RiPPLE

Introduction of the rope pump in SNNPR, and its wider implications

Sally Sutton and Tsegaw Hailu

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Research-inspired Policy and Practice Learning in Ethiopia and the Nile region (RiPPLE) is a 5-year Research Programme Consortium funded by UKaid from the Department for International Development aiming to advance evidence-based learning on water supply and sanitation (WSS). The RiPPLE Consortium is led by the Overseas Development Institute (ODI), working with the College of Development Studies at Addis Ababa University; the Ethiopian Catholic Church Social and Development Coordination Office of Harar (ECC-SDCOH), International Water & Sanitation Centre (IRC) and WaterAid-Ethiopia.

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List of acronyms and abbreviations

BoA	Bureau of Agriculture
BoH	Bureau of Health
BOWR	Bureau (regional) of Water Resources
CDF	Community Development Funds
CMF	Community marketing facilitator
CMP	Community Managed Projects (also CDF)
ETB	Ethiopian Birr
EWTEC	Ethiopia Water Technology Centre
FC/TTC	Faecal coliform/ thermo-tolerant coliform
GTP	Growth and Transformation Plan
HP	Handpump
IDE	International Development Enterprises
JICA	Japanese International Cooperation Agency
MOA	Ministry of Agriculture and Rural Development
MOH	Ministry of Health
MOWE	Ministry of Water and Energy
NGO	Non-government Organisation
PIM	Project Implementation Manual
RADWQ	Rapid Assessment of Drinking Water Quality (WHO, MOH UNICEF)
RP	Rope Pump
SG2000/SAA	Sasakawa 2000, Sasakawa Africa Association
SNNPR	Southern Nations Nationalities and People's Region

TVC	Training and Vocational College
TVET	Technical and Vocational Education and Training (college)
UAP	Universal Access Plan
UNICEF	United Nations Children's Fund
WASCAP	Water and Sanitation Capacity Building
WHO	World Health Organisation

Source definitions

Traditional Hand-dug well (TW or TRHDW)
A well dug without lining, usually without de-watering pump and often used by the families or local artisans.

Hand-dug well (HDW)
A well dug with funded externally, (NGO or government) large diameter with concrete ring lining, large (1m wide) apron and drainage. Usually mounted with a hand pump but more rarely a rope pump.

Machine-dug shallow well (MSW)
PVC or steel- lined borehole to less than 35 m

Hand pump (HP)
Conventional piston handpump, usually an Afridev or India Mk 2.

Rope pump (RP)
Locally manufactured, fairly standard design (see Section 1.3)

Semi-protected (SP)
A traditional well which has at a minimum an impermeable parapet and top lining sealed to a concrete apron and a cover (conforms to JMP minimum standard).

Unprotected (UP)
A traditional well which does not have all the features of a semi-protected well.

Executive summary

The Bureau of Water Resources in Southern Nations Nationalities and People's Region (SNNPR) has been at the forefront of the rope pump introduction for community and household water supply since the beginning in 2005. Since then the technology has been developed further and four high quality rope pump manufacturers have been trained by Practica and EWTEC, with support from JICA.

Over half of the *woredas* (77) are considered as having accessible shallow groundwater suitable for abstraction by rope pump.

Some 243 rope pumps have been installed during this period mainly for demonstration purposes. Of the 78 in the three *woredas*, 60% are said to be working.

Whilst the technical problems have been well addressed, the lack of demand for pumps in most areas, and the lack of capacity to respond to demand where it has developed are slowing down any efforts to go to scale. If rope pumps are to play a significant part in Universal Access Plan (UAP) coverage it will need a concerted effort by BoWR to have them recognised as a valuable technology by both sector professionals and households, and consequently included in their budgets. Technical guidelines are well-developed, but those for introducing and marketing rope pumps are not.

Water quality analysis suggest that traditional wells fitted with top slabs and rope pumps can eliminate contamination, and on average offers water which is five times safer than from unprotected sources, but half as good as from conventional handpumps. Low risk water quality (<10 FC/100ml) is as likely to be found in rope pump wells as in protected springs. The samples taken reflect the worst case scenario, collected in the rainy season from pumps often installed primarily for irrigation and mostly not chlorinated or cleaned out since the pump was installed.

In terms of reliability and adequacy of supply there was little discernible difference found between handpumps (Afridev and India Mk 2) on protected wells and wells with rope pumps.

Moves to demonstrate the pump's benefits have not been sufficiently strongly linked to marketing initiatives and the building up of effective support services. This has made it difficult to keep pumps working and for those impressed by the demonstrations, to buy pumps for themselves.

The model which BoWR has taken for introducing the rope pump differs significantly from that developed by BOA/IDE. The first depends highly on government in all aspects from procurement to promotion, and concentrates mainly on technical issues. The latter puts more emphasis on the role of NGOs and the private sector and focuses on demand creation and development of support services.

BOA are increasing efforts to promote household level water supply for irrigation and sales of rope pumps (target 400,000 new sources – ponds and rope pump wells). It would seem that BoWR should liaise closely with BOA to see to what degree the two initiatives can converge with multiple rather than single use systems being promoted.

Where market forces are introduced for rope pump uptake, the roles of government may need to be different from those for conventional community water supplies. Movement away from planning installations, procuring pumps, monitoring progress and regulating design towards provision of technical advice, promotion and quality need to be discussed and defined.

Micro-credit institutions do not consider household or group water supply as a sound investment at present and so suitable for loans. Few people will initially invest in water without either small incentives or systems which allow them to spread their payments. BoWR will need to consider whether revolving funds are sufficient and effective or what other forms financial support might take, including links to the new financing window for community managed projects (CMP).

Introduction

1.1 The rope pump study

This report looks at the present production and performance of pumps, the factors affecting their uptake and the elements of the supply chain which are needed to ensure their reliable performance and increased popularity. It looks at the experiences in SNNPR but also at those for rope pumps in the neighbouring Ziway area where pumps have been introduced in greater numbers and in a different manner. It is complementary to the report undertaken for UNICEF in February 2010 (Mammo 2010)

The report is based mainly on interviews carried out by Tsegaw Hailu in December 2010 with stakeholders at all levels, but also on the results of the field surveys carried out on 35 rope pumps in SNNPR. Interviews were carried out using semi-structured discussion points. The number of rope pumps surveyed was limited by:

a) the small number installed in the focal *woreda*s

b) the number of those which were operating and

c) the number of operating pumps used for drinking water as opposed to only other bulk uses (domestic, animal watering, irrigation)

1.2 The national context

The rope pump is based on an ancient Chinese technology, which was introduced in the 1990s to Central America. It was further developed in Nicaragua and now contributes significantly to rural water supply coverage (WSP 2008). Over the past decade efforts have been made to transfer the technology to various parts of Africa, often drawing upon the Central American experience (Sutton 2009). In Ethiopia this process started in 2005. As a result it is now possible to learn from Ethiopian experiences to date, and in the future Ethiopia could benefit from looking at the progress and processes of other countries in the continent which have taken different routes. At present more rope pumps have been produced in Ethiopia than in any other sub-Saharan country, but uptake and sustainability remain key areas which need much more marketing and development.

Adoption of the rope pump (RP) as an effective technology is being promoted not just by the water sector but also by the Ministry of Agriculture (MoA), with a focus on the expansion of small-scale irrigation. This is in line with the Growth and Transformation Plan (MoFED 2010) aims of developing community participation and labour intensive, low cost technologies. Within the agricultural sector the approach to introduction of the rope pump has been different from Ministry of Water Resources (MOWE) and valuable lessons are to be learnt from both approaches in order to scale up successfully.

The revised UAP (MOWE 2009) puts considerable emphasis on the potential of the rope pump to provide safe and sustainable water supply for households. It highlights the role of low cost technologies, both within community and household contexts. Whilst community low cost supplies (spring protection, handpumps on hand-dug wells and shallow boreholes) will receive government subsidies, household level low cost systems will be paid for in full by the householder and so compete with other items on the household budget. Marketing the benefits is therefore a key aspect if uptake is to make a significant difference to rural water supply coverage. Various aspects of

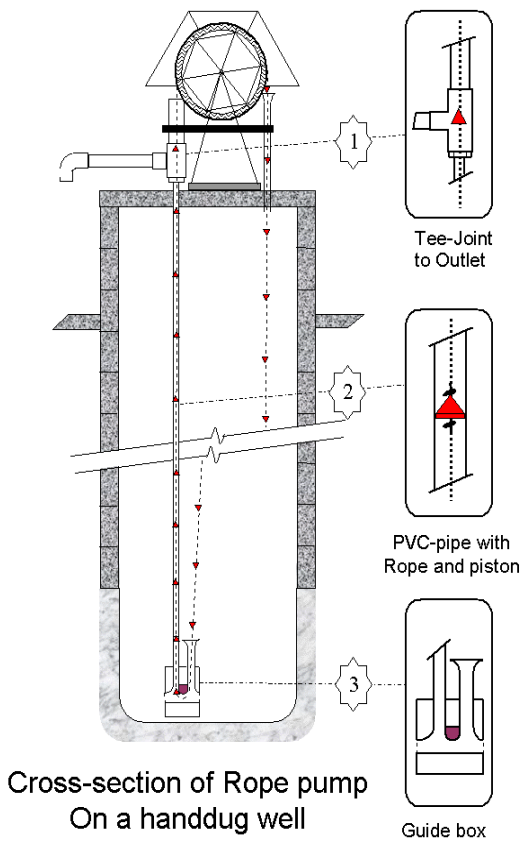
training, promotion and monitoring do need investment by government. Promoting self-supply may be relatively low cost, but is not a cost-free option.

1.3 The rope pump

The rope pump is being promoted for its low cost, ease of maintenance, availability of spare parts, good yield, and suitability for families/small groups. It does not have expensive pump rods, piston seals which need frequent replacement, or heavy and costly pump head works. The principles of its operation are described in Figure 1-1. With no foot valve the riser pipe must always be filled by water lifted from well storage before discharge starts. This is not a problem for shallow water tables but can be an effort at depths over 20m, where the weight of water can make the handle difficult to turn. To counteract this, the riser pipe on deeper wells is of smaller diameter as are the washers, and a second handle may be added.

Three basic rope pump models exist: one for families/irrigation, a more robust version for communities and a third deep well version. In addition wind-, bicycle-, solar-, animal and mechanically driven versions have been developed. Pumps may also be linked to elevated storage tanks.

Figure 1-1 Rope pump anatomy and principle



Cross-section of Rope pump
On a handdug well

The principle elements of the rope pump are a pulley wheel, a rope with washers (pistons) attached at regular intervals, a pipe (of slightly larger diameter than the washers) that enters the well and at the base of the pipe a guide box round which the rope runs and returns to the surface. As the wheel turns and lifts the rope and washers, the washers trap water and bring it to the surface. The pump will lift water from up to 60 metres.

