD staff, that included two members of PSU and three field mobilisers from the three key areas of operation (Diocese of HomaBay, Trans Mara and Kisii), gave an overview of past and present approaches (supply driven and demand responsive) and the project sites. The project staff was given an opportunity to ask questions, clarify issues and concerns on the study. The study team had originally planned to visit ten to fifteen communities during the baseline but due to inadequate time for the field visit and long distances from one community to another it was agreed that six communities be visited for the baseline before choosing three communities for an in-depth study. Dates were then set for visits to the communities and where possible appointments were made in advance.

During the baseline field visits, the team was accompanied by the programme manager, head of mobilisation and training at PSU, and the field mobiliser for the respective area visited. In some communities the team made impromptu visits as there was no time to make prior appointments. In others, visits were made according to appointments. During the baseline survey, the team met members of various groups, men, women, elders, water committee members and other key individuals available in the community. Discussions focused on technical skills, financial issues and availability of spare parts. The information obtained was summarised into sustainability snapshots attached in Appendix 4. During the baseline survey, the team also took an opportunity to meet and consult with a few stakeholders in the project sites visited. A list

of those met is attached in Appendix 2 and key findings from the consultations are found in Appendix 5.

3.2.2 Methodology for in depth study

After the baseline survey the team met with the programme manager, head of mobilisation and training, and field mobilisers from respective sites visited to discuss results of the baseline. Points of clarification were made and cross-checking of information was done. Out of the six communities visited, three were chosen for in-depth study. These are godNyango community in Kisii Diocese, Jwelu and Kanyauke communities in Homa Bay Diocese. The members present at the meeting agreed that two of the communities to be studied should demonstrate a reasonably high level of sustainability based on the baseline survey. The other community chosen should have a non-functioning handpump to enable understanding of factors contributing to its failure and compare this with the successful ones. Field logistics were agreed upon and appointments to visit respective communities arranged in advance.

During this study the team met members of various groups, men, women's committee, elders and other key members of the community. In a general meeting an opportunity was given to the local community mobiliser of RWD to introduce the team to the community. A community leader, locally known as *Jatero* then introduced the community members to the team. The team then explained the purpose of the visit and communities were allowed to seek clarifications, if any. When the team felt that the purpose was clear to the community, their consent to participate was sought including consensus on the time they were willing to avail for the team. The team then adjusted the methodology and tools accordingly based on the available time and other ground logistics.

The tools used for in-depth study included the village map, focus groups discussions separately with men and women and key informant interviews with different key individuals.

The first tool used was drawing of a community map which was used as an icebreaker and also to enable the team to gain a deeper understanding of the community set up. Issues not clear from the community map were further probed and thereafter, the community was divided into focus groups representing men and women. One research team member facilitated discussions with men and the other led discussions with women. Interviews with water points committees and other key individuals were also held.

The communities gave the team a maximum of three hours to discuss with the community groups present. Thus other tools like the transect walk, Venn diagrams and wealth classification, which the team had intended to use were not possible. However, with the tools chosen the team was able to get vital information from the communities.

A summary of the findings for each of the three communities is presented below. It is important to note that there is no guarantee that all information retrieved from community members is accurate. There is particularly the case for financial information.

3.3 Jwelu village

3.3.1 Background

The team visited Jwelu village in Suna South location, Migori district in HomaBay Diocese. The community was given a chance to draw a map of their area. All community members present participated actively making sure all the information was correct. From the discussions after drawing of the community map, it was learnt that the community water point, which was constructed in 2001 serves about forty-six households. From the map it was also learnt that there is a seasonal river and two hand dug wells (one individually owned and one communal) both of which are seasonal and unprotected. These traditional water sources are mainly used for washing clothes, watering animals and also for drinking by those unable to pay for water from the protected water point. The water from the protected water point is used for domestic purposes only.

According to the women a typical household uses an average of three to five twenty-litre jerricans per day. It was observed that the majority of the households take approximately half an hour to get to the improved water point. According to the members present the water quantity is able to meet the current demand the year round, and during the rainy season the water is discoloured and milky, and those with iron sheet roofing therefore use rainwater for their domestic needs.

From the community map the team observed that the committee members' households are concentrated around the improved water point. It was also noted that only committee members' households had latrines, and from discussions it was learnt that this is attributed to the fact that only committee members were ready when RWD was distributing the latrine slabs. The committee members were also trained on hygiene and it is expected that they will disseminate this information to the rest of the community.

3.3.2 Planning

The community began planning for the development of the water point in 1993. This was triggered by high prevalence of diarrhoeal diseases in the community due to contaminated water sources; long waiting times at the water points by women and the pain of paying for water in the neighbourhood. The women organised themselves to dig a water hole (scoop-hole) and let water ooze out. Women would then fetch water in turns and because water would come out very slowly they took a lot of time queuing. Considering this situation the men decided to take a lead took in discussing

water problems and it was resolved that a committee be formed, consisting of four women and seven men to look into ways of alleviating the problems.

The committee concluded that the community should have its own water source and began to mobilise the community to contribute some money for membership. A total of KSh5,000 was raised between 1993 and 1998 when the committee approached LBDA (an NGO known to some of the community members) for assistance, which referred them to RWD, as they were responsible for working in that area at that time. Once the community linked up with RWD, they were given choices of possible technologies and their cost implications. Considering this, women requested that their water hole be developed further but were advised that it was not technically feasible. The technical team of RWD then advised them to have a shallow well equipped with a handpump and siting was done at a different place. According to the community the planning process was very participatory, as both men and women contributed ideas used in decision-making. The community contributed KSh10,000, which was their contribution towards the installation of the handpump. Men assisted in the construction of the well and accommodated the artisans, while the women on their part provided lunch to the artisans during the construction period.

After the construction was complete, there was a ceremony initiated by both the community and RWD to mark the completion of the water point. However, there was no memorandum of understanding signed for this, as the community felt that they had actually initiated the whole process. According to women, however, they felt that the water project belongs to both RWD and the community and if there were any problem they would go back to the programme for assistance. So far, both men and women are satisfied with the quality of work done and are happy that nothing has happened to the water point to warrant assistance from RWD.

3.3.3 Implementation

The role and responsibility of the community during implementation was clearly spelt out. Thus during construction the men provided unskilled labour by assisting the artisans in digging the well and also providing accommodation for them. Women on the other hand had a responsibility to ensure that the artisans were provided with lunch. There was active participation during implementation, as their expectation of getting clean water was now becoming a reality.

One woman remarked in Kiswahili about the problems they had experienced before as translated below:
'When we were constructing the water point I kept on remembering what we women had gone through. The long wait at the water hole, and even then the water was not clean. This made me work even harder so that we can get clean water from the new project. I'm now excited that the community has clean water, diseases are a thing of the past and the pump has not given us any problem so far.'

After construction was complete the staff of RWD and the community got together for a ceremony to cerebrate the completion of the water point. Although, the community feel that the project was initiated by them and thus belongs to them, the women were quick to point that the project also belongs to RWD because when there is a technical problem they will have to go back to them, as they have no technical know how and do not know where to get spares from.

3.3.4 Operation and maintenance

The community has one shallow well installed with a handpump, which is two years old. The community reported that there has never been any break down since installation and no member of the community had been trained on operation and maintenance. There was a general consensus that in case the pump broke down then the community would have to go back to RWD for assistance, as they have no idea on where to get spare parts.

During the discussions the community revealed that they had no toolkit for repair except a spanner that had been left for them after installation of the handpump. They further expressed concern that they do not have any community member trained to undertake pump maintenance whenever there is a break down.

Discussions on how the community manages the water point showed that the community has scheduled times for drawing water, which are based on women's calendar of activities. In the past, drawing of water used to be in the morning and evening but at present it is done only in the morning hours to avoid overuse of the handpump. It was further learnt that the pump is always locked whenever it is not in use, and this was confirmed by the observations made by the study team.

