

Experiences with Micro Agricultural Water Management Technologies:

Lesotho

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**An input to the Study on Agricultural Water Management Technologies for Small
Scale Farmers in Southern Africa: An Inventory and Assessment of Experiences,
Good Practices and Costs**

An Inventory of Agricultural Water Technologies and Practices in Southern Africa and an Assessment of Poverty Impacts of Most Promising Technologies.

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Experiences with Micro Agricultural Water Management Technologies: Lesotho

1. INTRODUCTION

1.1. Purpose

The study was carried out to develop an Inventory of agriculture water technologies and practices in the SADC region. The study aimed to document the practices and technologies used in irrigation especially at micro levels in the region particularly those aimed at improving the livelihoods of the rural poor. It also sought to document the impact, success, adoptability and failures of initiatives of the different approaches by different organization.

1.2. Methodology

The study approach involved reviewing of grey literature, official reports and internet publications from different organizations. Face to face interviews with government officials, government technicians, NGO officials and Farmer Association members were conducted and a field trip undertaken.

1.3. Limitations

The main limitation to this study was the lack of documented data. A lot of the information on small scale irrigation schemes and initiatives is available only from the organizations involved in the schemes and can only be extracted through interviews with those individuals directly involved in the schemes. In the case of Lesotho an added limitation was time since only three days were spent in the country by the study team. As a result it was not possible to visit all the important sites and interview most of the relevant people.

1.4. Report structure

This report gives an overview of the water resources and water use in Lesotho, analyses the technologies and practices used for micro irrigation in the country, outlines the programs undertaken in the promotion of micro irrigation and describes the main players in micro irrigation development in the country be discusses the potential for scaling up the most promising technologies and practices

2. OVERVIEW OF FOOD SECURITY, HUNGER, AGRICULTURE AND WATER

2.1. Background to the country

Lesotho is a land locked mountainous country wholly within South Africa between altitude 1 500 masl and 3 482 masl. The total land area is 30 350 km², extending over 230 km from north to south and 210 km from east to west. Cultivated land area is just above 200 000 ha or about 7% of the total land area. The total population is estimated at 2.2 million 25% of whom live in Maseru the major urban centre in the country.

The country has a large agricultural sector but most farming activity is dryland subsistence type. The average rainfall is between 300 mm/yr in the lowlands and 1 600 mm/yr in highlands. However the rainfall pattern is uneven and often falls outside the main farming season from October to April.

2.2. Water resources and water use

2.2.1. Water resources

Total renewable surface water in Lesotho is estimated at 5 km³, the annual groundwater recharge stands at 1 km³. Being at high altitude and wholly within South Africa means the country receives no surface flows from another country and shares its basin only with south Africa. Consequently, upstream water pollution is not an issue in Lesotho and any transboundary conflicts are only with South Africa.

Water availability in Lesotho stands at 2 519 m³ per capita per year (Earth Trends, 2003). This figure is well above the SADC average and the water stress level of 1 700 m³ per capita per year. However, the water resources in Lesotho are not evenly distributed in time and space such that the rainfall is high in less densely populated mountain region and falls outside the main farming period.

2.2.2. Water use

By 1987 Lesotho's total water withdrawals stood at 0.1 km³ per year which is only 2.2% of the actual renewable water resources. The per capita consumption was about 32 m³ per person per year. Water consumption by sector is given in Table 1 below.

Table 1: Water use per sector in Lesotho.

SECTOR	CONSUMPTION (km ³ /yr)	AS PERCENTAGE
Agriculture	0.056	56%
Industry	0.022	22%
Domestic	0.022	22%

In the past a number of donor funded irrigation schemes have been developed in the country but a majority of these schemes have folded and generally few schemes are thought to have had a positive impact on the society. For example, by 1999 only 66 ha out a total 2 637 ha developed irrigation schemes were still operational as per design (Mlosy, 2002). The reasons sited for failure have included the failure of developers to take into consideration the concerns of the end users, inadequate capacity building for the end users, extension staff and the service providers as well as the use of inappropriate technologies.

2.3. Food security, health, HIV and AIDS.

2.3.1. Agriculture and food production

Total cropped land in Lesotho in 1999 stood at 325 000 ha or 10.7% of the total land area (EarthTrends 2003). The per capita crop land availability stood at 0.16 ha per person. The percentage of irrigated crop land at 0.3% is well below the continental average of 3.8%.

Crop production in Lesotho is average to poor. Cereal production in 1999 – 2001 was 322 metric tones or 158 tons per capita whilst crop yields averaged 1.337 tons per hectare. Table summarizes the agricultural production and yields in Lesotho between 1999 and 2001.

Table 2: Agricultural production and yields in Lesotho - 1999 to 2003.

PRODUCE	PRODUCTION (000 metric tons)	PER CAPITA (t/person)	YIELD (kg/ha)
Cereals	322	158	1 337
Roots & tubers	75		15 838
Pulses	13		679

Source: EarthTrends, 2003.

2.3.2. Food security

In 2004 Lesotho had to feed up to 900 000 people almost half the total population (IRIN Africa, 2005).