Maintenance needs are simple and can generally be carried out by users or local artisans using locally available materials

Bombas de Mecate 2008

The basic design (see Figure 1-1) has been provided with varying degrees of protection some of which have added significantly to the cost. Accompanying data on water quality changes are lacking, however, and encasing the top works (one option) hides the state of the rope and may encourage greater corrosion. The basic rope pump is usually installed to conform to JMP definitions of

'protected well' (WHO & UNICEF, 2006), even when principally in use for irrigation. However for community supplies, higher levels of protection are being added to assuage government and donor fears, generally without any evidence of effectiveness, or consequent favourable shift in professional attitudes to the technology. Low cost options still need much promotion to professionals if they are to catch their interest and be truly valued. Modifications to basic designs may be worthwhile, but if the cost benefit is to be determined, performance data are needed and are mostly lacking. The evolution to present designs should be systematically documented to avoid repetition of fruitless modifications.

1.4 Background to rope pump introduction in SNNPR

SNNPR has been the demonstration region for rope pump introduction since 2005 (JICA 2008). At that time the Ethiopian Water Technology Centre (EWTEC), with assistance from Practica and support from JICA, installed the first rope pumps in Yerga Cheffe and also undertook training in Butajira on motorised rope pumps. Since 2006, JICA have been working with BoWR on introducing the pump, initially through the training of four local producers and *woreda* level water staff. Most emphasis is on the technical aspects, and the dissemination plan concentrates on these in relation to pump manufacture and installation rather than water quality issues.

JICA itself has its WAS-CAP/ project in the region, building capacity in the water supply sector. Under this project, 50 rope pumps were distributed to *woreda*s from 2007 onwards, and a further 60 were to be installed in 2010-11. These are located in Silti, Angacha, Boloso Sore, Hula, and Chencha, and use a revolving fund approach (see Section 6.4). Some rope pumps are partly for irrigation, but overall JICA's market potential study (Naoki Y 2010) showed little existing interest in families buying pumps, and only slightly more interest in free pumps. A clear marketing strategy does not seem to have been developed. There is, therefore, no pressure on producers and no incentive for development of low cost /low quality pirate production of the pump which is a problem found in Amhara (Mammo 2011). A lot of work needs to be done for creating demand in SNNPR.

Alongside the development of production capacity by JICA, EWTEC and Practica is the work of several NGOs installing rope pumps mostly on a demonstration or gift basis. These include World Vision, International Rescue Committee, CCF, Productive Safety Net program, Norwegian Church Aid, and an Islamic Foundation. These initiatives are generally small scale and linked to other interventions for improving quality of life and livelihoods. None are specifically targeting household level adoption of the pump, but more communities or small groups.

At the same time, Selam TVC is producing pumps, linked to their hand drilling capacity, and distributed via NGOs. So far numbers are small and limited to three areas, Langano (Ziway/Oromia), Yerga Cheffe and Wendo Genet (Sidama). Selam TVC in Hawassa is an off-shoot of the workshops and training college in Addis Ababa, which started making rope pumps in 2005, and more recently started to train producers in the regions.

In neighbouring Ziway one producer is working with IDE and MOA to provide a robust rope pump for irrigation, which is also often used for domestic water supply. The market is just beginning to take off, particularly in Adam Tulu Jidu Kombolcha *woreda*. The method of introduction is different from that of JICA and so each may have something to learn from the other and both provide pointers on the best ways to scale up.

These initiatives indicate several different and largely unrelated efforts going into rope pump introduction. This can be both a blessing and a curse. It widens the numbers of people familiar with the pump, but provides no guarantee of support services and means some people living in neighbouring areas may be expected to pay full cost while others are being given a pump for free. Such factors have major implications for scaling up and are further explored in this report.

1.5 Regional potential for rope pumps (see report 'The Regional Potential for Self Supply'

Not all *woreda*s offer the same potential for use of the rope pump or for hand-drilling. Groundwater usually needs to be within about 25 metres (preferably with a dynamic water level within 15m, although with smaller riser pipes it can abstract from up to 35m with one handle, and as deep as 60m with two handles). Shallow geology needs to offer strata that are sufficiently consolidated to stand unsupported but not so hard that hand-digging is slow or impossible. Alternatively, hand-drilling ground needs to be sufficiently un-consolidated for easy penetration of the bit, helped by temporary or permanent casing (shallow boreholes). Such areas are limited and require an absence of pebbles/small boulders and highly cemented rock. Aquifer yields need to be high enough in shallow boreholes for an inflow of around 1 litre per second, whilst in large diameter wells the need is for adequate storage and inflow can be slower. Overall JICA and BoWR have assessed about half of all *woreda*s in SNNPR as having the potential for shallow groundwater abstraction and development of household level groundwater supplies, although some of these may not yet make much use of this resource.

1.6 Summary of main points

- The rope pump is regarded as a technology which has significant potential both for domestic and small scale irrigation water supplies to contribute to GTP objectives. It is therefore being promoted both by the water supply and agricultural sectors.
- More information is needed on its performance
- SNNPR has been in the forefront of the national development and demonstration of the rope pump since 2005. There are now four producers in the region and one nearby (Ziway), most of whom have been trained by EWTEC and/or Practica through the JICA capacity building programme.
- Over half the *woreda*s in the region have suitable groundwater conditions for rope pump development.
- Rope pumps have been being introduced in the region over a seven-year period, but progress remains slow.
- There have been several rope pump initiatives but they are mostly not connected in terms of promotion, strategy or support service development
- Whilst in other regions the problem may be of pirating and undercutting the prices of well-trained producers using good quality materials, the problem in SNNPR is more one of lack of demand.

2 Rope pump production

2.1 Technology options

2.1.1 Basic models

EWTEC with JICA have developed several models for household, community and irrigation water supplies allowing for elevated storage, and engine or animal power. However the basic models which can be produced by the workshops used by BoWR are three relatively costly alternatives, with no specifically low cost options to promote at household level. This gives potential buyers no choice, and also leaves only higher cost / higher specification options which fewer can afford. IDE produce a lower cost version for this segment of the market, with a slightly different design. Selam say they could also produce a model for around 1500 ETB. Other producers have not yet been encouraged or trained to offer different specifications. Other design variations include different types of handle bearing and types of bottom guide box.

2.1.2 Bottom guide boxes

The tension of the rope and the radius of the turning point in the guide box affects the friction and wear on the rope and pistons, with some users also complaining that washers get stuck (to avoid wear of the rope, it should not have tension but the rope should be just loose). In Ethiopia the usual design is with a piece of GI pipe turning point in the guidebox (Figures 2-1 and 2-2). This version is suitable for borehole diameters. The version in Figure 2-1 can create friction and wear to rope and washer, but the Figure 2-2 version reduces these problems significantly and since many rope pumps are for hand-dug wells, other designs (see those in Ghana) could be offered as well if they reduce capital and/or running costs.

Figure 2-1 Old bottom Guide box Aleta Wendo, fixed bearing

Figure 2-2 New bottom guide box, Abebe Garage Ziway

Figure 2-3 Concrete guide box (Ghana)

Figure 2-4 Large diameter glass bottle in the guidebox (Ghana)

2.1.3 Handle bushing

So far Ethiopia has limited options for the basic direct metal bushings and, more rarely, ball bearings. The latter add about $10 to the cost of the pump so they are an affordable option. In other countries wooden bushings are also offered as an option which can be easily replaced locally, and like the others, last well if greased.

Figure 2-5 Ball bearing

Figure 2-6 Simple metal bushings

Figure 2-7 Wooden bushings, Mozambique

2.1.4 *Plastic washers*

In Ethiopia the production of plastic washers is also centralised in one or two companies in Addis (e.g. MONACO) using imported or local PVC, (HDPE) whereas in other countries it tends to have been de-centralised by the use of hand-powered extruders which can provide cheap washers using waste plastic (figures 2-8 and 2-9). Once again, the lack of performance information for most alternatives means that most advice is based on personal preferences rather than concrete evidence.

Figure 2-8 Hand extruder for washers (Senegal) Produced by Ludo Engineering , The Netherlands

Figure 2-9 Washers produced with a small hand-operated extruder from granules or waste plastic (Ghana)

2.1.5 *Other design considerations*

A major difficulty faced by rope pump owners with traditional wells is that reliability of supply often depends on being able to deepen/clean out the well, as they will have done on a regular basis before the pump was installed. Access is also sometimes necessary for rope replacement/ fishing and for chlorination. However, the pump slabs that are widely used in the region tend not to have lifting hooks, and the riser pipe is not easily disconnected so the slab can be removed. A small access can be made with a cover between the legs of the pump stand, but this is not big enough for entry to the well. In Aleta Wendo, rope pump owners only gained access to their wells if *woreda* staff came and helped remove the top slab. This is not a sustainable solution.

2.2 JICA training

All the present rope pump producers have become established through support from NGOs in terms of training and initial marketing. JICA first initiated the training of professional producers in the SNNPR in 2005/6. The main objective was to establish qualified producers of quality products that would be disseminated to the community. Establishing a quality product involves three aspects in particular: good base materials, good technical skills and good design. Quality control is then necessary to ensure these aspects are maintained at a high level. The materials are specified but manufacturers do not always have access to the right materials. The design was fixed initially but JICA is now trying to develop a rope pump that is as reliable as an Afridev (used at community level). In some ways this defeats the main advantages of the rope pump as an affordable option for household level use, as community level models are more expensive and difficult to maintain, but it offers choice.

JICA has been providing some quality control but that is no longer its clear responsibility nor is it taken over by BoWR so currently there may be something of a vacuum, over an aspect which needs special attention. This has partly happened because the WASCAP project has taken over from the Addis based JICA project, with different consultants and different Terms of Reference.

JICA originally selected ten artisan mechanics who expressed interest in being trained and had an adequate expertise for the work. They participated in a one-month training course and several follow-ups, carried out with assistance from Practica and EWTEC. Of the ten, only three remain active and only two are really productive. These are Ato Timotiyos in Sodo and Ato Mekonen in Arba Minch. A third mechanic, Ato Menberu in TVET Hawassa, is less active as he has teaching responsibilities and other income. Each producer was to make 15 pumps to be assessed before being certified as competent, but not everyone achieved this. The three manufacturers mentioned above produced good quality pumps and were accepted as *bona fide* producers. They were also issued with a checkpoint list (JICA 2010) to encourage consistent standards of production.

In addition JICA has been training *woreda* and NGO staff in pump installation, but this has not been linked to maintenance, at least in the case of Chencha, since Chnecha was not originally one of the focal *woredas*.

2.3 Practica training

Practica has been involved in building production capacity in the region and to Selam TVC Addis from the start, and transferring training capacity to EWTEC through the JICA programme. In addition it has more recently been providing training to those producers linked to IDE and BOA. Practica offer a wider range of pump types (elevated storage, lower cost, linked to trickle irrigation etc), and with IDE have improved the design developed by JICA. This appears to be more robust but at lower cost. Production is at present limited to three areas of which the nearest to Hawassa is Ziway (Abebe Garage). Ten producers were trained but only one remains, as the others mostly found it difficult to maintain the stringent standards required by IDE.