It was confirmed by the members present that there is a committee of eleven members with four women and seven men, who had received training on leadership and basic management skills from RWD. The team noted the absence of youths in the committee and on probing it was learnt that the young people cannot always be trusted with responsibilities. Further probing also showed that although women are in the committee, they are passive members. This is strengthened by the fact that only men could recall that the committee meets three times a year to review monthly contributions by members; look into the application for new membership and also discuss the management of the water point by the caretaker. The team also learnt that the group has a constitution with laws and regulations to guide the committee and the members.

Both women and men confirmed that money for operation and maintenance is raised through membership fees, monthly contributions from members and the sale of water to non-members. According to them each man pays a membership fee of KSh300 and each woman KSh200 and each household is

expected to pay a monthly contribution of KSh15. If one does not pay the monthly contribution, s/he would be expected to pay KSh5 for every 20-litre jerrican fetched. All this money collected is expected to be used for the maintenance of the pump, and since no bank account has been opened the money is kept by the treasurer at home.

3.3.5 Sustainability issues

Institutional set up: There is a committee, which seem to be active, effective and accountable to the members but it was noted that only male members knew how much had been collected so far. Although women are represented in the water committee, very few had any idea of what was going on. The youth are neither involved nor represented. It was confirmed from the committee that they had received capacity building on leadership and basic management, simple book-keeping skills and hygiene education. The treasurer was noted to be old and with little or no formal education and from further probing it was learnt that he was chosen because he was trustworthy.

Operation and maintenance: The team learnt that there is an effective O&M mechanism as the community collects funds and in case of break down they will have money for repairing the handpump. It was noted that no training had been done yet for technical skills and spare parts are not locally available, thus the community depends on RWD for assistance.

There is no link between the community and the Ministry of Water. If there is need for technical support the community stated that they could only go to RWD, whom they knew. The members present stated that in case of a major break down the committee would convene members meeting to contribute towards the repair, although at present it is not clear how this would be done.

Technology: According to the community, water is adequate to meet peoples demand and it is reliable throughout the year and therefore they are satisfied. There is however some concern over the quality during the rainy season, as the water turns milky. It was noted that no preventive maintenance was being carried out or even planned for. Water is not accessible all day long as women have set out times for fetching water, a decision that has been endorsed by men. The community revealed that this decision has been adopted to ensure that the pump is not overused, a factor that has been attributed to rapid wear and tear of the rubber U-seal resulting in pump break down.

Impact: Women pointed out that since the new water point was completed there has been significant reduction in the walking distance to water point and this has led to saving on time, which can now be used for other productive activities. They also reported reduction in diarrhoeal and other water-related diseases.

3.3.6 Commmunity financing

The community was aware of the importance of raising funds for operation and maintenance and as noted earlier, the membership fee is KSh300 per man and 200 per woman. Members present noted that the community had agreed that for a reasonable amount to be raised, considering imbalances in number of households per homestead, each man and woman in the household should pay the membership fee agreed for each gender. They also stated that members were allowed to pay in instalments although there have been several cases where people pay half way and insist on having access to the water point. According to them, full access to the water point is only possible after one has paid the full membership fee.

Those who have not paid have to use the nearby unprotected water sources. According to the women, only one member, a widow is allowed to get water from the handpump free of charge because they know she cannot afford to pay for water. All other members are expected to pay KSh15 per month per household in addition to the membership fee to guarantee full access to the water point during the month. This money is used for the maintenance of the handpump whenever there is a break down. Both men and women noted that everybody in the community is able to pay for water. The community noted that some of the members had not paid, not because they are unable but because they are unwilling to pay. There is a feeling from men that the monthly contribution should be made by women, as water issue is their main preoccupation. Women however think the contribution should be from households. Through further probing of men and women it was clear that the money comes from the households but it is women who actually pay the treasurer.

The team also learnt that the caretaker collects money daily from those who pay KSh5 per Jerrican of water. At the end of the month the caretaker goes to the secretary to record the money collected, and then the secretary together with the vice chairman deliver the confirmed total collection for the month to the treasurer for safe keeping.

The team learnt that KSh2,200 has been collected so far and is being kept by the treasurer since the community has no bank account. During discussions on roles, responsibilities and how committee members were selected, an example was given of the treasurer, who is selected on the basis of good conduct, ability of the potential candidate to manage his resources well and having enough resources for compensation of the group in case he misappropriates the group's finances. These aspects are discussed extensively before final selection of the candidate is made.

3.4 godNyango village

3.4.1 Background

The second community visited was godNyango whose pump was installed in 1987 and had been broken down since 2002. According to information from RWD the handpump was installed during the era of the 'supply driven' approach and there was no mobilisation and sensitisation to enable the community to understand the importance of proper operation and maintenance of the handpump.

The team decided to study this community so as to compare it with other well-managed water points. During the baseline survey it had been noted that the community was not selling water, had no money for maintenance and leadership had been unstable in the past. These issues were considered critical and of interest to the team to investigate further and see how they had contributed to the sustainability (or failure) of that particular water point.

According to discussions with men, the idea of developing the water point begun in 1985 when a severe drought struck the area and caused all water sources to dry up causing acute water problems. Two old men, one of them a patron of a neighbouring primary school teamed up with the school management and visited RWD offices at Sikri and requested assistance. They were advised to organise themselves into a group represented by a chairman, secretary and a treasurer who would act as contacts for RWD. The RWD technical staff came and conducted geological surveys, which indicated that the current location of the well would have more water as opposed to a point the community had suggested in the school compound. When the pump was working it is reported that it used to serve about 105 households but these could have increased after a year since the handpump broke down. At present the community draws water from the nearby river Awachi, which is believed to be highly contaminated. From the community map it was noted that there are very few latrines and there is no health facility around, thus when the community members are sick they have to walk to a nearby town.

3.4.2 Planning

Discussions revealed that men took the lead in decision-making and planning and it is them that went to RWD, Sikri office to seek assistance after the drought. The water point was developed during the supply driven approach where the implementers would come and provide projects with minimal consultation with the beneficiary community. The community was not offered any alternative technology and it was not clear what their responsibility as a community was over the management of the water point. Although the community had proposed a site for the water point, this was found to be non feasible on hydrogeological grounds. From discussions it was noted that women and youths were not involved in the whole project cycle and thus saw no need to contribute or pay for water. As a result there is a strong feeling that

the water point belongs either to the government or RWD.

3.4.3 Implementation

The team learnt that the bulk of the work was done by the RWD and the community was only involved in providing lunches to the artisans and labour to remove soil from the well during digging. Women were not involved at all, and since community role was very limited they did not see the project as theirs. The fact that they were not involved in the installation and had not paid for the handpump strengthened their feeling that they have been offered the water and all responsibility therefore lies with the provider.

Figure 12: Afridev handpump

3.4.4 Operation and maintenance

During the discussions men could recall there was a committee initially with eleven men and one woman. Women, though represented by one woman in the committee, did not seem to know their roles. It was learnt that there was no leadership and management skills training for the committee, and there was no technical training for pump maintenance either.

According to the members present, they had been requested by RWD to provide two young men to be trained on pump maintenance and indeed the community chose them but no training was actually done

The team learnt that each household was expected to contribute KSh30 per month for O&M and it was the responsibility of the water committee to collect that money. According to the women present 90% of the households actually paid the amount and that the treasurer and the chairman had kept the money. The two have since passed away and no one knows what happened to the money, thus killing the morale of people from contributing. Apart from

collecting money for O&M, the water committee seemed to have no idea about what their roles and responsibilities would be over the water source.