Lesotho depends on food imports mostly from South Africa to meet its food requirements. The annual variation in food production from the mean is four times the Africa average and nearly eight times the world average. The country is therefore prone to food shortages. Though food imports, as a percentage of total consumption is nearly 50% the country receives relatively low amounts of food aid. Food imports constitute only 2.8% of total imports compared to the average of 13.5% for the African continent. It is important to note that Lesotho imports its food through open market mechanisms. Table 3 below summarizes the food security situation in Lesotho.

PARAMETER	LEVEL (%)
Variation in food production	24.4
Food aid as percentage of total consumption	45.8
Food aid as percentage of total imports	2.8

Percentage of children that are underweight	16
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Source: <http://apps.fao.org>

Unlike most other SADC countries food deficits in Lesotho are not mainly caused by droughts or lack of water. Most agricultural experts point to topography, soil and climate which do not favour maize production yet maize is grown on over 70% of the arable land in the country. A shift in policy by government and farmers to high value crops such as horticulture, fruit trees and livestock may go a long way in improving Lesotho's food security situation.

2.3.3. *Food security and HIV/AIDS*

On its special report on the food situation in Lesotho between 1995 and 2005, IRIN Africa noted that food production in Lesotho has been steadily declining particularly in the last three years of the decade under review. The two main factors cited for this decline are drought and the impact of HIV/AIDS whilst other contributed factors include lack of access to (rather than shortage of) arable land rising unemployment. The later point is exacerbated by the over dependency of Lesotho on surrounding South Africa's economy since any slight adjustment in the bigger South African economy will result in a major impact on the tiny mountain kingdom's economy.

The HIV/AIDS prevalence in Lesotho is reported to be 31% and is one of the highest in the SADC region. With respect to this the WFP has noted that the high HIV prevalence adds to the poverty profile of the population and reduces the availability of productive community members over time, whilst also increasing the care burden.

The number of AIDS orphans is increasing. Official records suggest an increase of 7 % from 85 000 in 2001 to 91 000 in 2003. Consequently the strain on the elderly and child headed households increasing.

3. ANALYSIS OF GOOD PRACTICES IN MICRO IRRIGATION AND RWH

3.1. Overview

3.1.1. Technologies and practices

Currently in Lesotho micro irrigation makes use of High pressure or Gravity fed Sprinkler systems, Centre Pivot systems and the recently introduced Drip kits. However, the most promising technologies and practices for small-scale irrigation in Lesotho are:

- i) Low pressure gravity fed sprinkler system
- ii) High pressure Drag-hose sprinkler systems
- iii) Drip kits supplied from roof catchments
- iv) Treadle pumps

According to the Ministry of Agriculture and Food Security (MoAFS) high pressure Gravity Fed sprinkler systems are the most commonly used. The recently introduced Drip kits are used by vulnerable communities for household food production. Table 3 summarizes the technologies used in Lesotho for small-scale irrigation as provided by the MoAFS.

Table 3 - Irrigation technologies and end users in Lesotho

LOCATION OF IRRIGATION	TYPE OF TECHNOLOGY /PRACTICE	SOURCE OF TECHNOLOGY	SOURCE OF AND ACCESS TO WATER	ENERGY REQUIREMENTS	SERVICE PROVIDER	END USER
Butha Buthe - Ha Rasekila/ Hololo	High Pressure Sprinkler	imported	Hololo River	Electricity	local agent and government	community organization
Quthing - Seaka	Hi High Pressure Sprinkler	imported	Senqu River	Diesel	local agent and government	community organization
Maseru - Masianokeng	High Pressure Sprinkler	imported	Phuthiatsan River	Electricity	local agent and government	Individual
Leribe - Tsikoane	High Pressure Sprinkler	imported	Borehole	Electricity & Diesel	local agent and government	community organization
Berea - Linokong	Centre pivot	imported	Mohokare River	Diesel	local agent and government	community organization

Source: Irrigation Dept., MoAFS (2005) (Pers. Comm.)

All of the above used systems are imported technologies. These are available from local agents and Government. Farmers can get them from Irrigation Department on a 4 year loan which includes operations and maintenance support.

Efforts are underway to get local manufacturer or self designed systems. The MoAFS (Department of Irrigation), is now working in collaboration with Appropriate Technology Section (ATPS) to remodel the treadle pump so it can be available to farmers at reduced operation costs (*Pers. Com.*).

3.1.2. *Sources of technology*

The technologies used in Lesotho are all imported technologies. The local agents supply those systems hence why farmers used them. The close proximity of the country to South Africa makes in prone to importing South African locally available technologies. The currently used technologies are imported through business initiatives from South Africa.

3.1.3. *Water sources*

The climate of Lesotho is temperate/continental sub humid and all these irrigation areas fall within this climate.

All irrigation in Lesotho is done along the river valleys. All areas have long growing season of about nine months. Winter months are from mid May to mid August these have characteristic constraints which potentially affect crops these are: frost, hail and sun scorch. According to observations frost incidence is higher on low lying alluvial plains near rivers this is where most areas under irrigation are located.