2.4 Capacity and output

In SNNPR the constraining factor is not the capacity to produce pumps but the lack of market. Thus the JICA trained producers say that they can each produce around 20 pumps a day on a production line method, but at present they have not even managed to sell the pumps that they made a year or

more ago. The four producers in the region have made some 548 pumps since their training almost four years ago, but production has now practically ceased.

Production within the region to date can be summarised as follows (see tables for more details):

- Merebe workshop (Arba Minch) have produced 231 pumps of which 77% are in storage
- Welayta Sodo have produced 243 pumps of which 53% are in storage
- Selam Hawassa have produced 59 pumps, all of which have been installed.
- The producer at TVET Hawassa made 15 rope pumps as part of his training/ accreditation and these were bought by the BoWR.

In total, out of all the pumps produced, more than half remain to be installed, and have in some cases been in storage for almost two years. The totals are given in tables 2-1 and 2-2

Table 2-1 Pump production - Arba Minch and Sodo

Merebe workshop, Arba Minch	**Purchased by**	**Distributed to**
127 RPs	BOWR	Not yet installed, stored at Zonal and Regional water offices
20 RPs	JICA	6 RPs installed in Arbamich Zurial *woreda* (3 are FN) 6 RPs in Detta *woreda* (Gamo-Gofa) 18 RPs in Chencha *woreda*
30 RPs	World Vision	All installed in Chencha
2 RPs	Ethiopian Catholic(A.Minch)	1 Installed & 1 going to be installed in Hammer *woreda*
1 –RPs	Arba Minch Crocodile zoo	In the Zoo
1-RPs	To individual at Chencha	Installed at Chencha ,CHRPHDW-15
30 RPs	Stored in the workshop	Produced on demand
20 RPs	Being made	
Total to date	231	77% of production in storage

Welayta Sodo	**Purchased by**	**Distributed to**
128 RPs	BOWR	Not yet installed, stored at Zones and Region water offices
65 RPs	Individual HHs	In Sodo and nearby *woredas*
20 RPs	IRC	Installed in Boloso Sore and Shanto *woredas* of Welayata Zone
30 RPs	JICA	Installed in Siltti and Betajera
Total to date	243	53% of production in storage

Table 2-2 Production by Selam TVC

Selam Hawassa	Number	Year of construction	No of people served
Wendo	15	2009	3110
Injibara	1	2009	500
Langano	10	2008	736
Hawassa	3	2008	240
Yerga Cheffe	7	2008	4500
Cheko	1	2008	180
Langano	21	2007	1470
Tufa	1	2007	200
Total to date	59	All installed	10936

Abebe Garage, the producer in Ziway was trained in 2007 by IDE/ Practica. In that year the necessary associated infrastructure of micro-finance and maintenance were not set up and people were not familiar with the pump. From mid-2008 onwards these elements were in place, and the market grew until in the last year alone around 600 pumps were produced. These have all been sold at cost price to individual households and have been installed by the producer. They are mostly used for Multiple Purposes (domestic and productive use).

2.5 Costs

Unsurprisingly the cost of pumps has been rising, as the value of the ETB has fallen, causing imported materials to cost more. When RPs were first introduced in about 2006 in Oromia, they were priced at some 1500 ETB, but the cost has now almost doubled. However, the RPs sold to BoWR (SNNPR) in 2007 were sold for 1800 ETB and producers found then that this hardly covered their costs. Now the same pumps cost between 2,500 and 3,000 ETB for a shallow lift pump which in US dollar terms remains almost the same as in 2006 at approximately $150-160. However these costs are high compared with other countries and with the Ziway producer all of which strive to keep unit prices to less than $100 to allow private household purchase.

Table 2-3 Production costs for rope pumps in ETB

Producer	Initial cost (2007)	Present cost (2011)	Cost including slab + installation
Arba Minch	1800	3400	4000
Sodo	1850	2500	3000
JICA	1700	2000	5000 (3000 subsidy)
IDE	14-1800	13-1800 inc slab	13-1800
Selam	1700	3000	3200

Obviously to some extent cost depends on the design, the materials used and the depth of installation and consequent length and diameter of PVC pipe. These rope pump costs are provided by IDE.

Table 2-4 Variation in costs with depth (IDE)

Depth Variation	Cost	Date	Remark
6-22 meter depth	1400- 1800 ETB	2008	From Addis Ababa
6-8 meter depth	1338 ETB	2010	Zeway
10 -18 meter depth	1498 ETB	2010	Zeway
18-22 meter depth	1680 ETB	2010	Zeway
22-30 meter depth	IDE does not recommend depths over 22 m because the RP cannot then be effective lifting water for productive purpose, which is their main objective. However yields are still adequate for domestic purposes.		

In the case of Selam, costs include imported Swiss rope for high quality and durability. IDE use high quality Chinese rope. In both cases pump owners would need to come to the producer to buy similar replacement rope. The Sodo and Arba Minch producers do not have access to these supplies and use rope purchased from the local market.

Most producers charge 50– 200 ETB (Selam) for installation, varying with distance. Installation usually also includes some training of the pump owner in simple maintenance (rope splicing and replacement, greasing bearings, tightening nuts).

IDE aim to keep the combined cost of a hand-drilled borehole and pump to below 3,500 ETB, including installation. The cost of the pump itself is kept below $100. They are able to do this because they source and negotiate for materials in bulk and the producer buys them from the centralised IDE store. IDE hope to turn this procurement system into a private enterprise as part of the national scaling up of their rope pump development which could then be available to all. IDE also use their development officers to promote the pump and this is therefore also a cost that the producer does not have to bear. In scaling up the promoters would get commission for the pumps sold, from the producer.

For others, a traditional hand-dug well with limited surface stabilisation costs an average of 500 ETB on top of the cost of the pump and top slab. A single concrete ring to reduce seepage into the well costs some 700 ETB.

2.6 Constraints to production

- The lack of a market
- Difficulty for the producer to market his wares in rural areas where people are spread out and transport costs are high
- Promotion not carried out by government bodies which still regard low cost options (and rope pump in particular) as having no place beside conventional alternatives.

- The technology may be easy but production actually requires extreme care for good quality
- *Woreda* and zonal offices are storing the pumps because they do not know what else to do
- NGOs provide a small and spasmodic market, which gives no continuity of income
- Although BoWR staff have been trained by JICA in quality control it is not being carried out (partly because pumps are not being produced, but also because the 2010 check lists are not being implemented)
- Raw material costs are increasing and pump manufacturers are worried that they may not be able to re-coup the cost in reasonable time, if at all.

2.7 Constraints to uptake

- Lack of proper site selection for demonstration pumps means that several have been put on wells which collapse or go dry. This unjustifiably gives the pump a bad reputation.
- Poor production quality and particularly poor installation practices may add to poor performance and further give the technology a bad reputation.
- Communities tend to prefer Afridev or India Mk2 handpumps for which maintenance services are well established
- Donors view rope pumps as a 'low cost= second best' solution and do not like to see it in their funded projects.
- Sector professionals often perceive that because the pump is "open" it can easily contaminate the well
- Lack of good examples of pumps that are perfectly installed on adequately sealed wells and of plentiful, reliable data on water quality.
- Depth limitations hinder rope pump adoption in areas with water at >25 m (alt http://www.guardian.co.uk/politics/2011/jun/03/figures-show-increase-london-underground-delayshough with small riser pipes it can go deeper, but with more effort in pumping).

2.8 Summary of main points

- A long history of training in rope pump manufacture in the region has resulted in high quality products.
- For domestic water supply, basic models for different physical conditions are available in the region, but no specific reduced cost model has been produced for household use.
- Good performance data on how various design modifications are performing in the longer term would help in identifying the best variations in design.
- At present there no longer seems to be an active process for quality control of pump production
- Training is concentrated on producers and government officers but more local private sector mechanics could also benefit from this and provide cheaper maintenance.

- There has been a significant fall off of producers from those trained because of high initial production quality requirements and subsequent production capacity far exceeding the present market for rope pumps. The remaining producers are the best and most committed.
- JICA are still modifying rope pump designs in a quest for greater reliability, and Selam and IDE are providing high quality rope to reduce the need to replace it. Other producers are receiving some informal feedback from users.
- Over half of the pumps made by the first three regional producers remain in stores, de-motivating them from carrying on production.
- The market for rope pumps has been very slow to develop and is hindered by weak supply chain coordination.
- Each producer could probably produce over 4-5000 pumps a year were there to be a market for them. At present no producer is able to make a living from rope pumps alone.
- Costs vary widely and the Abebe Garage produces pumps at significantly lower costs than the others, without sacrificing quality. This is chiefly through cost effective specification, consolidated production, and centralised purchasing of materials at minimum prices. Forward buying in bulk also avoids problems of temporary fluctuations in material costs.
- In FOREX terms pump costs have not risen significantly in the last five years, but they are high compared with those of other countries and the Ziway producer. This may limit up-take at household level.
- Lack of active donor, government and NGO support for its marketing severely hampers rope pump adoption by households or communities.
- The reputation of the rope pump is being damaged by some poor pump production quality, but mainly from poor site selection and pump installation in demonstration sites.

3 Rope pump performance

3.1 Functioning rates

Functionality rates for installed (mainly family) rope pumps were found to be better in one *woreda* than for conventional (community level) hand pumps, and worse in the other two. Part of the problem may be that *woreda* staff are much more used to dealing with conventional pumps and their installation, and so there is some variability in quality of installation of rope pumps. Additionally, *woreda* capacity to respond to well owner requests is limited and there is a lack of spare parts. *Woreda* staff have limited resources in terms of fuel and time and so may usually give higher priority to repairs for systems which serve larger numbers of people (as well as sometimes having a lower regard for low cost technologies).

Table 3-1 Functionality rates for conventional piston pumps and rope pumps

Woreda	**RP total**	**RP functioning**	**HP total [1]**	**HP functioning [1]**
Aleta Wendy	10	50%	101	55%
Boloso Sore	23	52%	89	79%
Chencha	45	67%	41	61%

[1]Data from BoWR coverage estimates for 2008/9. Rope pump data from BoWR 2010

In general the JICA/*woreda* installed pumps were found by the field survey to be more likely to be operating (68%) than those installed by World Vision and IRC (56% and 40% respectively).

However, both *woreda* and JICA staff felt that IRC pumps were more likely to be functional (contrary to what the figures show) because well owners were more trained in repairs, rather than depending on *woreda* BoWR staff. The high level of functioning of JICA pumps may also be due in part to their regular monitoring which helps to sort out problems and make necessary contacts with *woreda* offices.

This level of functioning is low for pumps only installed for a maximum of 3-4 years (and most for only two). It is often said that rope pumps are easy to maintain, but each breakdown strains the management capacity of users, especially where systems are community managed. The high rate of breakdown can also be linked to:

- Selection of wells including some whose history indicated unreliability or being prone to collapse and lack of top lining
- Sealing of wells, so that they could not be cleaned out or deepened
- Poor installation practices leading to the wheel and rope not being centralised relative to the pipes
- Poor maintenance. If rope is too tight and if bushings are not oiled, these parts wear out very fast

3.2 Condition of pumps

Pumps which were visited for the main survey (35) were all ones which were in operation and so do not give much of a picture of the wider functionality situation (as in Table 3-1 or for the region as a whole). Of those surveyed, it would appear most are kept in good working order, although (60%) are three or more years old, so have had time to go wrong.

