

HTN **SIKAT**

Partnerships, Roles and Responsibilities

HTN Workshop, Malawi,
17-21 March 1997

Proceedings

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1 Introduction

This document reports the proceedings of the Handpump Technology Network (HTN) Workshop held at the Makokola Club, Mangochi, Malawi, 17-21 March 1997. The Mangochi Workshop was hosted by the Government of Malawi and UNICEF Malawi and sponsored by the Swiss Agency for Development and Co-operation (SDC) and UNICEF. **Sections 1.1 & 1.2** provide information about the workshop's theme and objectives respectively. **Section 1.3** outlines the workshop's agenda and **Section 1.4** introduces its participants.

1.1 Workshop Theme

The rural water supply sector has made significant progress since the previous HTN workshop, held in Kakamega, Kenya, in November 1992. Therefore, in preparing for the Mangochi Workshop, the Swiss Centre for Development Co-operation in Technology and Management (SKAT) recognised that a wide range of non-technical issues — including the need for formulation and implementation of new sector policies, frameworks and approaches — required debate. The theme of the workshop, 'Partnerships, Roles and Responsibilities', reflects this need.

1.2 Workshop Objectives

Keeping the workshop's theme in mind, its specific objectives were established as follows:

- to work out recommendations and principles on institutional, financial and technical issues in order to optimise utilisation of financial and human resources

- to adopt guidelines on:
 - technology choice
 - standardisation
 - introduction of new technologies
 - research and development (R&D) framework, communication and dissemination of information
- to define the HTN's mandate and scope of its activities.

1.3 Workshop Agenda

The workshop agenda included a wide range of activities:

- introductory and keynote speeches by invited dignitaries
- presentations by renowned rural water supply specialists
- working group discussions in large and small groups
- plenary sessions to debate and finalise recommendations
- visits to handpump sites in the vicinity of Mangochi.

A copy of the agenda is enclosed at **Appendix 1**.

1.4 Workshop Participants

The Mangochi Workshop was a major international gathering of rural water supply and sanitation specialists with over 150 delegates attending from nearly 40 countries. Representatives from 11 national water sector agencies participated as well as UNICEF staff from 16 countries. Bilateral donor agencies and the UNDP/World Bank Water

and Sanitation Program were represented, as were 13 private sector manufacturing organisations. Non-government organisations (NGOs), external support agencies (ESAs) and consultancies also sent their staff to the workshop. A full list of workshop delegates is presented in **Appendix 2**.

2 Workshop Context

It is recognised that the supply of safe drinking water and sanitation services will remain an elusive goal, especially in Africa, without changes in the present arrangements and approaches. Similarly, unless additional financial and non-financial resources are mobilised, the objective of universal coverage is unlikely to be achieved in the foreseeable future. With these points in mind, **Section 2.1** provides an overview of the issues faced by the water and sanitation sector throughout the developing world. **Section 2.2** describes the role of handpumps in helping to resolve these issues.

2.1 Basic Human Needs

Malawi, like many other developing countries, struggles to provide its people with access to safe drinking water. The word 'safe' is significant. Most developing countries have, on the face of it, plenty of water. However, achieving the goal of universal access to safe drinking water is a gigantic and complex task, given the limited available resources.

Concerted efforts during the International Drinking Water Supply and Sanitation Decade brought water and sanitation services to hundreds of millions of the world's poorest people. However, despite unprecedented progress in the 1980s, the inability of many nations to provide for their people's most basic needs as we approach the turn of the century is still evident.

The statistics are staggering. At the end of 1991, Some 1,000 million people lacked access to safe drinking water and 1,800 million people had no safe sanitation facilities. UNICEF estimates that water-related diseases contribute to

nearly 4 million child deaths each year. The economic consequences are also immense. People in rural Africa, mainly women and girls, spend as many as 40,000 million hours each year hauling water. As a result, the continent's lost opportunities cost it at least US\$ 2,000 million per annum.

2.2 The Role of Handpumps

It is a commonly held view that all peoples, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs. According to Agenda 21, adopted at The United Nations Conference on Environment and Development (The Earth Summit) in Rio de Janeiro, "*Safe water-supplies and environmental sanitation are vital for protecting the environment, improving health and alleviating poverty.*" However, the expense of providing universal access to safe water, using traditional piped water supplies, is prohibitive.

The Decade saw considerable progress in the development and application of low-cost water supply and sanitation technologies, including handpumps. Drawing upon India's pioneering work in the field, the globally co-ordinated UNDP/World Bank Water and Sanitation Program placed considerable emphasis on the promotion and use of handpumps within water supply projects.

In the 1990s, handpumps continue to be the principal technology used to supply water to rural people in developing countries because, in most cases, handpumps represent the most cost-effective option for supplying low-income small communities with safe drinking water. They are also environmentally friendly, relatively simple to operate, and manageable by the community itself.

However, the proper maintenance of community handpumps is still a major problem in many countries. Many questions remain unanswered. How can the impact of the investment in handpump programmes be maximised? How can additional resources, especially at the local level, be mobilised? How can the sustainability of existing water facilities be improved? How can the different players co-operate and interact? These are just some of the questions facing planners and administrators in developing countries — questions that the Mangochi Workshop sought to resolve. It is a credit to the participants, and a sure sign of their experience and expertise, that such credible and pragmatic answers emerged.

3 Workshop Presentations

The workshop presentations are grouped under five main headings:

- presentations placing the issues of the sector into perspective (**Section 3.1**)
- presentations on the past, present and future of the HTN (**Section 3.2**)
- presentations that updated participants on the results of recent handpump R&D (**Section 3.3**)
- presentations on handpump technology selection, standardisation, local production and drilling (**Section 3.4**)
- presentations on handpump management and maintenance in various countries (**Section 3.5**).

A list of papers submitted during the workshop is given in **Appendix 3**.