3.1.4. *Service provision*

Historically, all irrigation schemes were donor driven and most of existing irrigation infrastucture/major capital outlays were financed from donor money through bilateral agreements with the Lesotho government. The Drip kits recently introduced are a donation from Indian Government. Notwithstanding, the operations and maintenance of all the currently existing schemes, but Linokeng, are local initiatives. The Linokeng scheme is relatively new (started in 2004) and is funded by the government for two years after which community will be expected to take over. It was expected that government support would end this year, but because of vandalism that took place at the scheme, the first crops will only be grown this summer, which may mean continued support by government until end of 2006 (Hape Sebatana (17 Nov. 2005), Irrigation Dept. MoAFS. *Pers. Comm.*).

3.1.5. *Performance*

All farmers claimed their systems were efficient. In cases where systems are prone to breakdowns like Seaka the water use efficiency could be reduced.

3.1.6. *Costs*

The operation and maintenance for most systems solely done by Government, agreement is that for the first four years Government buys the parts and does the maintenance after

which the farmers have to buy their own parts and government only assists with the repairs.

Currently Masianokeng, Ha Rasekila and Tsikoane have passed their four year retainer contract with the government. The farmers in these schemes are now doing their own maintenance as some of them have been trained in the maintenance of these systems. Table 4 below gives the breakdown of farmers irrigation.

Table 4 – Capital and operation costs of irrigation in Lesotho

DESCRIPTION		COSTS IN MALOTI (M1 = \$6.55)
Capital Costs	Drip Irrigation Kits	1,100
	Gravity	15,000/ha
	Pressure	40,000/ha
	Centre Pivot	800,000/ha
Running Costs	Farm Labourers	M400 per month
	Casual labourers	M20 per day per person
	Electricity	M20/ha / day
	Diesel	200l/day (M5/ l)

Source: Compiled from information obtained from Maluti Irrigation, the Dept. of Irrigation MoAFS and M. Hlalele, Farmer from Seaka Irrigation Scheme, Pers. Comm. (Nov., 2005).

In Seaka the breakdowns were frequent, now the system is serviced fortnightly. While in Masianokeng the system is never serviced. It is only attended to occasionally when there is a breakdown.

It is worth noting that the two systems are operated differently hence will be managed differently. Seaka is a communal system. The system is managed centrally and maintenance is done routinely.

The operation of the system in Masianokeng is managed individually. Any breakdowns are attended to on an individual basis.

3.1.7. *Level of use*

The systems or Irrigation schemes involve multiple users. Though the management of the area under cultivation is done individually in most cases, the system is used by the communal association within the scheme.

On average each scheme covers about 20 to 40 hectares of land. On the schemes where management is central, areas covered are constant and frequency of use is controlled. The farmers within the scheme contribute towards planting of the next years' crop. Irrigation frequency is controlled centrally. On the contrary, on the more decentralized schemes like Masianokeng, area covered varies from year to year. Some fields go fallow on some growing seasons due to financial constraints. Due to differing management practices of the irrigation schemes, the frequency and triggers of use are sporadic and indefinable in the more decentralized systems.

3.1.8. Appropriateness

The systems used in Lesotho are technologically appropriate so far as the climate and geography is concerned. However much needs to be done in terms of operation and maintenance of the adopted systems.

3.1.9. Contribution to welfare

All micro irrigation contributes towards income generation. The Drip kits disseminated to vulnerable communities are intended to contribute towards food security at a household level.

3.1.10. Environmental impacts

No studies have been done in Lesotho to assess these factors and currently available data can not address these arising issues. Further research is needed in this field.

3.1.11. Potential to scale up

There is need to upscale the operation and maintenance of the systems adopted in Lesotho. The issues to be addressed are highlighted in Section 6 of this report.

3.1.12. Enabling environment

There is draft Irrigation policy. This was formulated in line with existing legislature governing land and water resources management in Lesotho.

The land tenure system is viewed by most farmers as a limitation. Ownership of land is not guaranteed. So, farmers are unable to make long term plans. This is especially true for places like Masianokeng where the original members of the irrigation scheme leased out their land, they refuse to award long term lease to the farmers who are able to actively participate in farming (Mr B. Nkhabutlane, Farmer from Masianokeng Irrigation Scheme, Pers. Comm (Nov., 2005)).

Community resistance, donor dependency created by the previous irrigation schemes have resulted in overall unsustainable irrigation. When the four year loan period expires most farmers can not afford to operate their systems.

3.2. Low pressure gravity fed sprinkler systems

3.2.1. Technical description

The system is designed in such a way that surface water is harnessed at a point of higher elevation in relation to the irrigation area. The difference in head between the abstraction point and the sprinkler top provides the pressure for the sprinkler system. Heads of

between 5 m and 20 m can be achieved. A filtration media can also be incorporated into the abstraction works when the run of river approach is adopted to assist in filtering the water to avoid clogging the sprinkler heads. To ensure that the head difference is maintained within design limits the laterals are usually buried and the supply taps fixed in the ground.

3.2.2. Extent of use

The system is widely used in Lesotho for the small-scale irrigation schemes in the highlands and foothills.

3.2.3. Operation and maintenance

Operation is relatively cheap since there are no energy requirements. Repair costs can be high for systems based on the run of river were water turbidity is high.

3.2.4. Level of community involvement

Once it is established the community can operate the system within minimum support.