Table 3-2 Functioning status for surveyed rope pumps

	Functioning well	**Leakage onto top slab**	**Bearings worn**	**Easy lifting**
Yes	94%	71%	12%	94%
Functioning poorly	6%	29%	88%	6%

3.3 Breakdown and repair

No correlation was found between the age of the pump and the number of times it has broken down, nor one with the organisations by whom they were funded or installed. 46% of pumps have never broken down, and only 9% have broken down more than three times.

Almost all rope pumps which have had a problem have suffered from a broken rope. Yet half of all wells have not experienced this problem, suggesting that quality of installation may play a part. Certainly it has been observed that the wheel is often not centrally placed over the exit and entry pipes so that the rope and washers rub against them. Also the rope needs to be adequately tensioned. It should be just loose so it passes smoothly into pipes and round the guidebox turning point at the base. This turning point was found to be of a smaller diameter than on many models which may also increase friction and jamming. Selam and IDE feel that the rope quality is a problem and are now both importing higher grade rope (from Switzerland and China, respectively). 25% of pumps which needed repairs had had a problem with bushings. These require regular oiling which is seldom carried out. Washers/pistons also seem to be wearing out.

Community rope pump management: Chamba Ebecho Kebel, Bolos Sore.

A rope pump was installed in 2007 by IRC on an existing well. 25 HHs use it but only 13 pay.

Initially users paid twice for re-welding of the handle when it broke due to too many users. However the weld broke again and the committee feared poor welding by the local mechanic. They reported the breakdown to the *woreda* to try and get a better repair, but have had no response, since there is no budget for this.

Table 3-3 Time taken to repair pump

Repairs to rope pumps		
No delay	12	43%
Less than a week	11	39%
A week-a-month	3	11%
1-3 months	1	4%
>3months	1	4%

Rope pump in Chama Hembecho, Boloso Sore *woreda* (BSRPHDW94)

The pump is functioning but the well owner denied access to it because of a dispute two years ago between the management committee and the users. There is no support system to help committees resolve such problems or form a new committee.

Two-thirds of all repairs were carried out by the pump owner or the family, or a local mechanic organised by the owner. An institutional rope pump was repaired by the school director and the guard. Less than a quarter of repairs were carried out by the *woreda* water office, but where they did the work, delay was said to be less than a week in Chencha and a week to a month in Aleta Wendo and Boloso Sore. Overall 82% of repairs were said to be carried out within a week of breakdown, mainly using people who are untrained or with limited training in repairs. Thus where the system is established, whether based on local or government expertise, it can work well, but these statistics do not include pumps where maintenance problems have not been solved (50% of pumps in AW, 33% in Chencha). In these some have waited several months without being visited by a *woreda* team or the problem being solved. Referring specifically to last year, 16% of the pumps had broken down for significant periods, and taken an average of over two months to be repaired.

The pumps that were visited to explore breakdowns which had not been solved were mainly communal supplies. It is apparent that weaknesses in both community management and in *woreda* support play a part. Much of the problem arises from the lack of a culture of paying for water and the non-payment by some users. There is also a problem where a pump meant for communal use is actually installed on a private well. This reduces the powers of the well owner but still allows him to withdraw access if he is unhappy with the users. This situation is likely arise when NGOs want instant results but do not want to bear the cost of digging a new, unproved well, preferring a communal pump to a private supply.

Rope pumps are perceived as giving water which is safer than rope and bucket, but probably not as safe as a conventional pump. In areas with low coverage there is automatically a big increase in people wanting to use a well and the pump. The recommended number of people for one rope pump is 50 to 100. If a rope pump is used by more people there will be extra strain on the pump which may lead to more frequent breakdowns. One IRC pump suffered serial breaking of the handle from the weight of users, and the owner finally gave up repairing it. Average increases in user numbers in surveyed wells were about 50 new users per pump.

3.4 Maintenance costs

Typical maintenance costs appear to be around 70 ETB a year, but depend on the type of problem and the local ability to solve it. Welding costs 50 ETB a time. The cost of replacement rope depends on the type of rope purchased. Imported rope costs 200-300 ETB for a 30m well, whilst local rope costs around 50 ETB but does not last as long. The latter might seem like a cost-effective solution but owners/ users soon tire of organising for new collection and repair and it is a reason for pumps falling out of use. IDE and Selam therefore have both decided to source and supply higher grade, more expensive rope to allow management to gain strength and users to become used to having a good convenient water supply, before rope needs replacement.

It is a common belief that the beauty of the rope pump is that 'if it breaks, anyone can fix it'. Unfortunately this is not always the case and is especially questionable when training has been insufficient, or lacking completely. A good mechanic can figure out the principles, and given the responsibility may be able to make the repairs without too much trouble, but will often have little confidence in his ability without some introduction to basic design concept. Maintenance costs are kept high by limiting training to *woreda* level bureau and NGO staff. These are often very mobile, being transferred frequently between *woreda*s and so taking their expertise with them. It is also unclear whether the *woreda* office charges for maintenance visits but most pump owners must at least cover the per diem and fuel costs of the *woreda* BoWR staff. The stated limitations in availability of repair team because of lack of funds suggest that work is undertaken within the bureau budget rather than being at the cost of the users.

3.5 Water delivery

Well owners were asked about the adequacy of supply for the uses to which they wanted to put the supply, and whether this varied seasonally. Rope pump owners' responses were not significantly different from those of other water supply users.

Table 3-4 Adequacy of supply

	Traditional source	**Rope pump**	**Conventional HP**
Adequate always	75%	74%	70%
Part of the year enough	24%	23%	30%
Never enough	2%	3%	0%

However there are several tales of rope pumps on hand dug wells going dry (especially in Aleta Wendo) and the fear of officials and owners is that a) water levels are falling and b) larger discharges from rope pumps will accelerate that fall. Data from the Self-Supply survey (see below) show that Aleta Wendo does have the greatest variation in water levels of the chosen *woreda*s, a third going dry for some time over a five-year period.

Aleta Wendo also has the highest number of wells being deepened in response to wells going dry. Almost half of all AW wells have been deepened since construction, compared with 20% or less in the other *woreda*s. Well owners in Aleta Wendo are also used to cleaning out their wells on a

regular basis since shaft walls are prone to slough off where water levels rise and fall. This combined deepening and cleaning is usually done on an annual basis. When rope pumps have been installed with slabs that are hard to remove, access to the bottom of the well is no longer possible and the accumulated debris may build up around the pump intake. This is one possible explanation of the observed drying out. Another frequent factor is the completion of well excavation at times of raised water levels. Low cost lining would eliminate both these problems.

Table 3-5 Vulnerability to drought

	Aleta Wendo	Bolos Sore	Meskan
Dried in past 5 years	33%	25%	8%
Never dried	67%	75%	92%

Another possible explanation is that it was found that pumps had been installed in the rainy season and riser pipes were too short to reach dry season water levels. It was still possible to draw water from the same wells with a rope and bucket, using a rope longer than the length of riser pipe, but neither *woreda* office nor well owner had the means or access to pump producers to obtain more lengths of pipe and deepen the intake.

Some water levels may be falling and some rope pumps may take too much water from perched aquifers leading to drying up, but the evidence in Aleta Wendo is that many of the cases for which these reasons have been given for non-functioning can be explained very simply and differently. Certainly there was only a 5% difference in rates of drying out between wells with rope pumps and those with ordinary buckets and rope. Making the removal of pump and of the top slab easier would in many cases lead to more reliable supplies. Pump densities remain far too low to cause widespread draw-down of water levels. This might be a concern when mechanical pumping is linked to high well densities: a potential future problem but one that remains decades away.

3.6 Water quality

Water sampling was carried out from all surveyed rope pumps. No other data on rope pump water quality have been found and this is a major gap. More water quality data are still required if this level of technology is to be objectively assessed for its contribution to coverage and therefore additional sampling is ongoing. The results presented here may not fully reflect the quality which rope pumps have the potential to deliver. This is because:

- Most sampled rope pumps are installed at or below ground level, not on a raised parapet and top slab, only two had adequate top lining of the well shaft.
- No rope pumps were installed with proper drainage channels and waste water diversion from the top slab
- wells have mostly never been chlorinated, certainly not after maintenance
- wells were not cleaned out prior to installation or since,

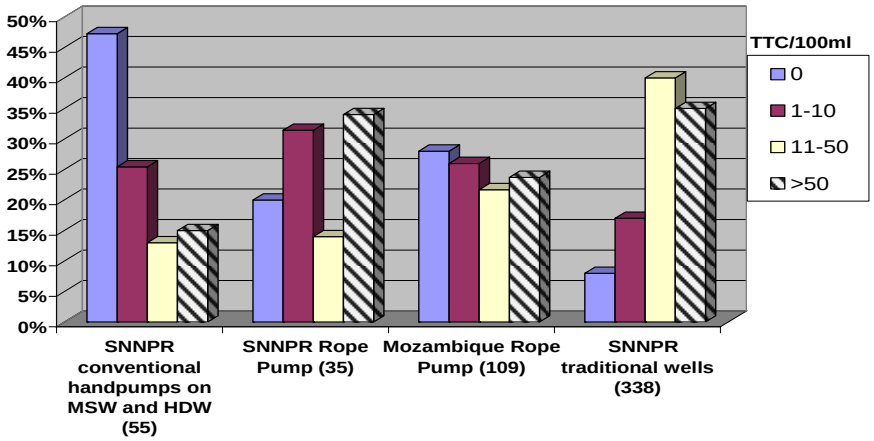
- in over 50% of cases the pumps are regarded primarily as a source of irrigation water. Site hygiene is therefore unlikely to be ideal, and measures that could be taken to ensure safe as well as plentiful water have not generally been thought through or promoted.

Figure 3-1 Good rope pump, but wrongly installed, with the top slab below ground level and no spout, apron, or drainage.

Despite the above points, sampled wells in Aleta Wendo all had less than 3 TTC/100ml, with three out of five having none both in the wet and dry seasons. This shows that with good installation and site hygiene contamination risks can be minimised.

Overall, the results show that water quality distribution is better than with a rope and bucket but not as good as with conventional handpumps. Figure 3-2 shows that some 20% of wells with rope pumps have zero TTC/100ml, and 52% have less than 10, which is counted as a low level of risk by

Figure 3-2 Water quality comparison rope pump and other sources



WHO. The latter figure is almost the same as that for protected springs (53%). A survey of wells with rope pumps in Mozambique (WaterAid 2008) showed a higher figure with zero TTC (30.5%) but almost the same proportion with less than 10TTC/100ml (56%) (see Figure 3-2). Again there is a suggestion that site hygiene is a key factor both for rope pumps in other countries and also for other technologies within Ethiopia. Even sealed handpumps on Ethiopian protected hand-dug wells were only 55% contamination free, and only 66% with less than 10TTC/100ml (RADWQ 2010) and those

in the surveyed *woreda*s performed even less well. Of the 55 surveyed only 47% were TTC free and 15% were badly contaminated (>50 TTC/100ml).