Since installation of the hand pump there have been three breakdowns. During the first breakdown the money, which had been raised through household contribution, had already been misappropriated and could not be used. Therefore, a prominent community member took an initiative to pay for the repair which was done by technical staff of RWD. The problem was that the rubber U-seal had worn out and needed to be replaced

The second break down was as a result of the wearing out of the same rubber seal. Two committee members, including one woman, went to RWD for assistance and they were requested to pay for the repair. The community could not raise money again and went back to the same prominent man and asked for assistance. Once again the man requested the community to try and contribute KSh10 per household but when this was not forthcoming he took the initiative and paid for the repair where RWD technical staff fixed the problem.

The third break down happened in April 2002 and up to date it has not been repaired. According to the community the prominent man is now old and sickly and is not able to assist anymore. The community is now seated waiting for a good Samaritan to come and assist them. They have not even convened a meeting to discuss how the problem can be solved and have now reverted back to the old water source, although they are consciously aware that it is highly contaminated. Members present even reported that there have been cases of cholera and people have lost their lives due to that same contaminated water yet they are not taking any action to repair the handpump, so as to get safe water.

It was learnt that the community is not aware what the problem with the pump is and are now asking for advice from RWD. Even if the problem with the pump were diagnosed, the community confessed that they would not know where to get the spare parts except by going to RWD.

3.4.5 Sustainability issues

Institutional set up: At present there is no committee and it was learnt that the one that had been formed during installation is no longer in existence. During the baseline survey the study team visited the community accompanied by RWD management and this raised the expectation that they had gone to inspect the pump for possible repairs. Therefore when the appointment for the in-depth study was made, a new committee was quickly constituted and was one day old by the time the team visited.

From discussions with women, it was noted that they are not involved in management of water issues. It was also learnt that there is no established channel of communication between the committee and the members,

especially women who knew very little about what was really happening. The team was further informed that no training had been done and the committee members knew nothing about their roles and responsibilities on water management. The team noted the absence of youths in the meeting and were informed that youths had nothing to do with issues related to water.

Operation and maintenance: Apart from the initial collection of KSh30 per household per month, which was embezzled, there has been no collection of funds for O&M. The pump is now broken down for the last one year and there is no ongoing effort to revive it.

There is no effective O&M mechanism as evidenced by lack of technical skills within the community for maintenance of the handpump. Spare parts are not available and there is no link or technical support from the Ministry of Water.

Technology: From the huge number of households served it was clear that the handpump had broken down due to over use. It further emerged that the community view the handpump as an investment of RWD, and therefore they have no sense of ownership. As a result they expect RWD to maintain the pump with little or no responsibility on the part of the community.

Impact: When the pump was functional, the water was salty but the community preferred it to that of river Awachi since the pump water was cleaner and more reliable. The water was used for domestic purposes and on average each household consumed about five twenty litre jerricans per day. There was little time saving as both the handpump and river Awachi are nearby each other. However, the community acknowledges that the availability of clean water had an impact on the reduction of diarrhoeal and skin diseases, which were common prior to the installation of the handpump. The communities have now reverted to the contaminated river water source, and sanitation related diseases, especially diarrhoea and skin conditions, are now prevalent.

3.4.6 Commmunity financing

Since the handpump was installed during the supply driven approach there was no sensitisation on the importance of raising money for O&M. Although RWD had informed the community that they needed to raise funds for O&M, very little money was raised and unfortunately this was misappropriated by the former committee. This has demoralised the community and made subsequent efforts to get them contribute very difficult. The community is now sceptical about any contribution and have reverted to the excuse of poverty as a defence for not paying. There is a general feeling that there is no sense of ownership of the project and therefore it is taken for granted that the water point is the project for RWD.

The team learnt that there is lack of information on many issues related to pump maintenance including technical skills to repair the pump, spare parts

and costs of repairs. Although the community has asked RWD to come and assess the extent of breakdown and give estimated costs, they feel that if the pump is repaired and there is another break down they may not be able to raise funds towards that repair.

The community claimed that they were extremely poor to make any contribution towards repair of the handpump. The team initiated guided discussions on socio-economic activities of the community, which revealed that many men had at least a cow, goat or a sheep. It was also noted that women were involved in ropes, mats and basket making from sisal, which they sold in the nearby markets. According to members present, the topography of the area does not support much agricultural activities. The team however noted that though there could be very poor people amongst the group as a result of limited economic activities, the issue of paying or not paying for water and handpump maintenance is more of attitude than actual inability to pay. This view was confirmed by a headmaster of a primary school in the community, where the children of the members present attend school.

He observed that:
This community has been used to so many free things. The free mobile clinic by the catholic diocese, free handpump and many other things…this has made us with time, believe that we are so poor and everything for us is, and should be, free. "We are poor, indeed very poor and we cannot afford anything, even to eat is a struggle."

3.5 Kanyauke village

3.5.1 Background

The third community visited by the team was in Kanyauke village, Lambwe division in Homabay Diocese. This is a women's group that has incorporated a few men into the group. According to the women, the group started in 1982, where women organised themselves into a group and decided to contribute money and support each other in turns (known as a 'merry-go-round').

According to the group they begun with a membership of 15 members and by 1983 seven men joined the group. It was then agreed that each member should pay Kshs 100 for the group to open an account. In 1983, the group opened an account with Barclays bank, which later closed its branch in Homabay. The group therefore transferred their money to Kenya Commercial Bank, which also relocated its business to Kisii and here too the group had no option but to move its account to post bank, Mbita where they operate a savings account up to now.

The objective of the group was to raise group income by growing and selling maize and other grains. The revenue collected is then banked and can be used

to assist the members themselves and also the poor children in the community to go to school. The group also used to buy and sell honey in which case the revenue was also banked.

Between 1985 and 1986 the women began to think of ways of solving water problems. At that time, they were collecting water from Lake Victoria, which was highly contaminated as it was used by both animals and people, distance from the community to the lake was very far and women were taking over two hours to collect water. Many old women could not make it to the Lake because of the distance and in 1990 there was a cholera outbreak, which strengthened the need to have safe water. The group then heard that LBDA was helping organised groups develop water points. They approached LDBA and were advised to apply through Department of Social Services in 1992. LBDA replied to the group only in 1994 and the group was asked to fill applications forms and begin to raise KSh10,000 if they wanted to have safe drinking water. This was followed by a hydrogeological survey by LBDA and the water was sited at the current location where the water point stands. LBDA linked the community with RWD, as they were the NGO working in that area, who confirmed that the community had to start raising KSh10,000 for the water permit. Thus RWD did a second survey and confirmed the location sited earlier by LBDA.

From the discussions with men, it was clear that they did not have much knowledge about the background of the project as set out above, indicating that women took the lead in initiating the whole process and only brought men on board as advisors. Nevertheless, there is a lot of co-operation and support from both men and women members of the group.

3.5.2 Planning

The women took the lead in planning and were given two possible alternatives, that of a shallow well or a borehole. After the hydrogeological survey the group was advised that only a borehole would be feasible. They were also clearly informed of their role in the development of the water point. The existing committee, the group was told by RWD, would have the overall mandate to manage the water point. At that point five youths were trained on operation and maintenance and seminars were held for the women's group. These focused mainly on pump maintenance, time management and health education. The seminars also addressed the issues of roles and responsibilities of the group, leadership skills, financial management and group dynamics. The group was also advised on setting times for collecting water to avoid overuse of the handpump. Both men and women noted that after the seminar they were confident of the skills imparted to them but expressed the need to have refresher training.

3.5.3 Implementation

The team was informed that during implementation both men and women in the group were involved. Women collected small stones and took them to the

site and also cooked for the artisans in turns, men collected the biggest stones and fenced around the water point. Members noted that they bought materials for the construction of the water point including cement, sand and gravel for the superstructure. They made limited contribution during actual digging of the borehole since this was machine drilled. The team learnt from men and women that during implementation they were very active as they were very eager to see water flowing.