3.1 Placing the Issues into Perspective

Chairing the introductory session, Mr K A Manjolo, Principal Secretary, Ministry of Irrigation and Water Development, Malawi, welcomed participants to Mangochi. He wished them a pleasant stay on the shores of Lake Malawi, one of the continent's largest bodies of fresh water.

3.1.1 *Setting the Scene*

Dr Natalie Hahn, UNICEF Representative in Malawi, gave the workshop's welcome address. Whilst noting that only 37% of people in Malawi have access to clean and safe

water, she praised the government's efforts to improve the present position and highlighted its "*bold new spirit*". During her introductory remarks, Dr Hahn noted major changes in government policy — universal provision of free education, decentralisation of services, accountability at the community level and provision of a social action fund. She told delegates of her hope that the water sector could now move forward with renewed vigour.

According to Dr Hahn, communities must be involved in the decision making process and should start to bear the cost of ongoing operation and maintenance (O&M) — particularly in urban areas. In her experience, no handpump project could succeed without the support of women. Stressing the particular needs of children, Dr Hahn indicated her desire to see the country's 38,000 classrooms provided with clean water and sanitation facilities. She felt that this could be achieved if a consortium of organisations, companies and the government worked in partnership. Concluding her address, Dr Hahn challenged all participants to act as catalysts for change — "*to bring water, and thus life*".

Ms Francis Turner, UNICEF Representative in Madagascar and Patron of UNICEF's Water and Environmental Sanitation Network (WESNET), East and Southern Africa, provided an overview of the water and sanitation sector as seen by UNICEF. Ms Turner stressed that whilst costs have come down and quality has improved over the past 20 years, 1,200 million people around the world are, as yet, unserved. She highlighted the complex interplay between technical, political, economic and social factors and emphasised the need for private sector involvement in the water and sanitation sector. Capacity building, community-based solutions and participatory approaches offered hope. Partnerships between complimentary players should enable them to have a positive impact on the needs of the people. Ms Turner

called for a system-wide initiative from the African continent that would ensure the provision of safe and clean drinking water for all.

3.1.2 Keynote Speech

The Hon Edward Bwanali, Minister of Irrigation and Water Development, delivered the workshop's keynote address. He emphasised the seriousness of the macro-level issues facing Malawi, but stated that in his view it was a criminal act, for a government, to do nothing to solve the water needs of its people. Mr Bwanali graphically highlighted the irony of his country's unpredictable water resource situation by stating that "*Following three to four years of drought, we have been blessed with abundant rains this year — so much so that a lot of water went to waste in the Indian Ocean!*". He said that much more must be done to harvest water before it goes to waste.

Mr Bwanali welcomed all attendees to the Mangochi Workshop, especially those who had travelled from abroad, and expressed his hope that Malawi would live up to its reputation as 'The Warm Heart of Africa'. Mr Bwanali stressed that water is a critical element in development and noted that globally co-ordinated efforts are required to ensure that communities, particularly the women in those communities, benefit. After reviewing his country's experience with its handpump programmes, Mr Bwanali stated that standardisation has many advantages. He called for national consensus on handpump systems and proposed that standards should be adopted on a regional basis. According to Mr Bwanali, the use of low cost technologies, such as handpumps, has become widely accepted within the water and sanitation sector. Although much still needs to be done, Mr Bwanali appealed to participants to be practical and realistic in their recommendations. In particular, he

called for discussions at the workshop to focus on demand-based requirements.

Mr Bwanali expressed his sincere gratitude to the HTN, SKAT and UNICEF Malawi for their support in running the Mangochi Workshop and welcomed their continued assistance to his Ministry. He declared his hope that the workshop would provide sound proposals and outlined his thoughts on appropriate handpump solutions: low cost; robust; easy to transport and install; acceptable to users; corrosion resistant; suitable for both water supply and irrigation; and, built from local materials if possible. In conclusion, Mr Bwanali called on the HTN to sponsor effective and efficient mechanisms to disseminate the results of the workshop so that all interested parties could benefit from its outcomes.

3.1.3 *Historical Background*

Mr Saul Arlosoroff, formerly Global Program Manager of the UNDP/World Bank Rural Water Supply and Sanitation Program, gave a retrospective analysis of 15 years of the joint global programme. He offered special thanks to UNICEF and SKAT for choosing Malawi as the site of the workshop. Mr Arlosoroff remembered that Malawi was one of the first countries to recognise the potential for handpumps in its rural water supply projects.

In his presentation, Mr Arlosoroff reviewed the issues that stimulated agencies to investigate handpump-based water supply systems as an alternative to piped systems. Despite their inherent low cost and suitability in solving the needs of millions of rural people throughout the world, handpumps have had to win over a large number of sceptics. Mr Arlosoroff provided an insight into many of the obstacles that needed to be overcome. After many years of work, three main principles emerged from the global programme:

- the need for village level operation and management of maintenance (VLOM) — supported by simplified designs, improved reliability and local manufacture, where possible
- the need for community management to ensure sustainability
- the need for a focus on ‘some for all rather than all for some’.

Mr Arlosoroff pointed out a number of important issues that have emerged in recent years:

- the need for a better balance between public and private sector responsibility for R&D
- the need to move the water supply sector away from an over-reliance on government actions to ensure sustainability
- the need to resolve a wide range of technical issues such as ongoing standardisation, use of new materials, reduction in the cost of drilling, pollution of groundwater supplies, and availability and supply of spare parts.

In concluding his presentation, Mr Arlosoroff warned of the continuing need to enforce quality standards. He talked about the danger posed to millions of handpumps by the motorised irrigation pumps. He called upon UNICEF, the HTN, the UNDP/World Bank and the donors to continue to promote large-scale handpump-based community water supply projects — these still represent “*the only hope for millions of (the) unserved rural poor*”.

3.2 The Past, Present and Future of the HTN

3.2.1 *HTN Introductory Remarks*

Mr Rupert Talbot, Chairman of the HTN (and Chief of WES, UNICEF India), provided a brief introduction to the network. He outlined its history and the demand-led nature of its conception following the Kakemega Handpump Workshop of 1992. He noted the sponsorship of the HTN by the SDC and praised SKAT for its role in providing the secretariat for the network.