Functionality rates for rope pumps are slightly below those for conventional handpumps, often because of difficulties with installation or with well maintenance once the pump is installed, and mobilisation of *woreda* staff for repairs.

75% of sources with rope pumps gave an adequate supply all year, the same proportion as for conventional handpumps. Most working pumps were in good order.

There is a risk of management fatigue with repairs, because even if each incident is low cost, there is not enough capacity to respond to the problems which arise. More training and more people trained are both required.

Rope pumps in Aleta Wendo show that rope pumps can provide water with low or no risks. Users generally tended to view rope pumps as providing safe water.

Overall use of a rope pump reduced contamination almost five-fold compared with using a rope and bucket. Allowing for low risk at household level (<10 FC/100ml) the rope pump produced water similar to in quality to protected springs but only half as good as a conventional handpump.

Poor site hygiene, wellhead protection, lack of well cleaning out and chlorination and lack of education on protective measures all contribute to higher than necessary health risks. Certainly there is scope for measures that could be taken to make the quality of water drawn with rope pumps safer.

4 Approaches to introduction and Development of Supply Chains

4.1 Necessary support services

It is apparent that there are different strategies for introducing the rope pump by different stakeholders. Most of the initiatives are at present led by NGOs whose roles should largely be taken over by government or the private sector if the adoption of rope pump technology is to be taken to scale. Many of the key questions revolve around these responsibilities, the need for subsidies or other methods of financial support, and what forms of support infrastructure need to be in place. To introduce a new technology, specific support services are needed. These include:

- Supply/ Procurement of materials for pump manufacture and part replacement
- Training of pump producers, installers and maintainers
- Well-equipped and managed workshops providing necessary skills for pump production and repair.
- Minimum quality specifications for production and installation
- Certification of producers and quality control of products and installation
- Repair and maintenance capacity at several levels (household, *ketena*/*kebele*, *woreda*)
- Effective marketing and promotion strategies for those with little or no familiarity with the range of products
- Micro-finance for producers and for purchasers of pumps

All these need careful consideration, clear definition of who is responsible for what, and phasing of the introductory process for greatest sustainability. The element of subsidised support is discussed in Section 6.2. Once offered it is very difficult to maintain a market if subsidy is removed and so should not be introduced unless there is no alternative.

4.2 Roles and responsibilities – Model 1, Rope Pump for drinking water (BoWR)

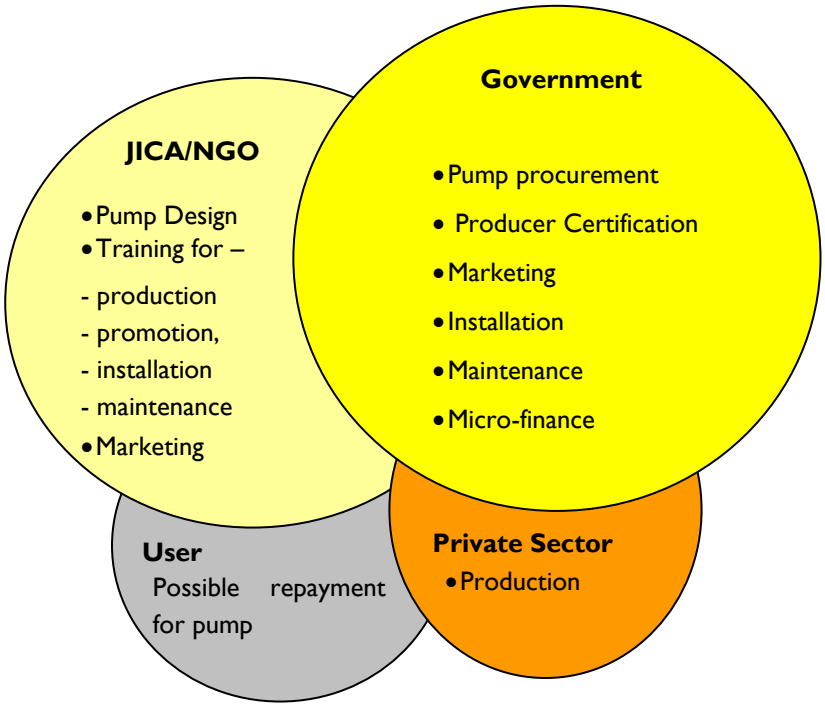
Key players in the introduction of a new technology or approach are the government, NGOs, private sector and users. The balance between them and the roles they play depend on the primary driving force and also on the stage introduction has reached. In the case of the rope pump for drinking water purposes (Model 1), the primary driver is the Ministry of Water Resources, assisted by JICA/ EWTEC/Practica. In this case many of the responsibilities are shouldered by government itself, with JICA helping in the technology development and demonstration. So far the roles of the pump producer and pump owner have been small. Roles can be summarised as in Figure 4-1.

4.2.1 Government responsibilities

BoWR undertake the planning, and have procured many of the pumps produced so far. As already mentioned, many of those remain to be distributed and installed. The *woreda* is closely involved in promotion and demonstration of the pumps and in their installation and maintenance. However this depends much on the interest and resources of the *woreda* offices, most of whom have many supply

systems serving larger numbers of people and with higher technology, on which most of their interest and resources are necessarily focussed. BoWR are also intending to certify pump producers and plan to buy pumps for their contracts from certified producers only.

Figure 4-1 Model 1: Rope pump introduction for drinking water supply – roles



Note. The size of the spheres is relative to the degree of influence in introductory activities

The plan has been to move from demonstration to going to scale based on procurement of pumps from *woreda* BWR offices by households through micro-finance systems. This was set out in 2008 (JICA 2008) but has been implemented in quite a variable fashion. Since no micro-finance institutions were found to provide credit for domestic water supplies, *woreda*s were to set up their own revolving fund systems, if possible with microfinance institutions, but with no guidelines. In the early stages many well owners were not told that they should pay back, and others were given two or three years to pay back into the fund. Marketing the pump to others was not part of the buyers' obligation. Some were prepared to pay up despite having originally received the pumps free, but many were reluctant especially where pumps were not repaired for many months or wells went dry. *Woreda* staff have generally not followed up the repayments, have no resources to chase up non-payment and the system so far is in its infancy. Only six out of 35 pump owners were found to have repaid the 2000 ETB required for full ownership (see also Section 6.4). For the coming year the plan is to increase pump purchase by the bureau through the World Bank programme, which has allocated funds (40,000 $US) for promotion and purchase of pumps and setting up support services.

So far the largest purchaser of pumps has been BoWR, but after two years over half the pumps remain in store at zonal and *woreda* level (see section 2.4). Some *woreda*s, such as Chencha, have put in small numbers (5-10) of pumps in their budgets, but retaining the 'project' approach constrains the market. A major question for the strategy development must be whether it should be the role of the government to purchase the pumps and sell them on, or whether this creates both a disconnect

with the producer and in the normal market relationship between supply and demand. Such disconnect may threaten the development of a market, while in many other ways government can help strengthen and create a vibrant demand.

4.2.2 NGO roles

JICA has been the main NGO supporting the set-up of demonstration pumps in six *woreda*s through working with *woreda*s on a **selection** of influential households. It also financed EWTEC and Practica to **train** the larger workshops in pump manufacture and BoWR *woreda* staff in pump installation and maintenance and follow-up on the training. JICA **standardised pump designs** but is now centrally re-designing for greater long-term functioning on community wells. At present it seems unclear who will provide quality control, but JICA is **monitoring** pump performance in the selected *woreda*s. Some pumps are being installed for household/ small group level and some for community supplies as a low cost alternative to the Afridev of India Mk 2. Selected households tend to be those which are rich and influential, the strategy being to try and get the pump accepted as a status symbol. However this policy may have the opposite effect. These are the people most able to buy the pump themselves, and giving it to them may make others feel that they should wait to receive the same, and that if the rich had to be given one, it must be too expensive for the poor to buy.

Some other NGOs are also becoming more involved in introducing the rope pump, but each using their own strategy. Most buy the pumps from the regional producers and provide the pump free to well owners or communities. **World Vision** was requested by BoWR to support installation of 30 rope pumps, in Chencha *woreda*. Target households are selected with *woreda* and *kebele* officials, and are often those regarded as influential but in need of support, and/or model houses, linking also to the pump for productive use sharing with neighbouring households. Distance to an alternative source is also a considered. They must all then depend on *woreda* BoWR capacity for pump repair and maintenance as no training has yet been given.

The IRC (International Rescue Committee) also give out pumps, but to a group which is managed by a committee, even though it is originally owned by an individual. The users/ committee and the well owner make a signed agreement with IRC and are trained in the operation and maintenance of the pump, rather than depending on *woreda* WRB staff, but still do not have close relationship with the pump producers. IRC line the top metre of the well which reduces the chance of collapses which are found more frequently on JICA wells, as top-lining is not standard on the latter.

4.2.3 Private sector

The private sector roles are limited to pump production. Producers do not have sufficient turnover to be able to market the rope pump effectively in scattered rural populations, and *woreda* and *kebele* levels of government do not yet seem to be doing this effectively either. Nor do pump producers have a role in pump maintenance that would both allow them to see any quality failings in the product, and perhaps to market the pump to others at the same time.

Generally pump producers feel frustrated that the market is not growing despite their production of good quality pumps. They have no resources for marketing, and often have problems in sourcing materials of the right specification. They need a more centralised organisation to help them with these issues. To help in this the Arba Minch producer has made an agreement with Arba Minch University 'Community Development' office, and will give the office 10% of the price of any pump sold through their marketing in rural areas. This is leading to exposure of the technology in the

media, agricultural shows etc. There are also six shops with spare parts but these are only ropes (unknown quality) and pistons/ washers. No-one (public or private sector) at present appears to hold spare pipes for when pumps are set too high in the water column (as found in Aleta Wendo).

4.2.4 The user/ owner

Until now the owner's role has been quite passive in this model of introduction. Most pumps have been provided free of charge, and the owner just contacts the *woreda* WR office for help if he/she cannot solve a problem. Some have spliced or replaced their own rope but many have had to call for assistance. Some owners are marketing the pump themselves, telling people to go to the *woreda* office to register a willingness to have a pump and even to pay for it. However in the case of Aleta Wendo there has been no response from the zonal or regional stores to release pumps to the *woreda* for these families in over a year although several pump owners have repaid in full to the revolving fund and over 160 householders have registered an interest to purchase a rope pump. Several of those expressing interest were prepared to pay the full cost immediately, but the delay has been demotivating and diminishes the impact of demonstration.