3.2.5. Costs

FAO estimates that the costs of running such as system in Lesotho excluding main line and storage reservoirs (if needed) is between USD1 950 to USD 2 750 per ha. Given that the income from vegetable irrigation averages USD2 300 per ha it is feasible with good field management to achieve a net profit with such systems.

3.2.6. Effectiveness of technology/practice

The system has been highly effective in the schemes where it has been used.

3.2.7. Suitability

The system is suitable in areas where heads of 5 m to 20 m can easily be achieved. The system is ideal for the highlands and foothills of Lesotho.

3.2.8. Environmental benefits

The system does not require alterations to topography and the water used for irrigation is released back to the river channel from which it was abstracted.

3.2.9. Advantages

The system does not require energy to run and it can easily be adopted for the terrain in the highlands and foothills of Lesotho. There are also numerous springs in these areas of

Lesotho and spring water can be harnessed for the gravity fed sprinkler irrigation systems with the added advantage that spring water has very low turbidity.

Compared to drag-line systems and drip kits, the gravity fed system has a longer design life. This gives farmers a more sustainable income source as well allow investors to recover their investment costs.

3.2.10. Disadvantages

The required pressure for efficient irrigation is not always met.

3.2.11. Cultural acceptability

The system has been well received by the communities that have used it.

3.2.12. Potential for up scaling

The system is ideal for the Lesotho highlands and foothills.

3.3. Drip kits with roof catchments

3.3.1. Technical description

The drip kits in Lesotho are supplied for 10 m by 10 m or 20 m by 20 m plots. The kits are low-cost, easy to assemble and operate. Water is supplied from a tank connected to a roof catchment and placed with its bottom at least a meter above ground to provide sufficient elevation head to drive the drip system. The homeowner's roof is used to capture rainfall and direct it to the irrigation tank through gutters.

3.3.2. Source and origin

Most drip kits in Lesotho are sourced from S. Africa. No attempt has been made in Lesotho to develop a local product.

3.3.3. Extent of use

The drip kits have been promoted for individual households, particularly the rural and urban poor families, female and child headed households. The main aim in promoting the kits was the desire to alleviating the effects of HIV/AIDS.

3.3.4. Operation and maintenance

No system as yet is in place to assist the communities to handle routine O&M and repair work for drip kit systems in Lesotho. Installation and maintenance of the kits is done by the NGOs providing the kits.

3.3.5. Level of community involvement

The community have been passive participants on the drip kit initiatives. NGOs have done more to identify the communities in need, supply and install the kits.

3.3.6. Costs

It was difficult to ascertain costs of the system in Lesotho. The main promoter of the system, World Vision, orders bulk kits with other humanitarian aid materials which makes it difficult for them to determine the cost of individual kits.

3.3.7. Effectiveness of technology/practice

The drip kits are a relatively recent phenomenon in Lesotho such that their effectiveness cannot be conclusively stated.

3.3.8. Suitability

The technology is suitable for much of Lesotho and can be used by all socio-economic groups. Rainfall is not a constraint in the country and the system can be used for much of the year. During the dry months groundwater supplies can augment the harvested rainfall.

3.3.9. Environmental benefits

Drip kits result in less water being used for irrigation thus more water is available for the environment.

3.3.10. Advantages

The observable advantage is that rainfall is harvested and used productively and that no energy is needed for watering gardens. As nutrition vegetables are grown at the household level food security and health is supported.

3.3.11. Disadvantages

The gutter and collector tanks significantly increase the installation costs of the system.

3.3.12. Cultural acceptability

It is reported that the communities have no objections to the technology.

3.3.13. Potential for up scaling

The technology needs to be promoted as a complementary technology to other micro irrigation technologies like sprinkler that cater for economic advancement of the communities. The drip kits will then remain as a household level food security measure.

As the drip kits have a design life of four to five years they need a more sustainable system for their effectiveness.

3.4. Treadle pump

3.4.1. Technical description

A treadle pump is simply a water pump fixed on top of a borehole to draw water. But Unlike most manual pumps, which are operated by hand, the treadle pump is operated by repeatedly pressing levers with one's feet. The pumped water can then be fed directly to the plants through a series of plastic pipes or be stored in an elevated tank before use.

The treadle pump comprises a cylinder fitted with a piston and some means of pushing the piston up and down. A pipe connects the pump to the water source and at the end of this pipe is a non-return valve that allows water to enter the pipe and stops it from flowing back into the source. The piston and the cylinder must have a very close fit, so that when the piston is raised, it creates a vacuum in the cylinder and water is sucked into the pump. When the piston is pushed down, the water is pushed through a small valve in the piston to fill up the space above it. When the piston is raised again, it lifts this water until it pours out over the rim of the cylinder and into an irrigation channel or tank. At the same time, more water is drawn into the space below the piston. The downward stroke of the piston once again pushes water through the small valve into the space above the piston and the process is repeated.

3.4.2. Extent of use

Although treadle pump technology is ideal for the rural poor communities, it has not been widely distributed in Lesotho. The reason for this may just be that the technology was not promoted on a massive scale in the country.

3.4.3. Operation and maintenance

There is a general problem with priming the pumps such that some users end up abandoning the pump altogether. The pumps are most often sold without any suction or delivery pipes such that users have to find these extra fittings. Not only does this increase the unit cost of the pump it may also result in the wrong fittings being bought and forced on the pump thereby increasing wear.