Introducing the workshop and outlining its objectives, Mr Talbot encouraged active participation and exchange of experiences by participants. He highlighted the main issues for discussion and called for participants to make practical, realistic recommendations. According to Mr Talbot, demand for inputs by the HTN are increasing. Paying tribute to a range of persons that had contributed to handpump developments over the years, he stressed the need for the HTN to mobilise additional resources. As a start, the Mangochi Workshop should aim to mobilise the combined wisdom of participants. Thus, the HTN should be able to contribute to an improvement in water supply coverage and the sustainability of handpump-based water supply programmes.

3.2.2 *The Role of the HTN*

Mr Arlosoroff assumed the chair and introduced Mr Erich Baumann, Head of the Handpump Department at SKAT, who outlined the role of the HTN. Describing the network as being interested in both the 'hardware' and 'software' aspects of handpumps, Mr Baumann provided participants with an overview of the HTN's activities since its conception. According to Mr Baumann, key deliverables of the

network have included support of country-level initiatives, local capacity building and publication of international specifications for many of the world's public domain handpumps.

Mr Baumann described the HTN's participation in GARNET, a 'network of topical networks' run by the University of Loughborough in the United Kingdom. He also outlined the structure of the HTN's overseeing bodies — the consultative group and inter-agency peer group — and called for organisations, particularly donors, to consider representation on these groups.

3.3 Handpump Research and Development

Mr Talbot assumed the chair for the presentations and plenary discussions on handpump R&D.

3.3.1 India Mark III Pump

Mr Vishwas Joshi, Project Officer, WES, UNICEF India, presented a historical review of the India Mark II and III deepwell handpumps before describing the current R&D programme. UNICEF has been sponsoring the development of a 50mm cylinder version of the India Mark III for the past few years. The new pump has the following advantages over the 63mm cylinder version of the same pump: reduced capital cost (by approx. 25% if used with GI risers); increased lift; interchangeable bobbin valves and washers; and, suitability for use on 100mm boreholes. The new pump includes an open top cylinder for ease of installation and maintenance.

Trials have been carried out since 1993 and the new pump is showing good reliability and user acceptance. Other handpump R&D activities in India include experimentation with 50mm galvanised iron (GI) and uPVC riser mains,

fibreglass reinforced plastic (FRP) pump rods and elimination of bacteriological contamination at the well point. On the latter matter, Mr Joshi described and demonstrated simple, inexpensive bacteriological test vials that use H₂S strips. At US\$ 0.25 per vial, these tests are affordable to most user communities.

3.3.2 Malda Pump

Mr Hamilton Khoviwa, from the Ministry of Irrigation and Water Development, Malawi, provided participants with an insight into the development of the Malda pump — a direct action pump based on the Afridev. Following a review of existing pumps in 1993, a team was established in Malawi to draw up design criteria for a new pump. The specifications stated that it should be able to pump 20 litres per minute from 15 metres, have identical fast wearing and down the hole components to the Afridev, incorporate ergonomic and VLOM design principles and be cost-competitive with similar direct action pumps on the market.

Mr Khoviwa spoke about the development phases of the Malda pump, including manufacture of the first 100 prototypes. He noted that hot dip galvanising of the pumps had caused some problems during manufacture, but that initial field trials had generated encouraging results. Breakage and disconnection of the handle rod had accounted for the majority of problems in the field – the cause of these failures was being eliminated through a design modification. Mr Khoviwa indicated that low pump volumes may undermine profitable manufacture and stressed the importance of surveying the market before establishing complete local manufacturing facilities.

3.3.3 HTN Handpump Specification

Mr Karl Erpf, Mechanical Engineer from the Handpump Department at SKAT, spoke about the typical stages in the development lifecycle of a product — from the initial idea through to full-scale production. He outlined SKAT's role (on behalf of the HTN) in overseeing the development of international specifications for public domain handpumps (including the Afridev, Malda and Yaku-MAYA). The HTN places particular emphasis on implementation guidelines that are institutionally sound, technically realistic and responsive to the needs of users.

SKAT's current activities include the development of guidelines for modularisation of public domain handpumps and ongoing monitoring of global R&D activities. According to Mr Erpf, SKAT has already published three revisions of the Afridev specification and plans additional revisions as and when required. Despite receiving core funding from SDC, SKAT will require further funding if it is to expand its role in the HTN.

3.4 Technology Selection, Standardisation, Local Production and Drilling

Mr Moses Gava, Commissioner for Rural Water, Directorate for Water Development, Uganda, assumed the chair for the presentations on technology selection, standardisation, local production and drilling.

3.4.1 Standardisation

Mr Ken Gray, Senior Project Officer WES, UNICEF New York, presented his views on standardisation. He described the need for standardisation of components. He spoke of the fact that many pumps had been produced without

standardised designs. This caused many problems in the field, such as the non-interchangeability of spare parts, need for increased training and difficulty of controlling inventories. Since the agreement of international specifications by the HTN and national level standardisation in several countries, the situation has improved significantly. Quality is easier to maintain as variation in product is more quickly recognised by manufacturers, inspection agencies and buyers. This is not to say that standards must stand still — revision of standards can and should take place. This allows the results of ongoing R&D to be included in the specifications for public domain handpumps.

Standardisation of pumps within a country is a complicated issue. In some countries, a single handpump type may be all that is required. However, in others, a series of handpumps may be needed to cover all the possible hydrogeological conditions. Care is needed when setting national standards and a range of organisations should be involved in the decision making process. Regardless of the number of pumps available in a country, all should be easy to operate and maintain, user-friendly, cost-effective in the long run, reliable and suitable for physical field conditions.