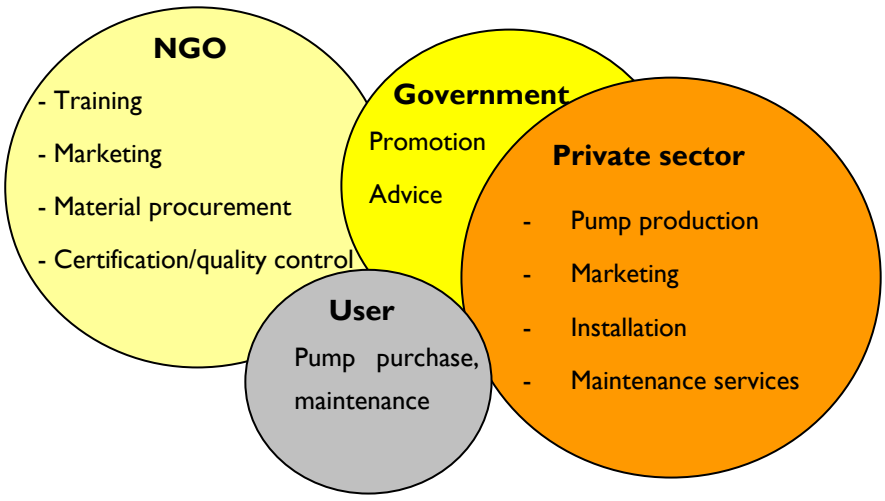
4.3 Roles and responsibilities – Model 2, Rope pump for productive uses

The Ministry of Agriculture and Rural Development assisted by IDE is working in a rather different way to introduce the rope pump (see Figure 4-2). The main differences are:

- The role of government is much smaller and that of the private sector is larger
- The user pays the full cost of the pump
- The private sector provides most of the support services to the user.
- The NGO provides the training as in Model 1, but also supports the marketing and quality control.

*The supply is not designed as a drinking water source although it may be used as such

Figure 4-2 Model 2: Rope pumps for productive use – roles*



Over time, the remaining roles of the NGO may be shifted increasingly to government (certification/ quality control) and the private sector (training, marketing, material procurement). There is also the possibility to regard the rope pump not as an end in itself but as a stepping stone to higher

technologies (diesel pumps especially) which can be saved for, after the rope pump loan has been paid off, using income generated from productive activities. It is understood that there is now a National Task Force set up by BOA to look at how to take this approach to scale, building on the IDE model and looking at how to make the various roles undertaken at present by the NGO more sustainable.

4.3.1 Training

Pump producers are given a three-week training course followed by certification if quality is good. Additional training has been given in modifications to design linked to quality control. Training is also given to community marketing facilitators and *kebele* level mechanics. There is also much awareness raising among the farming community of the potential for increased productivity with pumps and hand-drilled boreholes. At present there is no training or linking of irrigation-well development to domestic uses, although it is known that many well owners are using their supply for multiple purposes. Wells are clearly developed for productive use only, with domestic use being incidental (although widespread). This means opportunities to reduce risks at minimal cost for domestic supply water are often missed.

4.3.2 Procurement

IDE recognises the supply chain problems for materials in rope pump manufacture. They have therefore established a central store for materials, which allows them to consolidate orders and negotiate low prices with suppliers for bulk orders of pipes (manufactured in Addis Ababa), ropes (China), and pistons (from Addis Ababa). They can then also ensure that the appropriate specified pipes are kept in stock at their central store, when there is considerable variation in availability in Addis. These are then bought by pump producers at a fixed price which allows the total pump cost to be minimised. The plan is eventually to make this service into a private enterprise which can serve large areas and many producers.

4.3.3 Marketing

At present community market facilitators (CMF) work in *kebele*s marketing the rope pump and gaining commission from IDE for sales made. The plan here is to incorporate the cost of the commission into the pump price as it becomes better established, and to have a sustainable incentive. Hand-drilled boreholes are also promoted as a package with the rope pump. Promotion happens increasingly from farmer to farmer as the number of owners grows. The CMF consolidate orders for pumps so that the producer can make cost-effective production runs rather than making them one-by-one.

4.3.4 Subsidy

There is no direct subsidy, except in terms of the services (procurement and marketing) that IDE provides which keep the costs of pumps as low as possible. A link has been developed to Omo and Busa Gonofa Microfinance (see Section 6) so that those wanting to buy a pump can take out a loan for 8-12 months. An estimated 70% have done so and 80% pay back in less than six months, according to IDE.

4.3.5 Maintenance

IDE train installers and so also build capacity at *kebele* level, using local mechanics. However these mechanics are not able to weld pipes used in the pump body as this is made from galvanised iron.

Local mechanics are trained and issued with tools for maintenance and are responsible for an average of six pumps. Labour charges are around 20-30 ETB repair. For problems insoluble at local level, the pump owner can always contact the pump producer, whom he already knows through going to the workshop in Ziway to buy the pump. In some cases it may even be possible to call him by cell phone to ask for advice.

4.3.6 Quality control

This is mainly provided by IDE visiting and assessing production runs when large batches of pumps are made. The pump is also provided with a six month guarantee and this also ensures a good quality product. If it can withstand lifting water in sufficient quantities for crop and animal watering over this period, it will usually ensure a reasonably long working life of the pump.

4.3.7 Monitoring

There is monitoring of pump performance and of repayments and IDE is still much involved in seeing that supply chains develop effectively and bottle necks are avoided. For instance, initially IDE used the same design as JICA but found it too unreliable. Small modifications have improved the reliability and allowed the cost to be kept low both in terms of capital and recurrent expenditure. Monitoring has made it possible to assess what changes are necessary both to design but also to marketing approaches, and support to producers and micro-finance.

4.4 Additional pump production capacity and supply chain.

Selam TVC opened up a business in Hawassa in 2007/8, and has combined hand drilling and rope pump manufacture using equipment made in their workshops. Overall the enterprise concentrates mainly on technologies for crop processing and improved production, but historically the mother organisation in Addis has also done much work in developing water lifting and small scale irrigation technologies, on which the Hawassa branch is building. The original training in the Addis 'mother' organisation was done by JICA/ Practica. Support has mainly been from Water is Life International and SIMA who have been buying the pumps for installation in Langano, Yerge Cheffe and Wendo Genet ((Western Arsi, Gedeo and Sidama zones respectively)). However much of the cost of developing the rope pump design and expanding the uses (e.g. elevated storage, enclosed wheel for drinking water), is born by Selam itself, through its commitment to rural development. This has left little resources for marketing the pump and so to date production has been small. They do provide a six month guarantee for pumps sold and also monitor performance as far as possible.

Selam is keen to provide a quality recognising the need to get people relying on a good supply of water before the pump needs maintenance. They can provide training to pump buyers at their demonstration site, free of charge before the pump is delivered and installed, but they also train local mechanics so that maintenance costs are kept low.

At present this method of rope pump introduction has a limited market partly because it has not developed links either to government or larger NGO initiatives. This also affects the ability to produce pumps at competitive prices, but the workshop manager does say that they would be prepared to make a lower cost household level pump which would be cheaper than the workshops in Model 1 (drinking water), and competitive with those in Model 2 (multiple uses).

In terms of training, guarantees, links to borehole drilling, and monitoring of performance, Selam has much in common with the IDE approach. However the lack of a marketing strategy and relatively

expensive models offered at present do decrease the potential for Selam's rope pump production and sales.

4.5 Summary of main points

- Two different models have been developed for the introduction of the rope pump, one through the water supply sector and one through agriculture.
- The first (domestic water supply) model depends mainly on NGO and government inputs and has concentrated particularly on technical issues
- The second (irrigation) model involves more NGO and private sector inputs and full cost recovery from pump buyers. It has put much greater emphasis on demand creation and development of support services.

Major questions that arise:

- Is there a need for consolidated procurement/ negotiation of materials for making pumps?
- Should government procure pumps or should the household procure directly from the producer?
- How should the role of government differ in an approach which needs to be driven by market forces?

5 Stakeholder perspectives and market potential

5.1 Regional level

5.1.1 Views on low cost options

Stakeholder perspectives explored mainly relate to Model 1, the rope pump introduction as a drinking water source. The regional water resources bureau is committed to the development of low cost solutions for rural water supply coverage. Its main concerns are that it needs data from RiPPLE and others to decide on what levels of technology can be considered count towards coverage. Areas with potential for low cost options are already largely identified, and 70% of future coverage is intended to be through such options. These include handpumps, protected springs and rope pumps. The rope pump is regarded as a technology which can sufficiently improve family well status so that it may count towards coverage. Around 50% of *woreda*s are estimated to have potential for exploitation of shallow groundwater, and so are suitable for rope pumps.

There is a high awareness of the need for training especially of households and artisans, and some training has been given to *woreda*s to familiarise them with rope pumps. The need for changes in attitude of people to low cost technologies is recognised, but still needs quite a lot of attention even among some sector professionals. Some regard low cost options as very low priority compared to higher cost solutions. Such changes need to feed down from regional to zonal and *woreda* levels and also to be spread to NGOs and donors among whom such options are still not popular. Low cost options are not regarded as challenging in engineering terms, and their social marketing is a field in which most engineers have little experience. The regional Self Supply Task Force will need to plan a strong communications strategy to address these problems at all levels.

5.1.2 Collaboration on rope pump introduction

The Bureau is keen to develop domestic supplies to include multiple uses as per the revised UAP, but there appears to be little or no connection yet to the plans and promotions of BOA and others more involved in productive water use. BOA and the Natural Resources Environmental Protection Agency working of the Safety Net Program are planning major work on building up small scale irrigation, including the construction of family wells (up to 400,000 in the region in five years) and introduction of the rope pump, as well as diesel irrigation pumps. Such large-scale and well-funded programs offer an opportunity also to ensure that attention is also given to improving water quality for potable water. Few families will be able to afford to develop separate wells and separate lifting devices for domestic and productive water use in the short or medium term. It is therefore important to try and get small design improvements included in their plans to minimise risks of contamination for drinking.

Similarly NGOs such as World Vision and IDE are primarily aiming for sources for productive use, but in this case too, linkages over repair and maintenance capacity building could be developed to strengthen support to all types of supply. Where the rope pump is being promoted for both irrigation and drinking it may help its adoption if it is recognised as a stepping stone to higher level technologies. A rope pump can generally pay for itself in 6-8 months and then any profit can be saved for investment in a higher level pump at a later date when the rope pump can be sold on.

Additionally, at present there are a variety of systems set up at regional level (ADB, Safety Net, WaSH, JICA etc) all with their own policies on subsidy and payment. Much confusion can be avoided if they were to establish common methods for promotion and payment.

5.1.3 Constraints to rope pump introduction viewed from the regional level.

- The technology is not yet well promoted, and a communication strategy is needed
- Lack of budget even in BoWR to promote demonstrations and at least to distribute the pumps already produced
- Decision makers' understanding and awareness has not yet led to high commitment to support for introduction
- Community preference tends to be towards motorised schemes especially in cash crop producing areas

Lack of chlorination of rope pump source at installation and after, weaken confidence to use rope pump water for drinking

Lack of focus on intermediate actors in the process of introduction who can support new pump owners (e.g. trained mechanics, pump installers who can remove pumps for well cleaning, deepening etc, promoters and marketers).