3.5.4 Operation and maintenance

According to the members present the group has a water committee that manages the water point and it meets on a monthly basis to review maintenance of the water point and proceeds from water sales. As noted earlier, the committee has been trained on leadership, basic management skills and group dynamics and has the overall responsibility to ensure the water point is well managed including revenue collection.

There is a caretaker drawn from the membership who takes care of the water point on a rotational basis for three months. The overall responsibility of the caretaker is to ensure cleanliness of the water point and collect revenue from water sales. The caretaker is paid a salary of KSh200 per month and each woman in the group gets a chance to become a caretaker so as to make some little money which has boosted their morale. After installation of the handpump each member of the group was requested to pay a membership fee of KSh50.

Five youths were trained on operation and maintenance of the handpump and it was noted that four have since left and only one, a mechanic, is available within the community. He has a toolkit and has been able to fix two minor breakdowns in the handpump and charged a fee for each repair he undertook

From the discussions with the trained artisan, the most frequent cause of breakdown of the handpump is the wear and tear of the rubber U-seal. It was noted that this problem occurs mainly in the dry season when the water demand is very high. According to his experience the rubber seal can last for between six months to two years depending on care given to the handpump.

It further emerged that spares parts availability is a major problem. In particular, there is no local dealer and one has to go all the way to Kisii or Migori - over a hundred kilometres to get them. It is believed that the spare parts are not available in any hardware shop and can only be obtained from RWD offices. It was noted that the cost of transport to where the spare parts may be found is two to three times the cost of the spare part (U-seal) making it highly uneconomical.

Monthly collection from water sales is normally banked at the post bank and is used to remunerate the caretaker, cater for operation and maintenance and for any community contributions. Whatever the caretaker brings to the

treasurer is taken as the actual collection for the month. No records were available to cross check the correctness of the rates and amounts collected.

The members present said that currently there is no link with the Ministry of Water and wished the Ministry would stock spare parts in their district water offices for easy accessibility.

It was learnt that the community is not aware about the lifespan of the handpump and they were also concerned that in case there was a major break down they would not be able to cater for its costs. In case this happened, they would go to RWD and make arrangements for repair and then repay in instalments. At present such an arrangement is not in place.

3.5.5 Sustainability issues

Institutional set up: From observations the group seems to be very committed and has a strong water committee that has taken responsibility for managing the water facility. Although the handpump has had two minor breakdowns they have managed to repair it from their own resources and the project is still functional. The women felt that their involvement, especially on the management of the borehole, has contributed to the sustainability of the system as they are always within the community and have a felt need to maintain it.

Although other income generation activities (IGAs) for the group have stopped, the women are still thinking of initiating new IGAs as they feel that this would further support their efforts, bring in extra income that can cater for minor and major repairs of the handpump.

Operation and Maintenance: Members present felt that training the local mechanic for maintenance has proved very effective since he is within the community and charges affordable fees for repairs. He has his ongoing business concern as a mechanic and does not wholly rely on pump maintenance for his livelihood.

There is a general feeling that although the community is making every effort to sustain the water point, the unavailability of spare parts and the costs implication related to their purchase is a major draw back to the community's effort. The community would have wished to purchase those parts and stock them for later use but notes that RWD, who are currently involved in stocking the spare parts in their field offices have always claimed the demand was too high and each customer is allowed to buy one or two of each type at any one time.

Training of the water committee has proved to be very effective and members are happy that they are able to put into practice what they have learnt.

The community expressed desire to know the lifespan of the handpump and examples of possible costs in case of major break down so that they are able

to plan for replacement mechanisms, which at present they are not aware of.

From discussions with community members who are not part of the women's group, it emerged communication of management decisions is not passed to them. At present the approach is that decisions made by the women's group are passed to other users at the water point. Members are not happy because through this approach they do not always get the right information.

The group has scheduled times when water can be fetched, this is normally between 06.00 to 10.00 in the morning and 14.00 to 18.00 in the evening. Other rules regarding the use of the handpump include the fact that children ten years and below are not allowed to fetch water and no bathing, washing of buckets and clothes at the water point. The pump is locked when not in use and the caretaker is expected to clean the apron after the end of every day.

Water is used for domestic purposes and watering of small animals. Since the water is salty, many people do not use it for washing clothes and go to the lake Victoria for this purpose. The water quantity in the borehole does not vary so much during the dry season but there are few users during the rainy season since the community use other sources such as rainwater harvesting.

Impact: Members of the group noted their satisfaction with water from the handpump. The availability of water within a short distance has reduced the burden of women and children of carrying water for long distances. Consequently, women have saved time, which they are now using for other household chores and some have taken to making sisal ropes for selling. Women are happy they don't have to boil water for drinking and thus there is saving on fuel and the community at large is now aware of hygiene and that diarrhoeal diseases have reduced in the community.

3.5.6 Commmunity financing

The community is charging a membership fee of KSh50 per member and in addition each member pays KSh20 per month. The school nearby also pays the same amount monthly to draw water from the water point. At the moment, all the other income generation activities for the group have stopped and only revenue from water sales is bringing in income to the group. The group has tried to initiate a vegetable garden project using water from the borehole but the water is too salty for that purpose. They are at present keen to initiate other income generation activities to boost their income and are at the moment discussing ways forward and hope to approach a donor for that.

Revenue from water sales depends on the season, which directly determines the number of users. During the rainy season those with iron roofs prefer rain water thus reducing the number of users at the borehole and consequently, there is a reduction in the revenue collected. During the dry season the situation reverses in both demand and revenue.

Before any expenditure is incurred, the committee and members sit down and discuss. Members of the group confirmed that if any member has not paid the monthly contribution s/he is not allowed to fetch water from the protected water point. The aspect of the ability and willingness to pay was discussed at length and women confessed that they knew every member of that community very well and thus know who is able and not able to pay for water. So far they have been able to identify five community members who are extremely poor and are unable to pay and these are allowed to collect water free of charge.

At the moment the group said they had a saving of eight thousand Kenyan shillings in the bank and although they said they could have had more they noted that they are also expected to contribute in harambees such as in schools, churches etc. and this takes quite a big chunk of their resources.

Generally, it was noted that women have taken a lead in the overall running of the group and men are happy with this as they feel generally that the responsibility of keeping the money lies with the women. This feeling is strengthened by the fact that at present women are the majority in the committee and they also hold the positions of secretary, treasurer and chairperson.

4. Conclusions

It is important to note that sustainability is not simply affected by operation and maintenance procedures alone, as is suggested by current Government strategy in Kenya. Donor imposed procedures, regarding handpump procurement and project approaches, as well as social aspects, such as demand for water and ownership issues, can also have major impacts.

The levels of sustainability in the projects visited varied greatly, in part due to the large areas covered by single projects. In many areas where handpumps were installed during the supply-driven phase there was a widespread lack of awareness of maintenance issues among community members. More recent community-based approaches have resulted in an overall increase in sustainability, but these still rely heavily on the on-going presence of NGOs and appropriate support structures.

4.1 Institutional and policy issues

Government policy

The National Policy on Water Resources Management and Development (NWRMD), 1999 emphasises the need for enhanced participation in programmes by the various water users, while the Government ensures an enabling environment through appropriate policies, co-ordination and regulation. Under NWRMD Government takes an 'enabling' role, as regulator rather than implementer. Since the policy is fairly recent, it remains to be seen how effective this will be in increasing sustainability. Early indications suggest that private sector capacity and incentives for local Government may need to be developed further if this is to be successful.

Despite Government policy to the contrary, comprehensive monitoring and regulation of water supplies by Government institutions is not happening at present. This lack of co-ordination has resulted in a diverse range of project approaches and inconsistency in operation and maintenance arrangements.