3.4.2 Procurement

Mr Frans Claassen, Procurement Officer, Water and Sanitation, UNICEF Copenhagen, described the role of UNICEF Supply Division which is the global procurement assembly and supply centre for all the UNICEF assisted countries in the world. Apart from the provision of material supplies to the UNICEF assisted programmes, the Supply Division collects and makes available information on supplies to whoever is in need of this information to support UNICEF's projects. In this way the division makes use of its in-house specialised knowledge but also can tap information from its

global resources. According to Mr Claassen, the division is customer-oriented with the emphasis on providing support to UNICEF country programmes.

In 1995 the total value supplied globally amounted to US\$ 400 million (of which 10% was for water and sanitation supplies), making the UNICEF Supply Division the biggest UN procurement agency. The division forwards 80% of its supplies straight from the supplier to the country. Only 20% comes from the central warehouse in Copenhagen where, for example, setpacking is undertaken and emergency stocks are kept. The main advantages of global procurement are that UNICEF is able to obtain competitive prices, burst monopolies and guarantee the quality of its supplies through the engagement of its own quality control mechanism or through inspection agencies.

UNICEF Supply Division also pursues new developments in commodities related to UNICEF programmes in conjunction with field offices, product developers and manufacturers. One example is the India Mark II handpump. Another is equipment for saltiodisation. The Supply Division supports local procurement whenever economical and the quality of the supplies meets UNICEF's standards. It also helps to stimulate markets and assist local manufacturers to start producing newly developed products. Examples include the marketing of the India Mark II in Nigeria and East Africa. Mr Claassen concluded his presentation by emphasising that UNICEF's Supply Division is looking forward to an active involvement in the HTN.

3.4.3 Drilling Alternatives

Dr Peter Wurzel, Consultant from Spain (formerly Chief of WES, UNICEF Mozambique), began his presentation by stating that drilling for water in Africa was, in general, more costly than in other parts of the world. He subsequently

provided participants with useful advice on possible ways to reduce drilling costs. Dr Wurzel proposed ground rules for economic optimisation of borehole design and thus a revised programme for low-yielding handpump-mounted boreholes – scale down the diameter, depth and investigations (thereby reducing the costs). He stated that, in most cases, drilling should be used only when digging is not an option and that a flow of 1m³ per hour is more than adequate for a handpump-mounted well.

Dr Wurzel proposed that boreholes drilled for handpumps require a maximum diameter of 150mm, should be drilled only 10 - 20m below the water table and do not normally require thorough development. They can make use of low-cost uPVC casing and screens and do not always require gravel packing. He believes that drilling need not be preceded by formal groundwater investigation in all cases. According to Dr Wurzel, the choice of drilling rig is important. In his view, percussion rigs offer many advantages, despite being slower than rotary rigs. Their low cost, relative simplicity and limited reliance on outside support makes them appropriate tools in most parts of rural Africa.

3.4.4 Local Production

Mr Mansoor Ali, Project Officer, WES, UNICEF Nigeria, provided participants with an introduction to the handpump industry in Nigeria. A partnership with the private sector has been built on the sponsorship of local production of the handpumps. According to Mr Ali, in-country manufacture makes economic sense in the long-term because of the large potential market in Nigeria (88 million inhabitants of which 70% reside in rural areas). However, the start-up phase was not without its problems. During the initial stages, production of the RUWATSAN 1 (based on the India Mark III) and RUWATSAN 2 (based on the Afridev) could

not be maintained in spite of a substantial need for such pumps in the country. Very few orders were forthcoming from federal or state governments, the UNDP/World Bank or UNICEF — the very organisations interested in promoting a local manufacturing base.

Following a mid-term review in June 1993, a strategy of support for local manufacturers has emerged. UNICEF is now committed to ensuring that pump volumes are increased and is actively promoting the purchase of locally manufactured pumps by the federal and state governments and communities themselves. Successful delivery of trial orders for the direct action TARA pump has led to larger orders being placed and fulfilled. Deepwell handpumps have also been produced and the costs of both deepwell and shallow well pumps are becoming competitive with imported pumps.

3.5 Management and Maintenance

Mr Palat Mohandas, Joint Secretary (TM) and Mission Director, Rajiv Gandhi National Drinking Water Mission (RGNDWM), Ministry of Rural Areas and Employment, Government of India, chaired the presentations on management and maintenance. He commenced the session with an overview of his own experiences in India. According to Mr Mohandas, around 85% of the population in India has access to safe drinking water. Mr Mohandas spoke of the need to demystify handpumps and implement a people-oriented system for the management of rural water supply. The Government of India is attempting to move from implementation to facilitation so that the downtime figure of around 20 - 25% can be reduced.

Focus on Africa

During the workshop, Mr Brendan Doyle, Senior Programme Officer/Regional Advisor from UNICEF, Nairobi, drew out issues he considered to be relevant in the African context. According to Mr Doyle, in Africa, as many as 258 million rural people lack easy access to a safe water supply. Of these, mainly poor, people, 125 million would depend on handpumps as their only option. The cost is immense — time is lost and suffering is incurred due to poor health and death, as well as opportunities lost in education (especially for girls). In terms of lost productivity alone, it is estimated that over 40,000 million hours per year are wasted on water collection, amounting to US\$ 2,000 million per year opportunity cost to the continent.

Studies have found that the poor pay 10 - 40 times more than the better-off for their water (cost-sharing on capital investment, and full recovery of recurrent costs for O&M, access to credit, etc.) and that 20 - 50% of handpumps are broken down at any one time. According to Mr Doyle, *"It is still hard to determine whether this is the fault of policy, technology, borehole or capacity (or a combination of all these factors). However, significant changes are required if the lot of the majority of rural people is to be improved."*

3.5.1 Ghana

Mr Peter Sackey, Deputy Managing Director of the Community Water and Sanitation Division (CWSD), Ghana Water Supply Corporation, spoke of the Ghanaian experience with centralised management and maintenance of rural water supplies. Although the centralised system employed well-motivated staff, and provided the basis of a good monitoring system, it was expensive to operate and lacked the guarantee of sustainability. It was perceived as being too dependent upon inputs by government and donors.

