

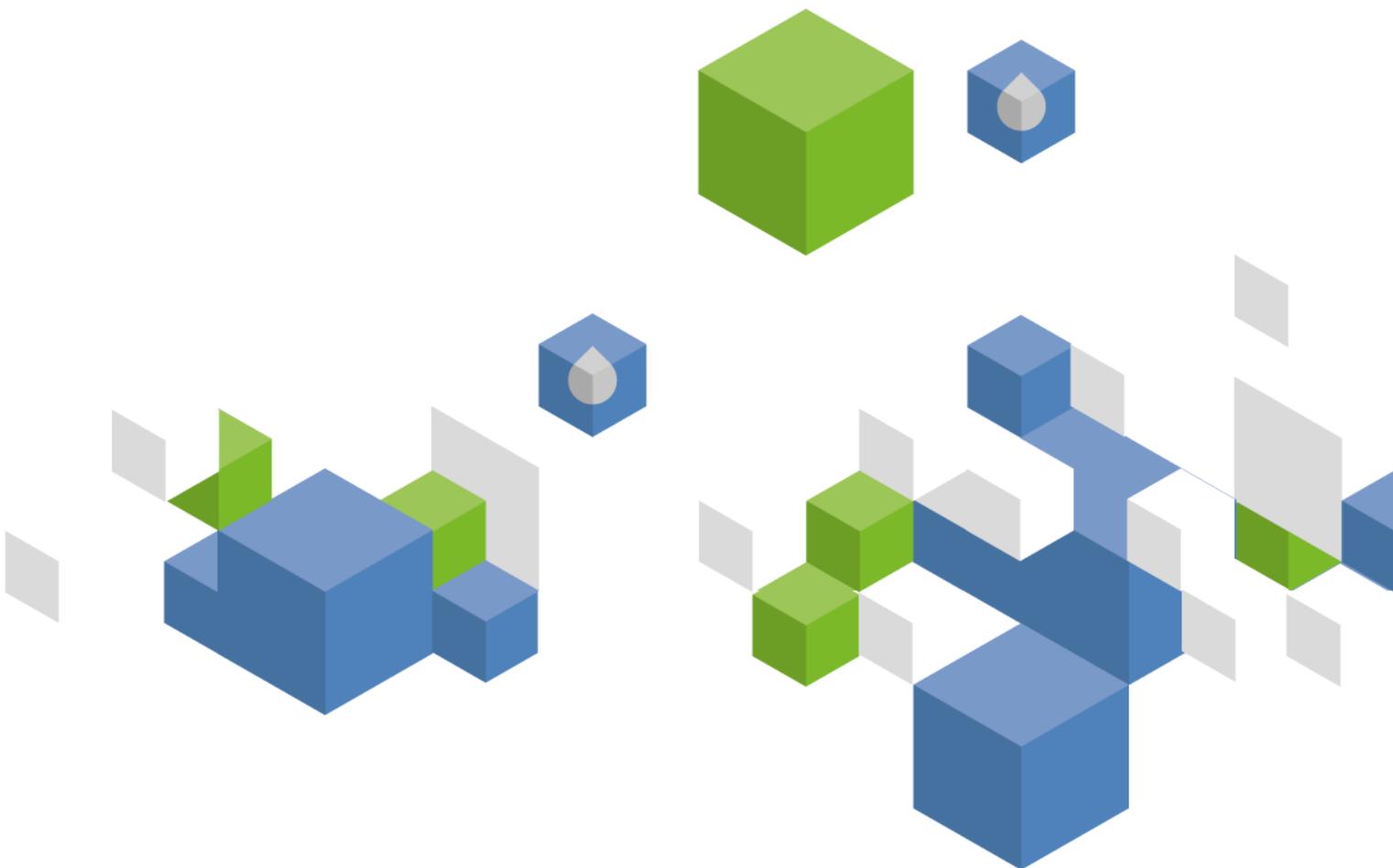


Food and Agriculture Organization
of the United Nations

FAO
AQUASTAT
Reports

Country profile – Lesotho

Version 2005



Recommended citation: FAO. 2005. AQUASTAT Country Profile – Lesotho.
Food and Agriculture Organization of the United Nations (FAO). Rome, Italy

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of FAO.

FAO encourages the use, reproduction and dissemination of material in this information product. Except where otherwise indicated, material may be copied, downloaded and printed for private study, research and teaching purposes, or for use in non-commercial products or services, provided that appropriate acknowledgement of FAO as the source and copyright holder is given and that FAO's endorsement of users' views, products or services is not implied in any way.

All requests for translation and adaptation rights, and for resale and other commercial use rights should be made via www.fao.org/contact-us/licencerequest or addressed to copyright@fao.org.

FAO information products are available on the FAO website (www.fao.org/publications) and can be purchased through publications-sales@fao.org.