5.2 *Woreda* level

5.2.1 Constraints to rope pump adoption.

Some of the problems identified at regional level were also those identified at *woreda* level. In Aleta Wendo, for instance, insufficient budget to cover maintenance of existing borehole and spring supplies has been reported, so there is little or nothing spare for rope pump maintenance or promotion. High demand is recognised in the *woreda* for rope pump purchase but so far procedural difficulties and lack of spare parts have restricted expansion of such supplies or even repairs to those already installed.

There appears to be a general reluctance in *woreda*s to allocate time or budgets for such low-cost options. This may partly be because of low exposure to them, but also because although there has been training on the technical aspects, the socio-economic aspects may have been less fully explained. There seems to be general confusion as to what the *woreda* should actually do, and a belief that rope pump introduction can be planned in terms of numbers of pumps installed per year, from the start. (People must decide themselves whether to buy one and so their response cannot be predicted initially).

The role of the region and the *woreda* needs to be to provide the support necessary in terms of technical advice, micro-finance, links to producers and spare parts stores, promotion of later steps up the ladder and their costs etc, and these are the initial measurables until the idea takes hold. This principle is not yet well understood and manuals and guidelines focus on the technical aspects but not the process of introduction and promotion.

5.2.2 *Coordination of efforts*

There appears to have been no coordination between the training of those who already produce the handpumps and building of *woreda* and local artisan capacity for rope pump maintenance. These trainings could be combined or cascaded for *woreda*/*kebele* staff, but consideration could also be given to providing much more accessible local capacity using *kebele* artisan mechanics, who, according to the pump owners, are capable with little additional training.

Health extension workers interviewed in one *woreda* also say that there is no coordination between their efforts and those of others wanting to reduce risks from water supplies. They are not made aware of water supply activities in their areas with which they could assist in improving links to site hygiene education and household water treatment. This could do much to improve water quality in rope pump supplies, and help health extension workers respond to the resistance they see to adoption of new practices and behaviour in relation to water collection and storage.

5.3 Pump producers

5.3.1 *Main concerns*

Most of the regional pump producers have similar concerns. These can be summarised as follows:

- The lack of an established system for quality control
- A feeling that donors do not appreciate the rope pump as a potential technology for household supplies that can complement community level supplies
- A lack of strong government marketing strategy following on from the training of producers in 2007
- Poor coordination of introduction by NGOs meant that their efforts were not linked to building up maintenance capacity or other support to encourage greater up-take. Initiatives were one-off efforts with one-year plans.
- No efforts to promote the advantages of the rope pump which could put it on an equal level with handpumps. So communities generally do not want rope pumps and regard them as second best and households are not aware of the advantages.
- Prices of materials are rising fast and pushing up costs. There is concern that these costs become too high for families to buy pumps
- If the technology is not widely installed soon ,it will be taken over by some other new technology and the efforts so far made in training and promotion will be wasted

RP Producers comments

"Donors and communities focus on appearance not performance"

"We do not have the resources to promote to rope pumps in scattered rural areas. Government have to help in this"

5.3.2 *Coordination of efforts.*

Selam is very involved in the development of post-harvest technologies and in this area there has been much feedback from users through networks and workshops supported by NGOs (SG 2000 and SAA). Such feedback has been used to improve designs, and develop maintenance services. No similar system has grown up for rope pumps, and producers are generally divorced from the public they supply for. There is also no association of pump producers which could help them to

standardise, and to share problems and solutions. Selam is also not included in debates over design standardisation in the region, despite their good research capacity and long experience in rope pump development. Perhaps there is a need for them to make more links to government planning to promote the rope pump and for the ministries to try and harness the efforts of all working to the same ends. This could ensure that not only are technologies standardised to some degree, but also training, promotion and support services. Selam is also developing HWTS technologies which could be promoted alongside other improvements to water supply.

5.4 Communities and households

5.4.1 Communities

Of the few communities which were using rope pumps there seems to be a tendency for management problems. Rope pumps tend to need more frequent attention than conventional handpumps (India Mk 2 or Afridev), and so this puts more strain on management capacity. With all handpumps it is more often the management (e.g. to organise and pay for repairs) than technology itself which causes difficulties in the long term, and this is particularly so for rope pumps (see Section 3.3).

5.4.2 Households/ users

From the SNNPR Self Supply survey results, all rope pump owners felt that having the pump had reduced the time to draw water, made more water available and provided cleaner water. All except one person felt that the effort of drawing water was less. The exception was a for a family with the deepest well in Chencha (30m) which is at the very limit for the standard rope pump to perform and so required more effort.

Only 12% of rope pump owners found no change in what they could do with their well water after getting the pump, but a third felt that there was more water available for domestic purposes and also for watering vegetables, and a fifth used the water more for animal watering. Half of the owners said that their productivity had improved with introduction of the pump.

Just under half of pump owners felt that having extra water easily available gave them enough additional income to pay back for the pump. They generally had a good idea of the cost of the pump, and those obtaining it through the *woreda*/JICA had mostly begun to pay something back towards the cost, but not completed payment.

75% of rope pump owners have found that the number of users increased when they installed a pump, as more neighbours elected to come to what they then perceive as a cleaner source. On average, 50 more people took their drinking water from wells with rope pumps installed than from those without. This causes concern to well owners who may fear the well going dry, but do not like to deny access.

Women in particular like the rope pump as an energy saving way of lifting water and for its better protection. For men it is the irrigation potential and easy availability for watering animals which gives it extra appeal, and justifies (and repays) the investment.

So far the spread of rope pumps has been small in the region and the interest raised has not been satisfied. Building up a market takes two or three years as IDE has found, but once established it becomes almost self-sustaining. Once a critical mass is reached promotion happens largely from

neighbour to neighbour. Few people yet appear to be really aware of the changes they can make to their own supply, or how they can achieve such changes, so a change in attitude to the 'can-do' mentality will not happen instantly. The potential is huge but the strategy to tap it needs careful and coordinated effort.

5.5 Summary of main points

- Attitudes at all levels suggest there is a need for a major effort in raising awareness and understanding of the rope pump and its benefits to all stakeholders. Understanding on the regional level is not generally feeding down to *woreda* level, although some zones such as Gamu Gofa have received 'ignition' from the revised UAP and have become committed to promote low cost options to satisfy household demand.
- Guidelines focus on hardware issues so the regional Self Supply Task Force needs to develop the software side of the technology, including defining the process of introduction, and designing a strong promotion campaign based on various messages for different audiences and interests.
- *Woreda* budgets at present do not seem to include adequate inputs for rope pump development
- There is a lack of coordination between the two bureaus (BoWR and BoA) leading separate approaches for rope pump adoption
- Common methods of promotion, payment, procurement and source protection would reduce confusion and variations in effectiveness
- Using lessons learned and updates on technology from other countries could further reduce the cost and increase sustainability of the rope pumps
- A rope pump can be viewed as an effective stepping stone to higher level technologies
- Health extension workers could be more involved to reduce risks of contamination of water at the source and in transit and storage.

6 Financing options

6.1 Options

There are four main aspects to the financing of rope pumps which can enable or constrain potential pump owners. These are subsidy, access to micro-finance, traditional savings schemes, and raising funds from within family assets.

Financing options can be summarised as follows:

Level	Advantages	Disadvantages
No subsidy (Buy only what you can afford)	• Is not donor dependent • Encourages adoption of sustainable technology levels • Shows everyone that solutions are affordable and can be copied • Does not de-motivate those who would be unsuccessful in applying for grants	• Limits those who are able to make improvements, concentrating benefit on the richer (except they usually share) • Limits the level people can reach at one time
Loans but no grants (Buy now, pay later) +deposit	• Increases range of those who can improve supply • Allows households to reach higher levels of service more quickly • Can also allow artisans etc to equip more fully • Allows two or more season's investment at one time	• Still limits those who can benefit • May be defaulters and more opportunity for corruption
Small incentives (free concrete ring / discount on rope pump, or bags of cement)	• Low cost implication to government • Helps publicity and focussing people's minds on the products • 'Something for nothing' is a good driver • Depending on cost of incentive, it may help people reach a higher level (eg pulley or rope pump) and better well protection	• May slow progress if people wait to be eligible for incentive or it is not always available. • May limit numbers benefitting if even small subsidies cannot be applied to all
Same per capita subsidy for all, whether community or Self Supply	• Opens up supply improvement to the greatest number of people • Allows choice by communities and individuals of solutions they prefer • Is equitable • Helps coverage in remote areas/scattered households	The reasons for Accelerated Self Supply relate largely to inadequacy of funding. Giving same per/cap subsidy to all will continue to limit significantly the numbers who can benefit

6.2 Subsidy

The first stage of introducing a technology is often demonstration using units which are provided free. This was the case initially with the rope pump within the BoWR/JICA initiative. In Oromia the system then moved on to 50% subsidy and a loan for the rest of the cost, and in SNNPR the move has been to get early owners to repay the cost into a revolving fund. However, in both cases, changes in organisations have meant that the money owed has not been consistently pursued.

MOWE have talked in the past of subsidising the rope pump 100% if well owners fully protect the well. At a present cost of an installed rope pump of some 2,500-3,000 ETB, it would need to serve some 5 households to give a per capita cost of less than 100 ETB. However shared management seems to cause some problems where it is presently practiced, and individual household ownership

gives a much clearer and more easily implemented management model. A full subsidy assumes that funds are available to subsidise for all. If that is not so, then subsidy may slow progress, as people will wait until they can access such assistance. Certainly IDE have found that subsidy (which they also started with) did not speed things up, did not engender feelings of ownership and did not enable a wider range of people to acquire a pump. Micro-finance, however, did.

6.3 Micro-finance

6.3.1 Micro-credit (in SNNPR)

There are several micro-finance organisations working in the SNNPR, but there is also a move to provide revolving funds to *woreda* BoWR offices for the purchase of rope pumps. Micro-finance institutions (e.g. Sidama and Omo M/F) have traditionally not been involved in providing credit for rope pumps and normally only provide loans against specific collateral which is usually land. Loans are specifically for investment that can be shown to lead to increased income and so a good probability that the loan will be paid back. Pumps for domestic purposes are not regarded as offering sufficient guarantee of increased income to be regarded as suitable investments for loans.

6.3.2 Micro-credit in Ziway (Oromia)

Busa Gonofa (BG) microfinance institution has been providing loans for rope pumps as a direct response to IDE requesting a credit service to encourage purchase. They provide loans to individuals whereas most micro-credit is to groups for investment in agriculture. Buda Gonofa say that demand for loans for pumps is reducing, but that may also be because more farmers are using Omo Micro-finance which also provides a similar service which is more widely accessible.

BG experience with micro-credit for rope pumps has not been entirely a happy one. Especially those who first took loans have not been too reliable in paying back, but since then IDE have been more careful in selecting which farmers they have encouraged to take out loans, and microfinance institutions have geared payments and guarantees to fit borrowers' circumstances better. Repayment rates have improved. IDE say that 80% of farmers have paid back within six months. The system is that if the loan is 2000 ETB, the repayment after a year is 2,500. The capital sum can be paid back at any time, but the interest must be paid monthly. In 2010, 220 households took out a loan of 2000 ETB. The maximum which can be taken is 2,500 ETB.