In 1994, the Government of Ghana launched a new strategy of community ownership and management of water and sanitation systems. It also introduced a policy of standardisation on four pumps — the direct action NIRA for use on shallow wells, the Ghana Modified India Mark II and Afridev for deepwell settings and one footpump (the Vergnet). Considerable progress has been made, but the private sector has lagged in its involvement and a sustainable market has not yet emerged. These disappointments aside, the CWSD has been able to create a forum for frequent discussion among stakeholders and this is helping to bring about uniformity in operation throughout the country.

3.4.2 Nicaragua

Mr Henk Alberts, Engineer with the Technology Transfer Division of Bombas de Mecate, Nicaragua, introduced the rope pump that his company has been producing and selling in Nicaragua without external support since 1992. He attributed the success of the rope pump to “*social acceptance*”, combined with good marketing and high levels of quality control. Around 50% of rope pumps are sold to development projects and the rest to communities and the private sector.

Mr Alberts provided the participants with a historical overview of the rope pump company in Nicaragua, stating that it had emerged from a donor-sponsored project that had been wound down. The company is owned and managed by ex-project staff. According to Mr Alberts, Nicaragua has now standardised on the rope pump (along with the Afridev and India Mark II). Compared to these latter pumps, the rope pump is relatively simple to manufacture and maintain. It has received widespread use on dug wells in Nicaragua and is thought to have considerable potential in other countries.

4 Workshop Recommendations

During the concluding plenary sessions chaired by Mr Mohandas, participants ratified a series of recommendations and guidelines to emerge from the Mangochi Workshop. **Section 4.1** details the workshop's recommendations on the role of the HTN. **Section 4.2** provides a summary of the workshop's recommendations on handpump research and development. **Sections 4.3-5** propose the way forward in the areas of technology selection and standardisation, local production and supply mechanism, and drilling respectively. **Sections 4.6-8** propose the way forward for institutions and capacity building, financial issues, and community management and private sector involvement respectively.

4.1 The Role of the HTN

The HTN has been functional for over four years. Given the limited resources and part-time staff, its performance has been impressive. The delegates at the workshop were asked to consider the future of HTN, its role in optimising the use of scarce resources and improving dissemination of information, and the need for a change in its mandate and the composition of its governing body. Based on the results of plenary discussions and a formal survey, there was overwhelming support for HTN's continuance. It was further agreed that the HTN should:

- expand its scope of activities to include:
 - operational research
 - drilling and digging
 - environmental sanitation

- place more emphasis on dissemination of information (newsletters, case studies, standards, manuals, guidelines)
- build stronger linkages with agencies, institutions and projects at country, regional and global levels.

In terms of its future governance, the workshop recommended that the HTN should be guided by an inter-agency peer group of 5 to 7 members and proposed six members of this group — SKAT, UNICEF, DANIDA, SIDA, the Dutch Ministry of Development Cooperation and Water Aid. Representation by governments from Africa, Asia and Latin America on a revolving basis should be sought. The workshop also recommended that the HTN should have a revolving chair (yearly basis) and that SKAT should continue to provide the secretariat for the HTN, drawing upon funds from interested donors. Members of the HTN should provide additional contributions and support, according to their means.

The workshop proposed that the HTN should prepare a three-year workplan (firm for two years and framework for the third year) and aim to hold a global workshop on topical issues on a two yearly basis. Depending upon support levels, the HTN should also establish regional networks, starting in Africa.

It was agreed that the final report should be translated into French (SKAT) and Portuguese (UNICEF) and shared widely with countries not able to attend the workshop.

4.2 Handpump Research and Development

The workshop found that R&D on public domain handpumps has contributed significantly to the development of the rural water supply sector over the past 20 years. As

a result of these efforts, field-proven handpump designs that are reliable and easy to maintain are now available in the public domain. Many countries and donors use these handpumps in their water supply and sanitation programmes.

As with any other product, the public domain handpump designs need fine-tuning to further improve the pumps' reliability and maintainability. The participants were asked to deliberate on usefulness of past R&D work and the need for continued R&D support to public domain handpumps. They were also asked to identify R&D gaps that need to be addressed and to suggest an R&D framework for better co-ordination and mechanisms for global dissemination of handpump standards and R&D reports.

The key recommendations on handpump R&D that emerged from plenary discussions and a formal survey were that:

- support to R&D on public domain handpumps should continue but be confined to the fine-tuning of existing pumps
- the identified R&D gaps include models for extra-deepwell application, corrosion resistant and cost-effective options for riser pipes and connecting rods
- the HTN R&D framework should involve country level projects, the private sector, R&D institutions and standards institutions
- HTN should place emphasis on dissemination of the results of R&D
- creation of an R&D database and the provision of access to the results of R&D through newsletters and the internet is considered essential

- the establishment of an internet-based system for dialogue is required to facilitate the development of an interactive R&D process
- HTN should support both north-south and south-south co-operation on R&D.

The workshop adopted as a public domain handpump the Malda direct action handpump which has been developed as a result of collaboration by the Government of Malawi, UNICEF, the private sector and the HTN.

4.3 Technology Selection and Standardisation

It should be recognised that a handpump is one of the most environmentally friendly water supply technologies (it is kind on the aquifer — drawing less than 1m³ per hour and only when water is required). Experience shows that appropriate technology selection and standardisation are perhaps the two most important factors in the long-term success of a handpump-based water supply programme. Although sometimes not immediately apparent, in the long term inappropriately selected technologies can jeopardise sustainability. In this context, the workshop recommended that the role of handpumps be given special consideration in the context of exploding urban populations.