The lack of a formal policy on handpump standardisation in Kenya has positive effects, in that new technologies can be introduced and developed locally. In particular, the lack of restriction on manufacture offers real opportunities for locally-developed, locally-appropriate pumps. However, there are obvious disadvantages. There are currently no procedures or guidelines in place to vet and regulate handpump technologies, and to implement quality control procedures. The current lack of regulation has resulted in a wide range of pumps, many of which do not have the necessary spares or skills available to ensure ongoing operation and maintenance. At present there is little to prevent any implementer introducing a new technology without any guarantee of sustainable O&M support in place.

Similarly, there is currently nothing to stop any importer bringing poor quality pumps or spare parts into the country. This situation does little to enhance sustainability levels throughout Kenya. The answer is not necessarily to introduce a standardisation policy but simply to ensure sufficient regulation.

At present the Government lacks appropriate structures and guidelines to regulate the sector in terms of project approaches, technology and O&M issues. There is also a lack of co-ordination between Government institutions and NGOs and private organisations, to ensure consistent practice and incremental progress and development.

Institutional support

The focus on community issues within Government policy and NGO approaches tends to detract from the importance of appropriate institutional support and responsibilities of stakeholders external to the community. District Water Offices undertake minimal monitoring of CBOs and provide minimal support to them. From this perspective, at least, DWOs do not make efficient use of their human resource base. Many communities rely wholly on NGOs or implementing agencies in their area to provide ongoing support and where projects, such as the Lake Basin Project, have closed down the sustainability of water supplies is often adversely affected.

Community-based maintenance is the most common maintenance system nationwide and is promoted by the Government. However, this model has clearly failed to deliver the widespread levels of sustainability initially hoped for. Private sector and NGO-based maintenance systems may require provide alternative solutions to ongoing O&M problems. The Rural Water Development (RWD) membership scheme, whereby communities pay a membership fee to RWD to provide maintenance and support, is an interesting pilot study but it is currently too early to assess whether this will be successful or not.

4.2 Financial and economic factors

Government and donors

The level of funding required for the implementation of new handpump projects in Kenya is beyond the means of most rural communities and significant external support is currently required. Without donor support it is currently unlikely that Government institutions will be able to provide adequate financial resources unless the profile of rural water supply is significantly enhanced and greater budgetary priority given to the sector. Most water supply projects have been funded directly by ESAs through NGOs or bilateral programmes and the degree of consultation with Government varies greatly.

Although the Government of Kenya has limited resources for rural water supply there remains the need for more efficient use of current human and financial resources. Staff salaries for DWOs are paid by central Government and yet many staff remain idle because they are unable to obtain adequate fuel to visit the field and communities are unable to pay the daily allowances requested for staff and transportation.

Private sector

The provision of handpump spare parts is not a natural business activity due to low turnover and profitability, however the Davis and Shirtliff distribution network for the Afridev pump is well developed and unsubsidised. There remains a limit to the level at which the provision of spare parts on a purely commercial basis is sustainable, and this is most effective when accompanied by the retail of pumps. NGOs and implementing agencies can help stimulate spares provision by buying from their local agent.

Some communities have long distances to travel to spares outlets and there would appear to be no purely commercial solution to this. The supply of spare parts for less widespread models of handpumps still remains a problem unless these use locally available 'standard' spares, i.e. components which are readily available in hardware stores, such as plumbing and automobile parts.

Owing to the relatively high level of industrialisation in Kenya there is considerable potential for the development of locally manufactured handpumps and follow-up maintenance services by private companies and organisations. Appropriate Government policies and ESA/NGO strategies have the capacity to go a long way to support existing and future private sector initiatives, if only there is the necessary political will.

4.3 Community and social factors

Levels of sustainability in communities vary considerably, even between neighbouring villages, and as a result it is difficult to draw general conclusions about project sustainability. Based on the baseline survey of six communities and detailed study in three communities the following observations were made.

Ownership

At present, decision-making during the project planning processes is mostly by men, involving women to lesser extents and completely excluding youths. Where the planning process had been initiated by women, men were brought on board from planning to management phases of the project as advisors. Youths were not involved, although in all cases they were the targets for training on operation and maintenance, where such arrangements were in place. The general consensus from the communities is that the youths are best

suited for O&M. In order to ensure there is a sense of ownership across the community groups and enhance sustainability there is need to have a strategy and follow up to ensure gender mainstreaming in the whole process - decision making, training and management of water projects.

There is lack of ownership of the projects by communities where the supply driven approach was used and the general feeling is that the project belongs to the implementing agency. The use of participatory approaches for mobilisation, sensitisation and training, which are key ingredients of a demand responsive approach, enhances the communities' sense of ownership of the project. Caution should, however, be taken in assuming that this automatically results in higher levels of sustainability. The projects visited that had used participatory approaches were only 2-3 years old and had experienced only minor break downs to date.

Where women were involved and had taken the lead in the planning process, the project seems to be working quite well. This was particularly evident from Kanyauke, which is a women's group managed water point.

Financial considerations

Projects in which communities are paying for water as they use it have improved capacity for repair of minor pump break downs.

Transparency and accountability in the management of revenue generated from water sales and other sources is a critical factor in guaranteeing continued payment for the service by the communities. Most of the communities are aware of whom among them is too poor to pay for water and have waiver systems for that purpose. They have also reported that the rates for water have been agreed upon through consensus by all community members using the water points. Although communities agree that they know who cannot afford to pay and indeed have exempted them, it was noted that because of irregular income patterns and availability of alternative water sources many members of those communities visited were not willing to pay for water from protected water sources.

Operation and maintenance

Spare parts are not locally available in any hardware shop within easy access of most communities and all the communities visited still relied on RWD for supply of parts, even when the concerned communities were located very far away from RWD offices. This has proved to be a big challenge to remotely located communities, who have to bear transport costs and contend with uncertainty of getting the spare parts.

There is general lack of technical skills for the maintenance of handpumps in the communities visited. There had been no training done for all except one community and stakeholders noted that even where training had been done, the high mobility of trained artisans (to look for their means of survival) is

threatening availability of the technical skills. In one community, a local mechanic had been trained as an artisan for pump maintenance and this arrangement has proved very effective, as the artisan was within the community, had his ongoing business concerns and was not wholly dependent on pump maintenance for his livelihood. This approach is highly recommended for adoption and replication.

In many of the communities visited information on O&M was lacking, particularly regarding where to find spare parts, and the communities expressed concern about this. Those communities that have committees and trained artisans are generally satisfied and have shown greater chances of sustaining their services.

Insitutitional issues

Most of the communities visited had water committees that had been trained on management, leadership and group dynamics though their capacity to manage water points in a sustainable manner was still limited. All the officials of the committees from the various communities visited were old and with little or no education; they were selected rather than elected and the community members had no idea on the roles and responsibilities of the committees. The majority of the committees also indicated need for further training.

The majority of communities had no accounts to bank revenues collected from water sales and the collection of funds in most cases was found to be irregular. There was no mechanism in place to ensure accountability of money collected and as a result funds are amenable to misappropriation. A case was noted where in one of the communities visited money had been embezzled by two of the committee members and this subsequently discouraged the community from making further contributions.

There is neither linkage nor mechanism in place for support to the communities by the government and NGOs. The end of project funding normally marks the end of financial commitment to RWD funded projects. After the project has phased out there is no follow up support to the communities, although it is clear that they cannot be left on their own and still be expected to manage their water points in a sustainable way. They need technical backstopping as well as advice on where to get spare parts. One of the communities visited had a pump that had broken for the last one year without repair.

The government and other stakeholders acknowledge that there is need to provide technical support to the communities after project phase-out. However, lack of resources to cater for costs such as transport is seen as a major constraint to achieving this role.

Impact among the communities

Hygiene behaviour change is a gradual process and requires time for meaningful results to be seen. All the communities visited acknowledge that availability of safe water supplies has reduced the prevalence of water and sanitation related diseases significantly. The communities who have been trained on hygiene education are now able to understand the link between unprotected water sources and diarrhoeal diseases.

Most of the communities with functional handpumps agree that women now spend less time on water and are able to engage in other productive activities, since they have shorter walking distances to water points.