3.4.4. Level of community involvement

Where they have been introduced the community has been eager to use them.

3.4.5. Costs

The system costs between USD200 and USD370 for irrigation areas of 0.6 to 1.8 ha per pump in Lesotho. Operation costs are minimal.

3.4.6. Effectiveness of technology/practice

Treadle pump technology is not well established in Lesotho and its efficacy is still to be evaluated.

3.4.7. Advantages

Treadle pumps are mostly used for irrigation of small vegetable gardens thereby improving food security and nutrition. The second advantage is that no energy source is required. Children can use it as a game and still meet the irrigation objective.

3.4.8. Disadvantages

The command area for a single pump is limited and the operational head for the pump may not exceed 10 m. the human energy requirement is also high and most users complain that the use of the pump is very tiring for a single individual.

3.4.9. Cultural acceptability

As yet no major complaints have been received in Lesotho about the treadle pump.

3.4.10. Potential for up scaling

The potential of the treadle pump appears to lie in its ease to be coupled with other micro irrigation technologies. For example, the technology can be used to supply water to the drip kits systems when groundwater is used for drip. Though it may not be used directly with sprinkler the system can be adopted to lift water into canals that can supply water to the reservoirs used by gravity fed sprinkler systems.

4. REVIEW OF IRRIGATION WATER INITIATIVES AND CASE STUDIES.

4.1. Irrigation development initiatives

The long term irrigation potential in Lesotho is estimated at 12 500 ha. Over the past 40 years several irrigation initiatives have been undertaken in Lesotho mostly with government/donor support but most have failed to survive beyond the financed phase. Some schemes have even resorted back to dry land farming practices. The reason given for failure range from poor project initiation in which projects are handed down to the farmers with their minimal participation and lack of operation and maintenance skills by the end users. Successful projects have been those that have communal ownership of the pump and conveyance infrastructure but individual management of the farm.

4.1.1. Water resources development

The ministry of Forestry and Land reclamation (MFLR) has identified irrigation sites requiring water storage structures and has started developing the water storage structures for some of the sites. The main problem has been the poor co-ordination between MFLR and the Ministry of Agriculture and Food Security (MAFS). This has resulted, in some instances, with storage facilities being developed by the MFLR at different sites from the ones targeted for irrigation by the MAFS.

4.1.2. Agricultural Sector Investment Program (ASIP)

The ASIP seeks to support demand driven irrigation development focusing on fruit and vegetable import substitution, employment creation and food security.

4.1.3. The Low cost drip irrigation project (LCDI)

The program sought to introduce affordable LCDI devices for small scale farmers and poor households driven by demand and market forces. The expected outcomes were that 5 000 farmers irrigate 0.1 ha each over a total area of 500 ha, M600 profit is realized per field per year and that the LCDI devices are produced locally in Lesotho by 2007.

4.1.4. The local initiatives support project (LISP)

The project was carried out in the Quthing District over an area of 182 000 ha. The project sought to serve 7 550 households consisting mainly of small farmers, female headed households, the landless and unemployed youth. The primary objective was to raise rural incomes by diversifying agriculture. Expected outcome was an annual increment of production of 6 900 mt of sorghum, 1 500mt for maize, 400 mt for vegetables and 160 mt of folder.

The project resulted in a significant positive change in household incomes and showed with the right technical and financial support small scale irrigation initiatives based on low pressure gravity fed sprinkler systems were viable in Lesotho.

4.2. Some case studies

4.2.1. Government initiated schemes

Hololo Valley – Ha Rasekila

Soil: Red clay loam formed from shale
Annual rainfall: 673 mm
Normal temperature: 18° C

The Rasekila irrigation scheme is situated on the flood plains of Hololo River. It is within a 30m pumping lift. The scheme is en route the Mokhotlong – Butha Buthe road. It is one of the longest running in the country. Technical and Expert back up support is within short distance as the site is located a few kilometers from Butha Buthe town where District officers are located.

Senqu – Seaka

Soil: Clay loam – dark creyish brown
Annual rainfall: 550 mm
Normal temperature: 13° C

The scheme is situated near Quthing. Irrigable land is above 30m lift from the Senqu River. Access to most of the area is good, it is off the main road. However the site is quite far from the nearest urabn centre where District Agricultural officers are located.

Hlotse - Tsikoane

Soil: Dark reddish brown loam
Annual rainfall: 500 mm
Normal temperature: 14° C

The Tsikoane scheme is situated along the Maseru Leribe main road. The site is en route to an urban centre; the site is closely located to back up support.

4.2.2. NGO initiated projects

Berea – Linokong

Soil: Fine sandy loam
Annual rainfall: 736mm
Normal temperature: 15° C

The Linokong irrigation scheme is situated on the banks of Mohokare River off the Berea main road. The site is far from the nearest administrative or urban centre making back up support not easily accessible.

4.2.3. Local initiatives

Maseru – Masianokeng

This is very representative of most Farmer Association schemes in Lesotho and will be presented in detail here.