© FAO 2005

Lesotho

GEOGRAPHY, CLIMATE AND POPULATION

Geography

Lesotho is a small land-locked mountainous country completely surrounded by the Republic of South Africa. It has a total area of 30 350 km², a north-south extent of about 230 km and a maximum width of about 210 km. Altitude varies from 1 500 m to 3 482 m. Lesotho is the only country in the world that is entirely situated above 1 000 m in altitude.

Lesotho is divided into four geographical regions:

- The *mountain region* covers 18 037 km² (59 percent of the total area of the country) and is characterized by the bare rock outcrops of the Maluti range and deep river valleys, with elevations of 2 000 m and above;
- The *foothills region* covers 4 529 km² (15 percent) and lies at elevations from 1 800 m to 2 000 m between the lowlands and the Maluti mountains;
- The *lowland region* covers 5 094 km² (17 percent) and is situated along the western border and consists of a narrow belt of land with elevation of 1 800 m or less and width between 10 and 65 km;
- The *Senqu Valley* covers 2 690 km² (9 percent) and forms a narrow strip of land that flanks the banks of the Senqu (Orange) River and penetrates deep into the Maluti Mountains; elevations vary from mountains to lowlands.

Lesotho has extensive areas of shrub lands, in particular rangelands, and a modest area of plantation forests (based on *Eucalyptus* and *Pinus*), while only less than one percent of the total land area is forest and woodland. In a few almost inaccessible areas, very small patches of Afromontane Forest are preserved, while most areas of forest, woodland and savannah in the rest of the country have been cleared for agricultural use, which has exacerbated the problem of soil erosion. Land degradation in various forms is a dominant landscape feature in the country, and soils with both management and inherent fertility problems that influence the productivity of both arable land and rangelands are common. Two areas covering together around 6 500 ha are devoted to ecosystem protection: Sehlabathebe National Park and Masitise Nature Reserve.

The cultivable land is largely confined to the lowlands and foothills on the Western border and the Senqu River valley in the south. Effectively all the cultivable land in the country, and sometimes more due to encroachment into marginal areas, is currently cultivated. Much of the rest of the land area is utilized for extensive animal farming. In 2002, the cultivated area was 334 000 ha, of which arable land was 330 000 ha, while 4 000 ha were under permanent crops (Table 1). FAO studies predicted a decline of land under cultivation due partly to land going out of production from erosion and partly to settlement expansion around main towns.

FIGURE 1
Map of Lesotho



FAO - AQUASTAT, 2005

LESOTHO

Disclaimer

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

TABLE 1
Basic statistics and population

Physical areas:			
Area of the country	2002	3 035 000	ha
Cultivated area (arable land and area under permanent crops)	2002	334 000	ha
• As % of the total area of the country	2002	11	%
• Arable land (annual crops + temp fallow + temp. meadows)	2002	330 000	ha
• Area under permanent crops	2002	4 000	ha
Population:			
Total population	2004	1 800 000	inhabitants
- Of which rural	2004	82	%
Population density	2004	59	inhabitants/km ²
Economically active population	2004	721 000	inhabitants
- as % of total population	2004	40	%
- female	2004	42	%
- male	2004	58	%
Population economically active in agriculture	2004	277 000	inhabitants
- as % of total economically active population	2004	38	%
- female	2004	58	%
- male	2004	42	%
Economy and development:			
Gross Domestic Product (GDP) (current US\$)	2003	1 100	million US\$/year
• Value added in agriculture (% of GDP)	2003	15.7	%
• GDP per capita	2003	610	US\$/year
Human Development Index (highest = 1)	2002	0.493	
Access to improved drinking water sources:			
Total population	2002	76	%
Urban population	2002	88	%
Rural population	2002	74	%

Climate

The climate is temperate with cool to cold winters and hot, wet summers. Mean annual rainfall is 788 mm and varies from less than 300 mm in the western lowlands to 1 600 mm in the northeastern highlands. There is substantial seasonal distribution of precipitation and as much as 85 percent of the total can be received during October to April. The Senqu River valley lies in a rain shadow area with some places not receiving more than 600 mm per year. The mountainous regions receive snow during the unusually cold winters. January is the hottest month with maximum daytime temperatures exceeding 30 °C in the lowlands. Temperatures on the mountains can fall to -20°C in winter.

Distribution of water and reliability of rainfall are serious constraints on agricultural production. Taken as a whole, rainfall in Lesotho is at a level that is adequate to sustain healthy agricultural activity. However, the erratic nature of its distribution is a major constraint for food production:

- The seasonal distribution of precipitation varies considerably and thus the danger of rain falling at the wrong time, or falling too hard, or not falling at all when it is needed, is always present even if total rainfall has been adequate;
- Extreme weather conditions occur periodically; droughts are said to occur three years out of every ten, heavy frosts are frequent and heavy unseasonable rains also occur from time to time;
- Not just the geographical distribution of precipitation, but also the fact that water does not always collect in places where it is immediately accessible for agriculture constitutes a problem; this makes it necessary to build, for example, conveyance infrastructures.