4.4 Technical and environmental issues

Local solutions

The main positive effect of having no standardisation policy in Kenya is that there are no constraints on local design and manufacture of handpumps. Local pumps such as the 'Afridev Bushpump' and the Rope and Washer pump offer potential technical solutions to long-term sustainability problems, at least in terms of ease of maintenance and availability of spare parts. Quality control and regulation remain challenges even for these pumps, but where materials are widely and cheaply available locally the importance of these diminish.

There are currently no support systems or incentives provided by Government or ESAs to encourage truly local manufacturing to develop more appropriate and sustainable technologies. Locally developed technical improvements such as the 'Beers' seal-less piston also lack promotion despite widespread applicability. Information exchange and dissemination of technical solutions and improvements among implementing agencies and Government institutions is currently limited. Organisations such as NETWAS are in a good position to facilitate this.

4.5 Research issues

The in-depth community and social study has raised some interesting issues and there is still a need to investigate factors contributing to willingness to pay among communities in more detail.

There also remains the need to assess alternative maintenance systems such as the membership approach or total warranty scheme. Projects need to be identified that have been using such systems over a prolonged period of time in order to assess sustainability.

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Appendix 1 Field visit diary

Date	Activities
Thursday 30/01/2003	P. Harvey arrived in Kenya. Informal meetings with individual team members and related staff.
Friday 31/02/2003	Meetings with National level stakeholders. Initial meeting with study team, David Mutethia and Pauline Ikumi at NETWAS offices for debriefing and to finalise logistics.
Saturday 01/02/03	Private sector meetings, Nairobi
Sunday 02/02/2003	The team travel to Kisii
Monday 03/02/03	Meeting with key project staff to plan and agree on the Research Programme
Tuesday 04/02/03	Meetings with stakeholders and the communities at Endonyo Onkobit and Chelelach in Transmara Diocese. Interviews with district water officers in Migori and Kisii.
Wednesday 05/02/03	Meetings with communities at Kaongo and god Nyango in Kisii Diocese. Meetings with spare parts suppliers and handpump manufacturers in Kisii, and technical visits to the field.
Thursday 06/02/03	Meetings with stakeholders and the communities at Kanyauke and Jwelu in Homabay Diocese. Interviews with SANA, Kisumu and visits to communities using different handpump technologies.
Friday 07/02/03	Meetings with stakeholders of Kisii Diocese in the morning; Research team met with project staff to select the three communities and get feedback from the baseline. Research team writes up the findings of the baseline. Meetings with private sector stakeholders in Kisumu. Review of Rope and Washer Pump programme, Kisumu.
Saturday 08/02/03	Write up for the baseline survey and preparation for the in-depth study.
Sunday 09/02/03	Write up and preparation for the field continued
Monday 10/02/03	Visit Jwelu Water Project and write up
Tuesday 11/02/03	Visit god Nyango Water project and write up
Wednesday 12/02/03	Visit Kanyauke Water project and write up
Thursday 13/02/03	Final report writing by the research team.
Friday 14/02/03	Research team travel back to Nairobi

Appendix 2 Persons met

Name	Designation	Organization/ Contacts
Stella Achoki	Head Mobiliser	RWD, Box 3255, Kisii
Caroline Aketch	Head Mobiliser	RWD, Box 212, Suna
Philip Athero	Water Bailiff	DWO, Migori
Peter Bore	Mechanical head	DWO, Trans Mara District
Pauline Ikumi	Sociologist	NETWAS, Nairobi
Joseph M. Kilonzo	District Water Officer	DWO, Trans Mara District
P.M. Matseshe	O&M Unit	MWRMD, Nairobi
David Mutethia	Public Health Officer	AMREF, Box 30125, Nairobi
Kariuki Mugo	Programme Manager	RWD, Box 3255, Kisii
Moses Mungai	Water Technician	DWO, Trans Mara District
D.K Mutai	Planning and design	DWO, Trans Mara District
Martha Nadupoi		TDP/GTZ, Kilgoris
Moses Naivasha	DWO Staff	DWO, Tharaka, Meru
Peter Njenga	DWO	DWO, Box 389, Suna-Migori
Abigail Nyaribo	Mob/Training Manager	RWD, Box 3255, Kisii
Harrison Obonyo	Deputy/DWO	DWO, Migori
Ernest Oduor	DWO	DWO, Kisii
Boniface Okotch	Technical Officer	RWD, Migori
Samuel Omakwe	Programme Coordinator	CBHC, St Joseph Mission Hospital
Peter Omangi		CARE Kenya, Homa Bay office
Geoffrey Omolo	Hydrogeologist	DWO, Migori
Colins Onyango	Handpump repairer	Akala
Davies Owino		IDCCS, Kisii Diocese
Rosemary Rop	Chief Executive Officer	SANA, Kisumu
Arnold Sanamba	Technical Manager	RWD, Box 3255, Kisii
Tom M. Simbi	SIWS-Head (O&M)	DWO Office, Box 389, SUBA
Philip Sitemba	Technical Officer	RWD, Kisii Diocese
Edward Tankoi	Ag. Head Mobiliser	RWD, Kilgoris Office, Trans Mara
Paul van Beers	Project Co-ordinator	RWD, Box 3255, Kisii
Godfrey Wainaina	Sales Manager	Davis and Shirtliff, Kisumu
M.A.S. Waweru	Sales Manager	Davis and Shirtliff, Nairobi

Appendix 3 Field checklists

Checklist A: National and/or Regional Stakeholders

Key informants (names, positions)**:** **Date of visit:**

Location: **Evaluator:**

Demographic or baseline data
- Data available for project area at Regional/National level?
- Plans to improve data on rural water supply?

Policy
- National Water Policy in place? What stage is it at?
- Does it cover standardisation, local manufacture, gender, cost recovery?
- Is the policy being implemented? What are the main constraints?
- Does it cover monitoring and evaluation?
- Are there assigned institutions for follow-up and back-up support?
- Is the ownership of the boreholes and handpumps clear?

Institutional arrangements
- Organogram of key stakeholders at national/regional level?
- Roles and responsibilities of stakeholders clearly defined?
- Communication and co-ordination between levels?
- Relationship with local level structures?
- Role of private sector with respect to handpumps?
- Role of NGOs in rural water supply projects?
- Are there phasing-out strategies for support agencies, what are they?
- Are there procedures to be followed if an institution does not perform as it should?

Funding and flow of funds
- How is funding arranged for rural water supply sector?
- How do funds flow to local level?
- How are recurrent costs paid for?
- What are the cost sharing arrangements for handpump projects?

Resources
- Are there adequate resources at national/regional level to fulfil roles?
- What areas are most lacking?

Capacity building
- Have staff at national/regional level received capacity building?
- Do they provide capacity building to local government or other partners?

Checklist B: Local Government and project partner stakeholders

Name of department/organisation: **Date of visit:**

Location: **Evaluator:**

Key informants (names, positions)

Policy

- Are staff aware of national policies? Are these relevant to handpump projects?
- Is there a national or regional policy on standardisation?
- Are staff trying to implement these policies? What are the constraints?
- Is someone monitoring performance?

Project process

- Are water supply activities based on data about coverage or scarcity?
- Is there a mechanism for communities to apply for a handpump?
- Are technologies other than handpumps offered to communities?
- Is a Memorandum of Understanding signed?
- What is the planning and implementation process for handpump installation?
- Who is responsible for siting and drilling boreholes?
- Who is responsible for quality control during construction?
- What do communities contribute towards cost of handpump and installation?
- Who owns the pump? And the borehole or well?
- Is there a formal handover of the handpump?
- What is done to monitor performance of handpumps once installed?