Historical background

The Masianokeng irrigation scheme started as the small scale irrigated vegetable project (SSIVP). In this scheme the Masianokeng community, under a cooperative, shared the irrigation infrastructure which was donated by the Lesotho government (through external loan), but farmed individually. When it collapsed in the 1990s, the Irish sourced funds and started the High Value Crops Project (HVCP) which was based on the principles of SSIVP. But there was a misunderstanding between the European Union and the Lesotho government. As a result the Irish withdrew their money leaving farmers stranded. This led to the collapse of the project leaving the infrastructure (i.e. pump and pipes) idling, but under the care of the Masianokeng chief. Years later, a farmer by the name of Buti Nkhabutlane went to the pump to check if still operating. After establishing that it was operating, he sought permission from the Masianokeng chief to use the infrastructure, which was granted. He then rented some fields from the community and started farming. Noticing this, other farmers started joining and this led to the establishment of the farmers association for the scheme called 'Lentsoe-la-lihoai', translated 'Farmers voice'.

Technical details

Technology:	Sprinkler
Source:	Imported
Energy:	Electricity
Water source:	Phuthiatsana River

A dam has been dug underneath the Phuthiatsana from which water is pumped into the external reservoir situated next to the river. The underground dam allows the silt from the water to be sifted and rid of silt before being pumped into the external reservoir¹. From this reservoir water is pumped again to the fields for irrigation. The external reservoir is 30x10 m wide and 4m deep.

¹ Lesotho rivers are highly silted because of acute soil erosion

Service provider: Association of farmers
End User: Association members (27 in all)
Total area under scheme: 40 – 50 hectares
% utilised: 30 40%

Enabling environment:

- i) The Lentsoe-la-Lihoai association has a constitution that governs it and has a committee which is elected every year.
- ii) Members farm individually from fields they hire from Masianokeng community members on rental basis (usually 1 – 3 years). Rental rate ranges from R500.00 to M1 500 per annum.
- iii) Farmers share the irrigation infrastructure (pump and main pipes) but each pays for their electricity pumping costs and farms individually.
- iv) They share the maintenance expenses of the pump and of the guard who mans the pump.
- v) Government intervention is minimal in the form of subsidies towards capital costs (pump and main pipes)

Challenges/constraints: The land tenure system in Lesotho does not allow full ownership of land (i.e. no title deeds). Small pieces of land (about 0.2 ha) are allocated to households for subsistence farming. Households not able to farm their land can lease it out. At Masianokeng scheme farmers rent such fields. The problem is they don't own the fields and those allocated the fields (i.e. Masianokeng community members) can stop the rental arrangements anytime. As a result farmers cannot make any long-term investment plans on the fields they use.

Members are against subsidy policy and donations/handouts as they believe do not help them but instead promote dependency and not ownership necessary for growth and development. They would rather have credit support as they would be responsible for the credit and this would make them work hard.

Operational environment

Socio-economic environment: I would say farmers are urban middle income
Single or multiple use: Single – irrigation

Performance

Water use efficiency: system claimed to be good and efficient and as such should be promoted.

Impact and adaptability

Income generation: Farmers are able to generate income for families. Example from a vegetable (cabbage) farmer (Buti Nkhabutlane) shows that on every cabbage-head sold he makes a profit of R1.50 (i.e. cost of producing a head of cabbage is R0.50 while the selling price is R2.50)

5. SUMMARY OF KEY ACTORS IN MICRO IRRIGATION AND RWH

The small scale irrigation sector in Lesotho is supported by the government, donors NGOs and farmer associations.

5.1. The government of Lesotho

The ministry of agriculture through several departments and units provides the technical services in the irrigation sector in general. The engineering division of the ministry is responsible for farm and irrigation mechanization, the Soil and Water Conservation provides extension services. The ministry is represented on the ground by District Agricultural Officers (DAOs). The Agricultural Research division offers services in agronomy and pest control. The Appropriate Technology in the ministry of Local government focuses on the development of irrigation technologies and standards for the country. However studies on irrigation have all lamented the un-coordinated nature of the ministry's operations.

Table 5: Main players in micro irrigation in Lesotho and their areas of operation.

LOCATION	CONTACT DETAILS	NAME	CORE BUSINESS
Butha Buthe - Ha Rasekila		DaO Butha Buthe	Implementation
Quthing - Seaka	58759957	Nt. Joel Hlalele	Implementation
Maseru -Masianokeng	58845462	Nt. Buti Khabutlane	Implementation
Leribe - Tsikoane	63142539		Implementation
Berea - Linokong	DaO Berea	Nt. Mpho	Implementation
LHDA			Enabling environment
Ministry of Agriculture Irrigation	22324827	Nt. Moeletsi	Service Provision/ Enabling environment
Maluti Irrigation			Service provision

5.2. Non-governmental organizations (NGOs)

The private sector and NGOs play a rather limited role in the development of irrigation in the country. Their main role has included the delivery of extension services, supply of agricultural inputs, supply of services, supply of equipment and marketing.

One of the major players in the micro irrigation in Lesotho is World Vision. The organization operates several schemes and irrigation systems in different locations in Lesotho. The organization targets both individual households and farmer associations. Table 6 below summarizes the work of World Vision in Lesotho.

Table 6: Communities assisted by World Vision in micro irrigation in Lesotho.