6.4 Revolving fund

There have been plans to set up revolving funds at *woreda* level so that individuals can take out a loan for two years to purchase a rope pump and pay back in instalments. Some say the revolving fund is based in or monitored by the *woreda* BoWR office, others that it will be based in microfinance institutions. The principle is that one person takes out a loan for a pump but within a group of five. The other four act also as guarantors and will in turn have access to the fund once the initial loan repayment has been made. Unlike the Model 2 loans it does not appear that an additional sum is included in repayment to cover administration costs and inflation.

In the survey just over a third of rope pump owners had been asked to pay back for the pumps they received, and of these, half had made full repayment (16%). The four in Aleta Wendo had repaid in full but the *woreda* offices had no more pumps to allow others to benefit from the revolving fund. On

previous visits other Aleta Wendo owners met had paid a small amount but stopped paying because the pump was broken down or the well gone dry or no-one had asked them for more.

6.4.1 The main problems and challenges to collect repayment of loans

- Individuals show little interest to repay the money in time unless carefully monitored (an additional expense), but high interest in getting additional credit.
- Big variations in crop production that depend on rains and good soil condition, cause unpredictable variations in farmers' income which can affect commitment to paying back over an extended period
- The number of clients who are receiving the loan from BG for the rope pump in Ziway is decreasing, because they say that in the focal *woreda*s for micro-finance promotion, there is saturation of demand.
- Break down and problems to get repairs done quickly may bring the revolving fund to a halt.

6.4.2 Encouraging /enabling environments

- The rope pump has transformed many farmers' lives. One who borrowed 3000 ETB for RP has earned 23,000 ETB within four months.
- The technologies enable farmers to cultivate up to six times a year within small plots of land.
- Development of the Community Management Project may make it possible for rope pump loans to be fitted into a well-developed system

6.5 Traditional savings schemes

There are two main ways in which money is traditionally saved and made available to members of the savings scheme. One is *edir* which is principally a way in which families save money communally as insurance for occasions when cash is needed urgently. This may be for funerals or illness or even marriage. Small amounts of money are paid in on a regular basis and a fund managed communally. Funds can grow to exceed many thousand ETB and so are sometimes also available for loans for investments which benefit the development of the community if the fund management feels the investment would be safe. Normally they are just for urgent loans to cover costs of unexpected emergencies, a form of communal insurance.

The second is *ekub* which is a 'tontine' system common throughout Africa. In this a group of people (often women) pay a weekly or monthly amount into the pool, and each week/month (or longer period) one member of the savings circle takes the total amount to use on whatever is their priority at the time. The amounts paid out are usually low, so buying a rope pump with this method would take some time, except in areas of high value cash crops. Forming a circle for larger investments (i.e. 1500 ETB which would be sufficient for a pump) would be difficult with normal household budgets.

6.6 Releasing assets

Of those families in the Self Supply survey who financed their own well construction, half used savings, with less than 10% taking a gift, grant or personal loan. 50% also sold assets to pay for the work and materials. Most often this was a crop such as vegetables, grain or coffee, but in some cases a sheep, goat or even a cow. 15% of well owners mentioned getting cash contributions from their neighbours, who also helped to provide labour. No-one had obtained formal credit for well

construction. With an average cost of around 500 ETB for the well, it seems most people had access to sufficient funds from their own resources. Certainly no micro-finance institution has been lending money for this type of investment in the region so far. With rope pumps at some three times this level of expenditure it would not be impossible for many farmers to find the necessary funds especially if micro-credit made it possible to pay over an extended period.

6.7 Summary of main points

- Whilst microcredit systems are quite accessible in the region they do not lend for family water supply investment at present.
- Some *woreda*s have started revolving funds to take in payments for demonstration pumps already installed, but repayment systems are not enforced consistently.
- In South Oromia, BOA/IDE loans are linked to micro-credit institutions because the pumps are promoted for income generating activities. Even so the early history of repayments shows variable success depending upon management. Repayment is now becoming better established and more reliable.
- The rope pump can transform lives but there has to be a will to improve and strive for greater productivity for the investment to bear fruit and for the owner to be able to repay.
- Many farmers could plan to release assets if they were convinced that the pump could transform their lives and lead to further improvements.
- Traditional savings schemes (*ekub*) may also play a part if planning is at community level, but most savings circles (*edir*) do not work with sufficiently large sums.

7 Conclusions and recommendations

7.1 Conclusions

7.1.1 Rates of progress

In five years, the uptake of rope pumps in the region has not yet become well-established. Although progress has been made it is not sufficient to regard rope pumps as being able to contribute significantly to coverage over the next four years (2015) unless there is a change of strategy and approach. This compares with rapid growth in parts of Amhara through BoWR support and in Oromia where rope pump introduction is more closely linked to agriculture. If the rope pump is to play a part in reaching UAP targets there needs to be a major focus on increasing rates of progress and a better strategy.

7.1.2 The product

Water quality analyses suggest that rope pumps offer water which is five times safer than unprotected sources. Low risk water quality (<10 FC/100ml) is as likely to be found in rope pump wells as in protected springs. The samples taken reflect the worst case scenario, collected in the rainy season from wells which are mostly primarily for irrigation, and have not been chlorinated or cleaned out since the pump was installed.

In terms of reliability and adequacy of supply there was no discernible difference between handpumps (Afridev and India Mk 2) on protected wells and wells with rope pumps.

Rope pumps are at present installed on wellheads which mostly have inadequate protection for drinking water supplies. No guidelines are given in the JICA manual for provision of an apron and drainage to reduce seepage back into the well.

The experience within Ethiopia and from other countries which have now adopted rope pump technology may also help in developing an improved strategy for going to scale, and for more cost-effective pump production and promotion.

7.1.3 The market

The main concern for the introduction of the rope pump at present is not so much the technology but the lack of demand. This lack of demand is due to several factors:

- Low priority from sector professionals (with notable exceptions), especially at *woreda* level because of more pressing practical problems with higher technology supplies
- No marketing strategy building on the 'demonstration models' and other routes of promotion
- Promotion on health grounds rather than on productive benefits found by users to be equally or more important (increased income, quicker drawing times, safety for children - signs of a caring family and status). Both should be highlighted
- Poor performance history of many of the pumps installed – seeing pumps taken out and owners reverting to bucket and rope can kill any neighbour's enthusiasm very quickly

- The IDE/Selam model of combining rope pumps with small diameter hand drilled boreholes could significantly increase the market for the rope pump, especially in areas with unconsolidated aquifers and shallow (<20m) groundwater.

7.1.4 Support service development

Where demand has been created so far it has not been well-coordinated with the development of support services, so momentum has been lost. Necessary developments include:

- Well-stocked outlets for further pump purchases and spare parts,
- choice of models and costs, with accompanying advice on maintenance, water treatment and productive uses (e.g. micro-irrigation),
- well established and responsive maintenance and repair services
- and micro-finance credit systems which vet applicants objectively and ensure repayment.

7.1.5 Pump procurement

At present all pump sales or gifts in the region are made through *woreda* offices or NGOs. This limits the speed of uptake to *woreda* budgets for rope pump promotion and purchase, which are usually a very low priority. Thus Chencha, where there are the greatest number of demonstration pumps used both for domestic and irrigation purposes, has only a budget for five pumps in a year. It also has no promotion system to encourage people to look anywhere else than the *woreda* or NGO offices, despite there being a good producer in Arba Minch from which the *woreda* indirectly buys. The lack of a link between producers and purchasers has several harmful effects:

- No feedback given to producers on performance
- No personal connection to get advice, training, put new clients in touch, (get commission?)
- Difficulty in access to some spare parts (e.g. pipes) and specialist welding
- No building of market dynamics which can operate without government budgets
- Disconnect in responsibility between the one making the pump and the one installing it, which means each can blame the other if it performs badly

7.1.6 Government roles

So far there has been no clear definition of government roles and little discussion on how these might vary from the roles taken in normal community managed systems. Rope pumps are generally not suitable as substitutes for Afridev or India Mk 2 so the major market will be small groups and individual households. If these are expected to buy the pumps for themselves then this will require BoWR to work in a different way. To get rope pumps established as a largely self-financed service level, it will be competing with all the other calls upon the household budget that a rural family faces. Thus the strategy needs careful analysis and also coalition building so that others (NGOs especially) follow the same line. It will also require easily accessed micro-finance for many.

7.1.7 Training

More information and training materials are needed at all levels, for pump owners, private sector well diggers and mechanics to BoWR and other regional bureaux for whom safer and more

accessible water supplies are relevant. In particular there is an absence of any guidance on how to introduce the pump and how to promote it.

7.2 Recommended actions

7.2.1 Regional workshop on rope pump introduction

This should be a first step in developing a clear plan for increasing up-take of rope pumps. It should include the Regional Task Force on Self Supply, BoH, at least one member of BOA involved in small scale irrigation promotion, BoFED and a few zonal and *woreda* staff from areas with high potential for the pump. It should also include pump producers, interested NGOs and credit scheme institutions.

The aim of the workshop would be to:

- Define the roles of the BoWR in going to scale with the rope pump
- Plan a regional strategy for spread of the rope pump for household supply (multiple or domestic use)
- Develop a plan for piloting in two *woreda*s
- Identify training needs and communications strategy

7.2.2 Roles of government - Key questions which need to be addressed

- How to include rope pumps in planning when up-take depends on a household's decision to buy? This may require a switch to targets rather than planned installations, and set budgets for support activities (promotion, training, monitoring) that will help realise targets but which do not provide hardware.
- Should the region buy pumps (pros and cons)?
- How should materials for pump manufacture be procured? Centrally, by producers, by region?
- How can the WASH MoU be best used to improve promotion of the rope pump and safe water?
- What links can or should be made to MOA activities in promoting household level water supplies for productive use?
- What should be advisory roles and what regulatory ones?

7.2.3 Regional implementation manual on low cost technologies to be developed

Development of this manual should include as many people as possible to highlight the potential and need for better understanding of the rope pump and its benefits to all stakeholders. The introductory workshop could be a first step but better information and more discussion is needed at all levels if real commitment to promotion is to develop.

- Which areas to focus on for rope pump introduction
- Technical aspects of reduced cost options (well head protection, lining, drainage etc)
- Communications strategies for marketing and key messages
- Promotion materials, media etc.

- Phasing of introduction and necessary steps
- Roles and responsibilities

7.2.4 Plans for piloting coordinated promotion and support service development in two woredas

In the past demonstrations have focused on individual families. We believe that there is now a need to demonstrate not the technologies at family level, but rather to demonstrate the promotion and support services at larger scale i.e. in *woreda*s. Key issues would include:

- Selection of *woreda*s
- Plans, budgets and proposals for funding.

7.2.5 Establishment of strong micro-finance support for water supply investment

Micro-credit institutions do not consider household or group water supply as a sound investment at present and so will not lend for it. Advocacy is needed to:

- Change their minds or
- Create well run revolving funds at *woreda* or *kebele* level or
- Bring loans for water supply included into CDF funding mechanisms.

Few people will initially invest in water without either small incentives or systems which allow them to spread their payments.

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