Institutional arrangements

- Organogram for rural water supply?
- Responsibility for mobilisation, installation and maintenance of handpumps?
- Where are handpumps and spares obtained? Where are they manufactured?
- What is the content and purpose of training and what has it achieved?
- How is training phased or linked with implementation?
- How are participants for training selected?
- Are there refresher courses at district or sub-district level?
- Responsibility for training and follow-up?
- Are roles and responsibilities clearly defined?
- What constraints are there to fulfilling roles?
- What is relationship like with national/regional level and communities?
- What is the role of the community in handpump maintenance?

Water supply issues

- What is the design criterion for number of users per pump?
- Is there a standard design for a handpump installation?
- What is the most significant aquifer in the region?
- What type of sources do people use if they do not have access to handpumps?
- What choices were people given regarding water supply technology choice?

- Typical depth of borehole or well?
- Who does the exploration and siting for boreholes? With what equipment?
- What is the success rate of drilling?
- Is there a problem with boreholes (e.g. drying up, siltation etc.)?
- Have any boreholes been rehabilitated?
- Is chemical composition of groundwater tested during drilling? Subsequently?
- Is bacteriological quality of water tested or monitored?

Maintenance

- What are the commonest causes of handpump failure?
- Is there is system in place for carrying out major pump repairs?
- Have communities been given toolkits for maintenance?
- Are they generally carrying out preventive maintenance?
- Do communities know how much it costs to maintain a handpump?
- Are they encouraged to regularly collect money for routine maintenance?
- Can communities afford the full cost of maintenance?
- Who pays for the cost of major repairs (e.g. dropped pipes, new rising main)?
- Are funds available for emergency breakdown (e.g. borehole collapse)?
- Where are spares available? Who buys them? Is there adequate supply?
- Is there a supply chain for spare parts? Could it be improved?

Community and social issues

- What mobilisation work is done with communities for handpump projects?
- Have staff been trained in participatory approaches?
- How is the community organized to operate and maintain the pump?
- Is implementation of water supply linked to hygiene education?
- How do communities communicate with local government and vice versa?

Checklist C: Community/Users

Name of village/location: **Date of visit:**

Distance to district capital: **Evaluator:**

Key informants (names, positions, number of adult males/females)

C1. Project process

- When and how did the community first get involved in the provision of a handpump?
- Were they offered, or did they consider, any alternative technologies
- (e.g. bucket and windlass)?
- Were they clear about what their responsibilities were throughout the project?
- Did they sign a Memorandum of Understanding? What does this say?
- To what extent did they participate during installation?
- Where they involved in the siting of the handpump and if so how?
- Did they contribute towards the cost of the handpump and installation?
- Are they happy with the quality of the work done?
- Who owns the pump? And the borehole or well?
- Was there a formal handover of the handpump? If so how was this done?
- Does the community report back to local government on pump performance?

C2. Institutional arrangements

- Is there a formal organization responsible for managing the pump?
- Who is on this committee or organization (gender)?
- Are roles and responsibilities of organization members clearly defined? What
- are they?
- What constraints are there to fulfilling roles?
- What training did they receive in relation to the pump?
- When was this training received (before or after installation)?
- Are they confident with the skills they gained from training?
- What is the procedure when the pump breaks down?
- Does everyone trust the organization?
- How much contact does the community have with the local water supply
- department?

C3. Water supply issues

- How many households/people use the handpump?
- How much water per day does a typical household use?
- What is the maximum distance users walk to the handpump?
- What is the typical distance?
- What is the handpump water used for?
- Is the taste of the water acceptable?
- Is the handpump the preferred source of drinking water?
- Is it acceptable for washing clothes (no discolouration)?
- What other sources are there nearby? Are these used and if so what for?
- What is the relative distance to alternative sources of water?
- Does the water quality vary at different times of the year?

- Is the quantity of water adequate for everyone or is it rationed?
- Does the quantity available vary at different times of the year?
- Is the pump used all year round? If not, why not?

C4. Maintenance

- How many handpumps are used by the community? How many are functioning at present?
- Are breakdowns frequent? When were the last three breakdowns?
- What is the typical downtime?
- What are the common breakdowns with the pump?
- Have there been any problems of vandalism?
- Who is responsible for repairing the pump? How far away do they live?
- Has the community got a toolkit for maintenance?
- Are they doing preventive maintenance? (Specify what and when)
- Do they have access to spare parts locally? How far do they have to travel?
- Who supplies spare parts?

Financing

- Can the community afford to buy spare parts?
- Do communities know how much it costs to maintain a handpump?
- Do they consider they can afford to maintain the pump?
- Are they regularly collecting money for routine maintenance? How?
- How much money do they have collected at present? How is this stored (bank account, treasurer, livestock, spares etc.)?
- Are there any problems with collection and storage of funds?
- If they are not regularly collecting money do they consider that they can quickly collect enough money whenever the pump breaks down?
- How much have they spent on maintenance in the past twelve months?
- Who would pay for a major repair (e.g. dropped pipes, new rising main)?

C5. Community and social issues

- Is the handpump used by a single community or more than one? Are there any specific groups within each community?
- Have they established any rules with regard to the pump? Is the pump lockable?
- Does everyone in the community have access to use the pump?
- Are there any local taboos or beliefs associated with water or the handpump?
- What has been the impact of the handpump on the community?
- Is the community satisfied with the handpump? Why?
- Have they had any training on hygiene education? Do they understand the link between poor quality water and disease?
- How do communities communicate with local government and vice versa?

Technical data

- Type of handpump (model, make, country of origin)
- Type of source (borehole, hand-dug well)
- Date of installation
- Depth to cylinder
- Riser pipe material
- Approximate yield (strokes/litre; litres/second)
- Number of strokes to arrival of water

- Observed pump faults
- General quality of construction/installation
- Condition of apron/drainage

Checklist D: Private sector stakeholders

Private pump mechanics

- Where and when did they receive training?
- How were they selected to be trained?
- What did the training comprise?
- How long have they been working as a pump mechanic?
- How many pumps do they work on now?
- Who pays them for work? How much?
- Where do they get spare parts from?
- Can they carry out all repairs? What do they do if it is beyond their capacity?
- Do they have other employment?

Pump or spare part suppliers

- What profit levels do suppliers make? Why do they sell pumps/spare parts?
- Which models of pump do they stock (or hold parts for)?
- How long have they been stocking pumps/parts?
- How long are they ever out of stock?
- How did they initially go into business (e.g. with support from project)?
- Is the business now making a profit without external support or subsidy?
- Do they supply the full range of parts? What parts do they supply and why?
- Where do they purchase these items? Do they purchase them on credit?
- Who are normally their customers for pumps/parts?
- Do they provide technical assistance?
- Do they provide warranties?
- What degree or marketing is used or is needed?
- How does regulation effect them?
- How could business be improved?

Water vendors

- How long have they been vending water?
- How much do they charge for water? What profit do they make?
- What type of people are their typical customers (trade, private, farmers)?
- Do they pay towards pump maintenance?
- What would they do, or do they do, when the pump breaks down?

Appendix 4 Baseline survey results

Sustainability snapshot (WaterAid, Malawi)

The basic sustainability snapshot tool, as developed by Steve Sugden of WaterAid Malawi, was used for each community visited during the baseline survey.

Factor	Statement
Financial	1. No funds available for maintenance when needed. 2. Funds available but not sufficient for the most expensive maintenance process. 3. Funds available and sufficient for the most expensive maintenance process.
Technical skills	1. Technical skills not available for maintenance when needed. 2. Some technical skills for maintenance but not for all. 3. Technical skills for all maintenance processes available.
Spares and equipment	1. Spares and equipment not available when needed. 2. Spares and equipment available but not for all repairs. 3. Spares and equipment available for all repairs when needed.

The results obtained for each community visited are summarised below.