LOCATION OF IRRIGATION*	TYPE OF TECHNOLOGY /PRACTICE	SOURCE OF TECHNOLOGY	SOURCE OF AND ACCESS TO WATER	ENERGY REQUIREMENTS	SERVICE PROVIDER	SIZE OF SCHEME (HA)	NO. OF FARMERS
Butha Buthe - Marakabei/ 'Malere	Dragline	imported	Hololo River	Electricity	World Vision	14	22
Quthing - Mokanametsong	Drip-kits	imported	Roof catchments (200 tanks)	Gravity	World Vision	Backyard gardens	200 households
Mohale's Hoek - Taung	Drip-kits	imported	Roof catchments (200 tanks) plus 10 earth dams	Gravity	World Vision	Backyard gardens	200 + households
Mafeteng – (i) Sekameng and Malumeng	Drip-kits	imported	Roof catchments (200 tanks) plus 10 earth dams	Gravity	World Vision	Backyard gardens	200 + households
(ii) Ha-Thoahlane	Dreadline	imported	Mohokare River	Diesel	World Vision	4.7	22
(iii) Ha-Noana	Stand-Pipe	imported	Spring	Gravity	World Vision	0.4	15
Berea - Mapoteng: (i) Ha-Hlajoane	Dreadline	imported	Phuthiatsana River	Diesel	World Vision	8	20
(ii) Liphakoeng	Low pressure sprinkler	imported	Spring	Gravity	World Vision	0.2	25

World Vision does not target any specific technology for promotion but seeks to meet the need for livelihood support by any irrigation system appropriate to the proposed scheme area. The favored systems include low-pressure gravity fed systems and drip kits supplied from roof catchment water.

5.3. Farmer associations

Farmer association represents a group of farmers who come together in one irrigation scheme. Usually they rent the fields, own and operate the pump and conveyance system jointly but farm their plots and market their produce as individuals. Table 7 shows some of the farmer association operational in Lesotho.

Table 7 table showing participants in Micro irrigation projects

Name	Location	People Served	Types of service offered
Ha Rasekila Farmers	Butha Buthe - Ha Rasekila	Association	Implementation of micro Irrigation
Seaka Farmers	Quthing - Seaka	Individual	Implementation of micro Irrigation

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Name	Location	People Served	Types of service offered
Masianokeng Farmers	Maseru - Masianokeng	Individual	Implementation of micro Irrigation
	Leribe - Tsikoane	Association	Implementation of micro Irrigation
Likopong Farmers	Berea - Linokong	Association	Implementation of micro Irrigation
Lesotho Highlands Development Authority		Lesotho Highlands Water project Affected communities	Support and equipment

The only technologies promoted in Lesotho currently are Drip irrigation, Sprinkler irrigation (High pressure and Gravity fed)

6. SCALING UP CONSIDERATIONS

Government is committed to ensuring food security as stipulated in national Poverty Reduction Strategy and Vision 2020. Exploiting the national irrigation potential through micro irrigation is one of the priority areas. However, there appears to be no clear policy on scaling up small-scale irrigation schemes in Lesotho. Though the national irrigation policy places emphasis on small-scale low cost low technology schemes, the government policy of the day seems to favour large-scale schemes geared towards commercialization of agriculture.

The main players in the irrigation sector in the country have identified key areas that need attention if irrigation in general and small scale irrigation in particular is to be sustainable in the country.

Based on observation women are employed as casual laborers there is need to engage more women in operation and maintenance so they can actively participate in micro irrigation in Lesotho.

6.1. Small scale irrigation schemes or micro irrigation technologies?

In promoting irrigation the relief, settlement patterns and socio-economic status need to be considered. The livelihood needs an economic development needs need not be treated separately. Most players in the country think and some of the promoted scheme, suggest that Lesotho needs to develop parallel schemes at the household level: small nutrition gardens based on family drip kits and irrigation plots based on gravity fed semi portable sprinkler systems for commercially driven agriculture.

6.2. Donor support and farmer initiatives

Opinion in Lesotho is unanimous that donor support has natured the dependency syndrome in farmers and has resulted in initiatives that do not survive beyond the funded project phase. Co-operation among farmers in Lesotho is poor and this is often cited as a major factor in the failure of donor funded schemes.

Suggestions have been made that donor reduce their visibility at the scheme level in the irrigation sector by financing irrigation through local finance and banking systems. Whilst this may be feasible for small scale commercial farming it is not the right approach for food security initiatives that aim at supporting the elderly, sick and OVCs.

6.3. Government support and the enabling environment

The issue of the government subsidy to agriculture in general and irrigation in particular needs to be reviewed. Whilst government feels duty bound to establish and, in a majority of cases, maintain irrigation schemes, the more successful farmers all clamour for better management of and a clearer policy on produce marketing.

The land tenure system in Lesotho may have no influence on micro irrigation schemes targeting the individual household for livelihood purposes such as drip kits for less than 30 by 30 m. the situation changes dramatically when commercial small-scale irrigation is to be practiced. Most farmers associations have to rent irrigation farmland from individual owners in consultation with the chief. There is no title deed land in Lesotho. As such land cannot be used as collateral when borrowing money. Consequently there is no micro financing for small-scale irrigation in Lesotho.