In preparing for the workshop it was felt that there is a need for guidelines on technology selection and standardisation which can be considered by implementing agencies while taking a decision on these two aspects. The workshop recommended that a process should be followed for technology selection. This would comprise of defining field requirements, establishing performance criteria, literature search, pilot scale testing of potential handpumps and large scale testing of selected pumps to evaluate field perform-

ance leading to final selection. All stakeholders should be consulted during this process.

The workshop found that standardisation brings in significant benefits that outweigh disadvantages if any. Based on the results of field evaluation, national standardisation on a minimum number of field proven handpumps, to meet the varying hydrogeological conditions, should be adopted. Standardisation should be achieved through a 'National Standardisation Committee' constituted by the government with the representation of all stakeholders. The workshop recognised the need for the formulation of public domain handpump standards by the International Standards Organisation.

Introduction of a new technology where national standardisation already exists should follow the technology selection process strictly to ensure proper selection. The workshop noted that such a change-over holds enormous implications and ramifications and should not be introduced in haste. The guidelines for handpump technology selection and standardisation that were adopted by the workshop are given in **Appendix 5**.

4.4 Local Production and Supply Mechanism

There is no denying that local manufacturing has its own advantages. However, such a decision requires careful consideration of various factors to ensure its long-term viability. It may be possible that, in a given situation, introduction of a better service delivery mechanism is more important than establishment of a local production base.

Following deliberations, the workshop recommended that the most important objective is to achieve an efficient service delivery, either through local production or through a network of dealers. Wherever feasible, local or regional

production should be encouraged — in order to improve access to pumps and spare parts. Where demand or the market is too small, an effective dealership network should be developed.

Recognising that sustainability may not result from the manufacture of handpumps alone, the workshop recommended that potential manufacturers should consider a diversification of their production range to minimise dependency on the handpumps market. To ensure the quality of service delivery by the private sector, safeguards should be put in place. These should include pre-qualification of suppliers, third party inspection and dealer warranty.

Centralised procurement, where implemented, should be seen as a starting point towards eventual decentralisation. The private sector should be encouraged to provide a complete package including supply, installation and after sale service. The workshop recommended that governments should take the lead in the sector for policy/strategy development, co-ordination and facilitating others to deliver water and sanitation services through NGOs, ESAs, local institutions, the private sector, etc.

4.5 Drilling

In most cases, the cost of drilling a borehole is substantially higher than the cost of a handpump. In some countries, drilling costs are prohibitive. Although drilling costs in India remain below US\$ 1,000, the cost per well in many African countries exceeds US\$ 10,000. This is seen as one of the major constraints in expanding water supply coverage, particularly in Africa. Water quality from handpumps is another major emerging issue that needs serious consideration.

The workshop considered the potential for reducing drilling costs. It found that drilling costs can be reduced by optimisation of well design, adoption of appropriate low cost drilling or digging options, use of uPVC casing and screen pipe and selection of minimum well diameter. It recommended that standard specifications should be developed for optimum well designs. In particular, the workshop recommended that for use with a handpump, drilled wells yielding 1m³ per hour should be considered acceptable.

The workshop recommended that the private sector should be encouraged and strengthened to participate in drilling programmes. It suggested that a market study of the water and sanitation sector should be encouraged to gauge the potential for private sector involvement, especially in drilling of boreholes and construction of wells for the estimated 125 million unserved rural population in Africa who will depend upon handpumps as their only option. Technical options that encourage community participation should also be encouraged. Similarly, groundwater quality testing and control should be carried out — especially in places of high risk of aquifer contamination.

4.6 Institutions and Capacity Building

In order to improve sustainability and create a sense of ownership among users, certain changes are required in the implementation strategy. These include the development of demand driven approaches, private sector based service delivery mechanisms, user involvement in decision making processes and cost sharing by all stakeholders. Capacity building at all levels will be required, as well as changes in the government and donor role.

Changes in the implementation strategy must be backed by a corresponding change in the institutional role of govern-

ments — from that of provider of services to that of facilitator. The changes should include, among others, formulation of national policy and guidelines, co-ordination, support, facilitation, funding, and capacity building.

NGOs and the private sector will carry out the implementation work, service delivery, training, etc., while ESAs will provide financial and technical support. As the main stakeholder, the beneficiary community should be involved fully in the decision making process, planning, physical implementation, cost sharing and management of O&M.

Decentralisation of maintenance is desirable as it leads to enhanced effectiveness and efficiency. However, the change-over from a centralised system will need to be properly planned for it to succeed. Other requirements will include national policy and guidelines, strengthening of the private sector service delivery mechanism, transition period for piloting phase, among others.

Recommendations for Africa

1. *The Role of the HTN*

The workshop found that the HTN is a desirable institution in the African context. Its role in providing a link between the different countries, spreading knowledge about successes in handpump programmes, analysing requirements for R&D, etc. should be enhanced through the development of a regional chapter of African members.

2. *Handpump Research and Development*

According to participants at the workshop, there is no need for African countries to 'reinvent the wheel' in R&D of handpumps. Sufficient public domain pumps exist to cover the spectrum of field conditions — not only in Africa, but also around the world. Public domain R&D efforts should be limited to enhancement of the performance of existing pumps. However, significant R&D is required for building knowledge of the 'soft side' (demand, marketing, commercial networking, behavioural change, services, etc.)

3. *Technology Selection and Standardisation*

There are advantages in Africa to standardisation on handpumps or a family of handpumps for both deep and shallow lifts and to standardisation of the pump components themselves. Technology selection and standardisation (choice, local production options, etc.) are major issues that require a strategic approach. The HTN is seen as a very useful mechanism through which African countries can exchange information on their experiences with technology selection and standardisation.

4. *Local Production and Supply Mechanism*

In-country manufacture of handpumps is not always advisable or commercially viable. In Africa, the economics of local production are often less than satisfactory and African countries would be well advised to concentrate on the development of sustainable supply chains rather than sponsor local production per se. Economies of scale may be insufficient to allow an adequate return on investment. Regardless of the source of pumps, there is a need to ensure adequate quality control of pump manufacture and to sponsor the development of efficient service delivery mechanisms that operate at the village level.