Naitawang community, Transmara Diocese

Factor	Statement	Score
Financial	No funds available for repair when needed	1
Technical skills	Some technical skills for maintenance but not for all	2
Spare parts and equipment	Community is not aware on where to get spares and equipment when there is a breakdown	1

The handpump installed in 1999 and since then no major breakdown has been experienced. The community reports that in case there was a breakdown they would not know where to get spare parts and equipment including how much these would cost. They however appreciate and still remain attached to RWD to direct them on where to get spare parts whenever need arise. Limited on site training was done to the community although no plans for refresher training are in place. There is a committee with a membership of twelve which meets yearly or whenever there is a problem with the handpump to discuss the logistics of maintaining the handpump. Water is free for both members and non-members. There is no revenue generated through use of water, no regular contribution towards maintenance of handpump and in case need be the community would be called upon to contribute in cash or kind for the repair of handpump. Members are however not willing to contribute any money for repair until there is a breakdown.

Chelelach community, Transmara Diocese

Factor	Statement	Score
Financial	No funds available for repair when needed	1
Technical skills	Some technical skills for maintenance but not for all	2
Spare parts and equipment	Community is not aware on where to get spares and equipment when there is a breakdown	1

The handpump was installed in 2001. There is a committee of ten people representing six men and four women. They meet monthly to discuss how to maintain the handpump. Limited on site training was done and no plans for refresher training are in place. There has never been any major breakdown since installation. The water point serves 854 households, both members and non-members. Each user is expected to contribute ten shillings per month. These collections are ongoing and so far the community have accumulated two hundred and fifty shillings but have no account to bank this amount. There has never been any major breakdown except a check up of the pump due to low water levels. If there was breakdown the community would not know where to get spare parts thus rely on RWD to direct them.

Kaongo Women group water project, Kisii Diocese

Factor	Statement	Score
Financial	Limited funds available for maintenance when needed	2
Technical skills	Technical skills not available for maintenance when needed	1
Spare parts and equipment	Community is not aware on where to get spares and equipment when there is a breakdown apart from visiting RWD for guidance	1

The pump for this water point was installed in 2001 and is managed by a women group. The community made their contribution of Kshs 15000 towards the installation of the handpump. The women group has thirty members and an active committee consisting of eight women and two men. The committee meets twice per month to discuss ways of maintaining the handpump. Members have to pay Kshs 20 for registration and also make a monthly contribution of Kshs 10 in order to fetch water. The women group has other Income generating activities such as dairy cows for milk, which is sold and money ploughed back to the group. There has been no break down since installation of the handpump and in case it happens the community would have no idea where to get spare parts. There had been no training on technical skills and the community expects to go back to RWD for assistance in case there is a breakdown. At the moment they have Kshs 900, which is kept by the treasurer at home since the group has no bank account. The members felt that in case the pump breaks

down they would call for an emergency community meeting to raise funds for the cost of the repair.

godNyango water project, Kisii Diocese

Factor	Statement	Score
Financial	No funds available for maintenance when needed. Pump broken for more than a year and no repairs done	1
Technical skills	Technical skills not available for maintenance when needed. Community depend on RWD for assistance	1
Spare parts and equipment	Community is not aware on where to get spares and equipment when there is a breakdown. Depend on RWD for assistance	1

The pump was installed in 1987 and provides water for about 105 households and a primary school in the community. The pump has broken down twice and was repaired with support from a prominent community member. The third break down was in April 2002 and the pump has not been repaired since then. This has made the community revert to contaminated river water source nearby, despite the fact that five people are reported to have died of cholera as a result of taking water from the same river.

There was a committee, which was initially made up of twelve members, but currently there is no committee. The community perceives the water point to be theirs when it is functioning and once there is a break down they feel it is the responsibility of RWD. They attribute this perception to lack of sensitisation and mobilization during planning and implementation of the project.

Kanyauke water project, HomaBay Diocese

Factor	Statement	Score
Financial	Adequate funds available for maintenance when needed.	3
Technical skills	Technical skills available for maintenance when needed.	3
Spare parts and equipment	Community depends on RWD for spares and equipment when there is a breakdown.	2

This is a women group water project and pump installation was done in 1997. There have been two minor repairs of replacing the U seal rubber in 1997 and 2000. They have a technical person trained on maintenance of the handpump. During the two minor repairs the community acquired spare parts through RWD, Migori office and the technician did the replacement. The project serves sixty-seven households. Members of the group are twenty-two and all have paid membership fee of Kshs 50. All users pay Kshs 20 per month to

guarantee them access to water point. The women group has scheduled times for fetching water, once in the morning and afternoon. The group has a committee that meets monthly to discuss the welfare of the members and for the caretaker to give a report on the water point maintenance and also amount of money collected during the month. The community has a bank account and at present they have Kshs 8000 in the account, which is banked with post bank.

Jwelu community water project, HomaBay Diocese

Factor	Statement	Score
Financial	Some funds available for maintenance when needed but not adequate for major break down.	2
Technical skills	Technical skills not available for maintenance when needed.	1
Spare parts and equipment	Spare parts and equipment not available when needed.	1

The pump was installed in year 2000 and serves forty-six households, who are members. Membership fee is Kshs 300 and 200 for men and women respectively. In addition the members pays Kshs 15 per month to have access to the water point while non-members are allowed to fetch water at a fee of Kshs 5 for a 20-litre. The project has Kshs 2,500 so far, which is kept at home by the treasurer as they have no bank account. There is a committee of eleven members, comprising of four women and seven men and meets twice a month. There is no person trained on technical maintenance of the handpump and in case of break down the community expects RWD to assist them. No break down has been experienced so far and the community has no idea where to get spare parts, which they hoped RWD would provide.

Appendix 5 Key findings of stakeholders' consultation

Consultations were held between the research team, RWD and their collaborators in three dioceses where RWD operates namely Kisii, Homabay and Transmara. The discussions focused on the stakeholders' roles, constraints and experiences in handpump projects during and after project implementation. The participants were mainly drawn from the Ministry of water, NGOs operating in the areas and church development programmes. After the discussions, there seem to be consensus on the following issues.

Roles

The government policy has changed from being an implementer to a regulator, and this shift of policy supports the involvement of the private sector, which also gives them a greater responsibility for service provision.

For community water supplies the district water offices is expected to provide technical support to the communities. From discussions it emerged that a few communities have been consulting the DWOs for technical support. The DWOs have the manpower but in many cases the lack resources to meet such costs as transport, fuel etc.

NGOs and other local stakeholders are involved at different stages of the project cycle, planning, implementation, capacity building, and monitoring and evaluation. Their collaborators' roles decline gradually towards project phase out and almost cease after funding period as there is no financial commitment to follow up the communities. It is expected that the ministry of water will take over from that point. There are no formal arrangements that have been made and the resources are limted.

Experiences

Stakeholders noted that there are limited choices for handpumps and the most commonly used is the Afridev type. It was noted that although the technology is simple, easy to maintain and spare parts are locally available, the frequency of breakdown of the pump is too high. Mobility of local artisans, where they have been trained is also very high. Only women are always available in the community and are the first to suffer the consequences of pump breakdown but unfortunately they are rarely targets for training on maintenance. Building on this experience, there are pilot projects training women on simple maintenance and preliminary results have shown positive outcome and this is hoped to enhance sustainability of handpumps.

Constraints

Stakeholders agree that inadequacy of resources to meet increasing community demands is the main constraint for the ministry of water (DWOs). For the private sector, inability to have resources for follow up of communities after project funding is over is seen as a hindrance. Evaluations of projects impact and sustainability immediately or shortly after project implementation, a common practice at present, does not give a true reflection of the community capacity to sustain water projects. Stakeholders also note that lack of harmony in approaches is a common constraint, especially for those working in the same neighbourhood. Cost sharing between the community and NGOs was noted as a good example, where communities in the same locality but served by different development partners may be subjected to different percentage contribution. This has been observed to bring discontent and made community participation in some cases rather difficult and consequently affected perception on ownership and sustainability of the projects.