6.4. Marketing and financing

An agricultural marketing policy is urgently needed in Lesotho. A strategy for Marketing boards and their modus operandi has to be developed if commercial small-scale irrigation is to take off and bring the desired economic benefits.

Micro financing approaches need to be developed to allow those farmers or an individual whose economic being is such that they do not qualify for humanitarian support but is inadequate for self-financing of agricultural initiatives. At the moment there is no system in place to cater for this group of people.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusions

It has been observed during the course of this study that:

- i) Lesotho promotes small-scale irrigation schemes but not necessarily the use of micro technologies in irrigation.
- ii) The country's draft irrigation policy is not fully complied with and there is poor co-ordination within and across ministries in the development and monitoring of irrigation schemes.
- iii) The country relies heavily on run off river schemes that remain vulnerable to seasonality of flows as well as droughts.
- iv) The main driver of small-scale irrigation development has been the government with international donor support. Communities are actually reluctant to take up plots in government initiated schemes.
- v) The target of government irrigation schemes has not been specific for social groups nor for geographical areas of special characteristics. This despite that most government officials recognise the geographical disparities in their discussions.
- vi) The co-ordination of irrigation development remains problematic even with the new National Irrigation Policy.
- vii) Extension services for irrigation development remain inadequately staffed, poorly resourced, insufficiently trained and limited in the range of services offered.
- viii) The land tenure system in Lesotho remains a major constraint for running small-scale irrigation schemes on a commercial basis.

7.1.1. *About NGOs and donor agencies*

- i) NGOs have tended to focus mostly on food security initiatives and have been involved heavily in schemes for the elderly, sick and vulnerable sections of society at the expense of developmental assistance.
- ii) NGOs have tended to identify community beneficiaries on the basis of perceived need and willingness to be helped. As a result some deserving but not so willing households have been left out in the cold.

7.2. Recommendations

7.2.1. General

It is recommended that:

- i) The government of Lesotho focuses more on the enabling environment for the development of small-scale irrigation in the country i.e., on policy formulation, legislation and regulation rather than direct provision of technology and supervision of communities.
- ii) Water sources be expanded to include groundwater resources and rainwater harvesting. These two are accorded a very low priority in micro irrigation development in Lesotho.
- iii) The private sector be engaged by both NGOs and government to assist in the provision of loan facilities for inputs and equipment.
- iv) The communities adopt a greater sense of responsibility for the schemes developed for them and that they meet up to 50% of project costs where feasible.
- v) Capacity building for government staff, service providers and the recipient communities be taken as a priority. Areas to target are O&M, planning and management as well as project initiation and financing.

7.2.2. For the NGOs and donor agencies

- i) The NGOs need to play a bigger role in the provision of skills and expertise and advocacy rather than the direct provision of technologies.
- ii) The NGOs need to involve the communities early in their initiatives if uptake is to be improved and sustainability issues addressed.

ANNEXES

Annex 1: List of contacts

Name of NGO/Agent or scheme	Telephone Numbers	Contact person
Lesotho Save the Children	+266-22322543	M. Mofokeng
Save the Children UK	+266-22312279	M. Kanetsi
Matsieng Development Trust	+266-22312776	M. Makenete
World Vision Lesotho	+266-22317371	T. Sedio
Butha Buthe - Ha Rasekila	N/A	DaO Butha Buthe
Quthing - Seaka	+266-58759957	Nt. Joel Hlalele
Maseru –Masianokeng	+266-58845462	Nt. Buti Khabutlane
Leribe - Tsikoane	+266-63142539	
Berea – Linokong	DaO Berea	Nt. Mpho
LHDA		
Ministry of Agriculture Irrigation Maluti Irrigation	+266-22324827	Nt. Moeletsi
Department of Water Affairs	+266-22312383	L. Motanya

Annex 2: Information sources

	The Lesotho highlands water project, 1997 – www.lhwp.org.ls/overview/default.htm
Lebese Lekholoane	Micro irrigation – the story of LCDI in Lesotho
IFAD	Statement by Lesotho to IFAD’s 27 th session of the governing council, 2004 – www.ifad.org/events/gc/27/speech/lesotho.htm
IFAD	Lesotho: Local initiatives support project (LISP, 199-LE) – www.ifad.org/evaluation/public_html/eksyst/doc/prj/r199leae.html
MOACLR	Lesotho – National irrigation policy and development strategy
	Summary statement of National Irrigation Policy, 2003 – <i>Ministry of Agriculture and Food Security</i>
CRS/SARO	Lesotho: Impact: food shortage (ENSO not responsible), 1998, http://darwin.bio.uci.edu/sustain/enso97/0398/06MarLesotho.htm
Water in Africa	Managing Water – www.peacecorps.gov/wws/water/africa/countries/lesotho/managingwater.html
Paul D. Coverdell	Uses of water in Lesotho: rainfall patterns – www.peacecorps.gov/wws/guides/lesotho/leswater.html
IRIN	Lesotho: special report – food crisis deepens, 2004 – www.irinnews.org/s_report.asp
MOACLR	National Irrigation Policy of Lesotho, 2002 – <i>Ministry of Agriculture and Food Security</i>

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