AGWATER SOLUTIONS
Improved livelihoods for smallholder farmers

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This briefing note summarizes the preliminary case study findings for discussion and comment

MOTORISED WATER LIFTING IN ETHIOPIA

Based on a report by Gebrehaweria Gebregziabher

Encouraging enterprises that combine the supply of pumps, technical support to farmers and markets for produce, could greatly improve the use of water lifting technologies and bring economic benefits to farmers.

The opportunity

Agriculture in Ethiopia is dominated by smallholder rain-fed systems but low and erratic rainfall limits productivity and food security. Consequently, investment in small-scale irrigation has been identified as a key poverty reduction strategy. In addition, given the water resources potential, promoting groundwater use and adoption of household level irrigation technologies is crucial. In its Growth and Transformation Plan (GTP), the Government of Ethiopia discusses making use of groundwater by supporting farming households in the adoption and use of private hand-dug wells and suitable water lifting technologies (WLTs). How exactly this can be achieved remains unanswered.

The research

The research was designed to identify factors that influenced the adoption of WLTs, particularly motor pumps, by smallholder farmers in four regions: Amhara, Oromia, SNNP and Tigray. Data was collected from 800 randomly selected farm households (200 sample households in each region). The sample was stratified according to data on the number WLTs distributed by the Regional Bureaus of Water Resources (RBWR). The study considered various physical factors (e.g., water source, water table height, land size, soil fertility) and economic factors (e.g., the supply chain, cost of WLTs, subsidies, finance, extension services).

Main findings

The total number of pumps in use in Ethiopia is not known but figures for the number of pumps supplied by the RBWR were collected (Table 1). These figures suggest that the use of motor pumps is greater than that of treadle pumps, even though the latter are produced locally. The total number of motor pumps in use could be higher given the number imported from 2004 to 2011 (Figure 1).

Table 1. Pumps supplied by the RBWR

	Oromia	Tigray	Amhara
Motor pumps	19,355	18,448	20,916
Electric pumps	13	ND	ND
Treadle pumps	162	ND	14,731
Rope and washer	316	ND	ND
Total	19,846	18,448	35,647

Source: Regional Bureaus of Water Resources. ND = No data

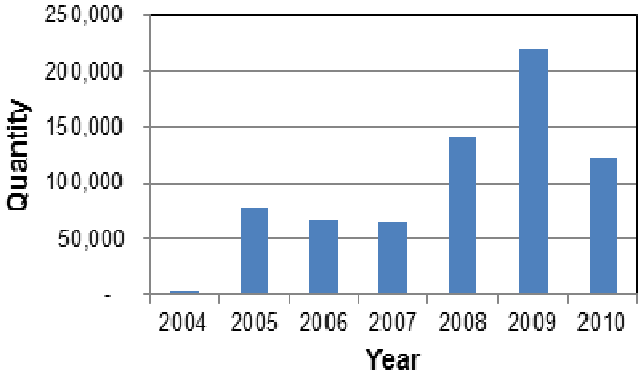
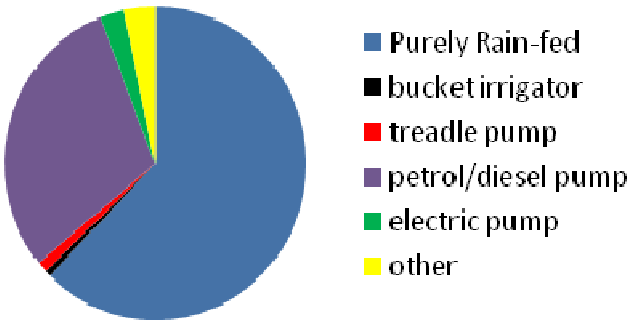


Figure 1. Motor pumps imported to Ethiopia

Of the farmers interviewed, 30% had adopted petrol/diesel pumps, 3% used electric pumps and 1% used treadle pumps (Figure 2). Petrol/diesel pumps were almost evenly distributed across the regions studied.



Source: RBWRs

Figure 2. Percentage of farmers using each WLT

The gender dimension

Female headed households were found to be less likely to adopt WLTs and constituted only 3% of the adopters compared to 21% of non-adopters. This is probably due to lack of labor and finances; households with higher numbers of adult males were more likely to adopt WLTs.

Factors affecting adoption of motor pumps

Water source: Access to a year-round water source is essential because in 82% of cases pumps are used to irrigate in the dry season. Whether the source is ground or surface water does not have much influence on adoption rates.