5. *Drilling*

Effective and efficient management and tight control of logistics during the field operation of drilling rigs (the "*pack approach*" proposed by Dr Wurzel) appears to offer hope of reduced cost. Similarly, costly hydrogeological and geophysical siting may not be necessary in all situations ("*An experienced eye and throw of a hat may suffice.*") It is important to match borehole diameter and yield to pump and to match rig size and capacity of borehole and programme. It is possible to improve borehole/well and

pump installation specifications and African countries need to do more to explore lower cost and more sustainable options (dug well, manual drilling, percussion rigs, etc.) and to exploit the potential of private sector. If drilling is kept in the public sector, the use of production bonuses as incentives to increase drilling productivity could be explored.

6. Institutions and Capacity Building

The participants recognised the democratic changes taking place throughout Africa that are leading to decentralisation policies and processes. There is a growing requirement to involve communities, especially women, in all phases of water supply projects and programmes in a true participatory way. Given the extent of the changes, there is also a need for capacity building at all levels and for different purposes (community, local entrepreneurs, local & national government, NGOs, the private sector, institutions, etc.) Policy and strategy development and provision of adequate institutional arrangements/structures are important considerations. Improvements in approaches (planning, implementation, co-ordination, including community training and empowerment) and provision of resources for monitoring and evaluation (for decision-making, R&D, lessons learned and experience exchange) will be required. Young professionals with broader development training (social sciences, policy planners, management, etc.) should be sought. The role of the Africa Working Group (collaborative council) should be recognised.

7. Financial Issues

Water supply programmes should not set up their own financing/credit arrangements at the village level, relying instead on existing rural credit systems. The growing potential for mobilising private sector finance should be explored. Similarly, relaxation of import restrictions, less bureaucracy and easier access to foreign exchange are seen as ways that the sector can be assisted. Greater contribution from communities, particularly for O&M and refurbishment, should become the norm as the government hands over management to village water committees and groups.

8. Community Management and Private Sector Involvement

The participants identified a need for clear policy and implementation strategies/guidelines that all stakeholders understand and can implement and a need for harmonisation of government and ESA's policies. There is a strong argument for promoting the VLOM concept (at community & local entrepreneurial level) and a requirement for reliable back-up repair services for spare parts, borehole/well maintenance. The hospital/pharmacy concept described by Mr Peter Macy, may be a suitable delivery model in this context. The need for reliable monitoring and evaluation system tools/processes (that provide information for different needs and at different levels and to share lessons and experiences) cannot be underestimated.

4.7 Financial Issues

Currently, governments and donors are spending about US\$ 1,500 million per year in the sector while estimates of the amounts required to achieve universal coverage range from three to five times the present investment. It is obvious that the lack of adequate resources will continue to be a major constraint. Consequently, strategies have to be developed to mobilise additional resources and to maximise the impact of investments by using appropriate technologies, improving community involvement and increasing private sector participation.

Keeping in view the resource constraints, the workshop found that it is necessary to mobilise additional resources particularly through user contribution in cash and kind. For this to happen, governments need to create an enabling environment that will include a well-defined decentralised policy, which empowers local authorities and communities, enables community ownership and supports the development of a strong private sector service delivery mechanism. There is a need to optimise the available resources.

Whereas for new schemes the major contribution is likely to come from donors and governments, in the case of rehabilitation schemes the major contribution should come from user communities. To facilitate community contribution, the government should establish credit schemes through rural banks. In the case of O&M, full costs should be borne by communities.

The present system of channelling donor funds results in extensive delays. The funds should also be channelled to communities through NGOs. To ensure accountability, the implementation should be a collaborative effort of the communities, NGOs and government.

4.8 Community Management and Private Sector Involvement

In the past, projects were supply driven, as the thrust of governments and donors was to provide this basic need for life in the shortest possible time span. It is now recognised that an implementation strategy, which puts the users in the key decision making role, is essential to mobilise additional resources and improve sustainability.

The workshop found that the community is the key stakeholder and focal point of all development activities. It confirmed the underlying principle that it is the local community and not those trying to help it, that have most at stake and therefore the most important role in the water supply and sanitation sector. It is vital that government agencies, donors, advisors, community leaders and residents recognise and adhere to the principle that the community itself must be the primary decision maker, organiser, maintainer and overseer. Consequently, the user community should also share costs.

Community management is necessary for sustainability of community water supply and sanitation facilities. The workshop recommended that the government should provide an enabling environment and framework for establishment of community-based implementation and management of maintenance. Efforts must be made to build capacity at community level to plan, implement and manage maintenance of facilities.

Community/household ownership of water points (boreholes, dug-wells, springs, etc.) should be promoted to ensure greater sustainability of service. In this context, special attention should be given to the promotion of sanitation and hygiene in schools (both physical facilities and education through classroom curricula) and as a means of

inculcating safe sanitation and hygiene understanding, behaviour and practices in tomorrow's generation.

With the role of governments changing from provider to facilitator, the private sector will obviously have to play a much greater role in service delivery. The workshop recommends that the private sector should play a lead role in service delivery including production, supply of pumps and spare parts and repairs. Wherever necessary, the private sector should be strengthened. The government should play a role of a facilitator and provide technical support, build capacity in co-operation with NGOs, monitor project implementation, and assist in major repairs or rehabilitation. Finally, emergencies should not be used as an excuse to introduce inappropriate technologies and approaches, nor to avoid community participation — special efforts should be made in emergency situations to embark (from the beginning) on long-term sustainable development approaches.

5 The Mangochi Declaration

The Mangochi Workshop found that although low-cost water supply and sanitation technologies are well proven, and despite the existence of many examples of successful implementation strategies, progress in many developing countries remains slow. Setbacks, especially in Africa, continue. Experiences from around the world point to an urgent need for a partnership-based approach, including the creation of an effective framework for co-ordination of efforts and closer collaboration on a global scale. **Section 5.1** outlines and presents the 'The Mangochi Declaration' — a call for renewed vigour within the sector to solve the needs of the world's unserved.

5.1 A Call for Renewed Vigour

In a declaration ratified by the Mangochi Workshop it is proposed that new impetus should be given to the global efforts in the water and sanitation sector. Participants at the workshop pointed out that by the year 2000 approximately 2,200 million and 2,900 million people would require water and sanitation services respectively. Most of these will reside in poor communities. "*Business as usual*", is not a desirable option. The application of current policies, strategies, funding levels and implementation rates means that the sector will not even keep pace with the population growth rate.

**The Mangochi Declaration, 17-21 March 1997:
A New Initiative for a Water Supply and Sanitation Program for the Un-
served in Developing Countries**

Lack of access to safe water supply, inadequate sanitation and poor hygiene practices are among the leading causes of illness, death and malnutrition in developing countries. The consequence of this deprivation of basic needs is catastrophic to human and economic development globally. In rural Africa alone, 40,000 million hours are lost each year on water collection from distant sources. In economic terms, this is estimated to cost the continent at least US\$2,000 million per year - time that could be invested in food production and other economic activities or health and social development.

In spite of the major advances made since the 1980s in providing water and sanitation services to 1,200 million and 770 million people respectively (including the application of cost-effective technologies, promotion of strategic planning, adoption of participatory approaches and collaboration among agencies and governments) the challenge for the future is daunting. Furthermore, of the average yearly investment of US\$13,000 million in the water and sanitation sector over the past 15 years, only about one quarter was spent on low-cost technologies and approaches to serve the rural poor and deprived, low-income urban populations.

By the year 2000 it is estimated that approximately 2,200 million and 2,900 million people will require water and sanitation services respectively. Fully three quarters of these will reside in poor rural communities and in deprived, low-income urban areas (the majority of whom will be under 18 years of age), thus inhibiting their rights to social and economic development. It is clear that to continue with "business as usual", the application of current policies, strategies, funding levels and implementation rates, we will not even keep pace with the population growth rate.

In view of this immense global challenge, over 150 participants comprising senior government officials, representatives of external support agencies, non-government and private sector organisations and leading professionals from nearly 40 countries met at Mangochi, Malawi from 17-21 March 1997 to consider the application of policies and strategies that will help to resolve the issues faced by the water and sanitation sector. The Mangochi Workshop, hosted by the Government of Malawi and UNICEF and held under the auspices of the Handpump Technology Network (HTN), recognised that the supply of safe drinking water and sanitation services to all is not a distant dream, but will remain an elusive goal, especially in Africa, without changing the present arrangements and approaches.

In particular, the Mangochi Workshop perceives a need for governments to move away from the cost-prohibitive solutions that solve the needs of a few to the adoption of solutions using proven, cost-effective technologies and approaches (such as handpumps, spring protection, dug wells and upgrading of traditional water sources and sanitation services) that offer hope to all. It identified that for many of the world's poor, these simple, environmentally friendly solutions remain the only, or if not, the most cost-effective option - both in rural and rapidly deteriorating urban environments.

The Mangochi Workshop identified an urgent need for effective collaboration between governments, external support agencies, non-government organisations, the private sector and user communities. It also recognised that sustainability of standardised, handpump-based and other low-cost water and sanitation systems and approaches can be enhanced by the creation of effective political will and legal environments, promotion of decentralised decision-making processes, mobilisation of the private sector and by adopting demand-driven, community-based empowerment approaches. The Mangochi Workshop recognised that the HTN, whose mandate was reaffirmed and future role was expanded during the workshop, can play a key role - both as a nodal point for information exchange and as a facilitator of best practice throughout the world.

Although low-cost water supply and sanitation technologies are well proven, and examples of successful implementation strategies prevail, progress in many developing countries remains slow and setbacks continue. Experiences from around the world point to an urgent need for a partnership-based approach, including the creation of an effective framework for co-ordination of efforts and closer collaboration on a global scale.

The Mangochi Workshop reminds national governments of their roles and responsibilities for enabling the provision of safe water supply and sanitation services within the framework of the Convention on the Rights of the Child. The development of rational water supply and sanitation policies, together with the introduction of supporting legal, financial and institutional structures is seen as a necessary precursor to success.

Cognisant of the comparative advantage it derives from its global presence, the Mangochi Workshop calls upon UNICEF to work in close collaboration with the World Bank, UNDP, the Collaborative Council, the UN System-wide Special Initiative on Africa, as well as other UN agencies, governments, external support agencies, non-government organisations and the private sector to take a leading role in meeting one of the compelling challenges to sustainable development in the early 21st Century.

The Mangochi Declaration perceives a need for governments to move away from the cost-prohibitive solutions that solve the needs of a few. It calls for the adoption of solutions using proven, cost-effective technologies and approaches (such as handpumps, spring protection, dug wells and upgrading of traditional water sources and sanitation services) that offer hope to all. For many of the world's poor, these simple, environmentally friendly solutions remain the only, or if not, the most cost-effective option.

Abbreviations

CWSD	Community Water and Sanitation Division, Ghana
DANIDA	Danish International Development Agency
DTW	Deep Tube Well
ESA	External Support Agency
FRP	Fibreglass Reinforced Plastic
GARNET	Global Applied Research Network
GI	Galvanised Iron
HTN	Handpump Technology Network
NGO	Non-Government Organisation
O&M	Operation and Maintenance
R&D	Research and Development
RGNDWM	Rajiv Gandhi National Drinking Water Mission, India
SDC	Swiss Agency for Development and Cooperation, Bern, Switzerland
SIDA	Swedish International Development Agency
SKAT	Swiss Centre for Development Cooperation in Technology and Management, St Gallen, Switzerland
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
VL0M	Village Level Operation and Management of Maintenance
WES	Water and Environmental Sanitation
WESNET	Water and Environmental Sanitation Network