Information awareness: Understandably, farmers need to be aware of a technology in order to make use of it. The study found high levels of farmer awareness, especially associated with extension services and radio ownership but not with television ownership. However, despite this, only 2 to 39% of those who knew about a technology actually adopted it (Table 2). This implies that awareness is a contributing factor for adoption but not sufficient on its own.

Table 2. Awareness and adoption of WLTs

Type of pump	Number aware	Used WLT (%)	Still use (%)
Treadle	25	8	4
Rope and washer	134	14	7
Petrol	510	39	33
Diesel	368	17	12
Electric	148	18	11
Wind	61	2	0
Solar	13	0	0

Cost of WLTs: Purchase price can be a hindrance to adoption. This is considerably higher for motor pumps than manual WLTs (Table 3) partly due to import taxes which account for around 37% of the cost. In addition, the average investment cost of water storage facilities, such as shallow wells and ponds, can be prohibitive.

Table 3. Average costs of WLTs provided by farmers

	Capital costs (Birr)		Maintenance costs (Birr)	
	WLT	Accessories	2010	To date
Treadle pump	3,650	4,000	375	517
Rope and washer	2,593	200	0	0
Petrol pump	4,751	1,872	953	1,420
Diesel pump	7,246	1,971	1,792	2,527
Electric pump	5,000	1,929	13,000	0

Materials and services: As may be expected, access to fuel was found to be an important factor in the adoption of motorized pumps but household labor was not.

Most motor pumps are imported by private companies, not through public support programs. Despite the involvement of private enterprises, there are insufficient spare parts and

A motor pump can be small, comparatively light and portable

support services for adequate maintenance. The farmers reported that machinery frequently breaks down, and their unfamiliarity with the technologies leads to delays in agricultural activities and contributes to dissatisfaction with WLTs (Tadesse et al., 2008).

Markets: As with other agricultural water management options, markets can often constrain farmers and hinder uptake of WLTs. This is because WLTs are usually used to grow marketable crops such as vegetables but farmers have limited capacity and power to negotiate prices. In addition, markets may not be close by and there can be considerable competition.

Land size: Motor pumps are capable of irrigating larger areas than manual pumps but farmers with larger areas may prefer to diversify their rain-fed crops or adopt other forms of irrigation such as gravity fed irrigation, rather than invest in pumps.

Finance: More farmers use their own money rather than credit to buy pumps, but where credit was available motor pump adoption increased. The greater use of cash than credit may imply that credit agencies are reluctant to lend to smallholder farmers. In addition, households who received remittances are more likely to adopt motor pumps while farmers who engage in off-farm activities are less likely to, possibly because they are often the poorest and avoid risk.

Environmental factors: In drought prone areas there is a tendency to use water more intensively which may contribute to the use of WLTs, especially motor pumps. Soil and water conservation and watershed management activities could have improved groundwater recharge giving smallholders better access to shallow groundwater irrigation.

Advantages of adopting WLTs

Most farmers who adopt WLTs do so to irrigate in the dry season, which provides additional household income. Incidents and depth of poverty were found to be lower for households with access to irrigation (Gebregziabher, 2008).

Solutions

- Support the establishment of businesses that sell a variety of pumps and provide after-sales services and parts. Businesses that cover the entire chain, including the sale of farm produce, may overcome the problems that farmers face with market traders. This will increase profit and make the whole business more sustainable.
- Provide support in terms of start-up capital, tax exemptions etc. (but try to select options that will benefit the poor).
- Train dealers in technical aspects, marketing and after-sales services, and support them in setting up demonstration plots.
- Strengthen extension services to provide guidance on WLTs and irrigated agriculture and incorporate experience sharing tours.
- Develop pump maintenance and repair manuals in local language.
- Explore credit arrangements and supportive policies that enable farmers to purchase WLTs without collateral or proof of future income.
- Explore opportunities for pump rental markets.
- Develop and air appropriate informational programs on the radio.

WLTs are usually used to grow marketable crops such as vegetables

Questions for discussion

- How can entrepreneurs be encouraged and supported?
- What supportive financial mechanisms can be put in place?
- Is there potential to manufacture motor pumps locally?

References

Gebregziabher, G. 2008. Risk and Irrigation Investment in a Semi-Arid Economy, (PhD) Thesis, Department of Economics and Resource Management, Norwegian University of Life Sciences, Norway.

Tadesse, N., Berhane A. and Bheemalingeswara K. 2008. Initiatives, Opportunities and Challenges in Shallow Groundwater Utilization: A Case Study from Debrekidane Watershed, Hawzien Woreda, Tigray Region, Northern Ethiopia. Agricultural Engineering International: the CIGR Ejournal, Manuscript LW 08 008. Vol. X