Population

The country has 1.8 million inhabitants (2004) with an annual growth rate of 1 percent (Table 1). Population density is 59 inhabitants/km², and 82 percent of the population is rural. The lowland is the most populated and intensively cultivated zone followed by the foothills, the mountains and the Senqu river valley. Lesotho ranked 132nd out of 178 in the 2002 UNDP Human Development Report and over 49 percent of the population is ranked as poor. Improved drinking water sources are available for 76 percent of the total population, comprising 88 percent of the urban population and 74 percent of the rural population (Table 1).

ECONOMY, AGRICULTURE AND FOOD SECURITY

Lesotho's economy is dominated by the services and manufacturing sectors, which in 2003 contributed 40.6 percent and 43.1 percent respectively to the national GDP of US\$ 1 100 million. The value added in agriculture was only 15.7 percent of GDP and the sector provided work for 277 000 people, which is 38 percent of the economically active population. Of these agricultural workers, 58 percent were female.

Smallholder farmers whose farms are generally less than 1 ha in size dominate the agricultural production. Maize is by far the most popular crop accounting for some 60 percent of the cropped area, sorghum between 10 and 20 percent, wheat for about 10 percent and beans for a further 6 percent. In late summer, farmers plant wheat and peas on residual moisture, which remain dormant for most of the winter until the first rains in spring.

Although Lesotho's main natural resource is water, drought chronically affects the country, leading to significant decreases in the contribution of agriculture to the GDP and forcing the country to appeal for assistance from the international community, thus illustrating the vulnerability of the agricultural sector. The country is a persistent net food importer, externally sourcing up to 65 percent of its annual maize requirements and 80 percent of its annual wheat requirements. The scope for increasing food production through area expansion or through higher productivity is extremely limited. Government sees irrigation as a key avenue for increased agricultural production and household food security, as it would enable farmers to intensify and diversify their crop production base. Crops identified for diversification include vegetables and fruits such as paprika, asparagus and apples.

One cannot over-emphasize the potential impact of HIV/AIDS on the agricultural sector. Despite the lack of reliable data on the extent and nature of that impact, it is clear that the disease is having a negative and dramatic effect on food security and vice versa. The impact is on labour availability, mobility and productivity, investment in the sector, the retention of knowledge about farming practices, the use of home gardens and the efficiency of the extension services. The burden of work falls on inexperienced younger or older and weaker household members. So HIV/AIDS increases needs at the household level while reversing the impact of efforts to build capacity.

WATER RESOURCES

Lesotho is located entirely within the Orange River basin. The major sub-basin river systems in Lesotho are:

- The Senqu (Orange), which drains two thirds of Lesotho (24 485 km²), originates in the extreme north of the country and leaves Lesotho near Quthing. In its catchment area, four large dams will be constructed under the Lesotho Highlands Water Project (LHWP).
- The Makhaleng, with a catchment area of 2 911 km², originates in the vicinity of Mount Machache and leaves the country near Mophale Hoek.
- The Mohokare (or Caladon) marks the border with South Africa and has a catchment area of 6 890 km². It springs from Mount Aux Sources, and leaves Lesotho near Wepener. All its major tributaries are located in Lesotho.

The Lets'eng-la-Letsie wetland in the Quthing district was tentatively designated as a RAMSAR site by the Government as part of its accession to the RAMSAR Convention.

Lesotho's natural renewable water resources are estimated at 5.23 km³/yr, by far exceeding its water demand (Table 2). Due to Lesotho's commitments in the framework of the LHWP, its actual water resources will have decreased to 3.03 km³/yr by 2020.

TABLE 2
Water resources

Renewable water resources:			
Average precipitation		788	mm/yr
		23.9	10 ⁹ m ³ /yr
Internal renewable water resources		5.2	10 ⁹ m ³ /yr
Total actual renewable water resources		3.0	10 ⁹ m ³ /yr
Dependency ratio		0	%
Total actual renewable water resources per inhabitant	2004	1 679	m ³ /yr
Total dam capacity	2005	2 820	10 ⁶ m ³

Groundwater resources are estimated at 0.5 km³/yr. Aquifer yields are low: of a sample of 818 wells, only 12 percent yielded above 1 l/s; average well depth was 65 m in intrusive, sedimentary or volcanic rock, and 28 m in alluvial rock. In 1995, about 3 300 wells, equipped with hand-pumps, served the rural population in the lowlands, while 10 percent of the urban municipal production originated from groundwater. Except for the area around Maputsoe (aquifer yield 50 l/s), the potential for irrigation with groundwater in Lesotho is low.

Major dams have been constructed in the framework of Phase I of LHWP:

- Katse Dam in the Central Maluti Mountains was completed in May 1997. It is a concrete arch dam, 185 m high, with 710 m crest length and a storage capacity of 1.95 km³. It impounds the Malibamatso River catchment (1 866 km²);
- Mohale Dam is a concrete faced rockfill dam, 145 m high, with 540 m crest length. It impounds the Senqunyane River catchment (938 km²) and has a storage capacity of 0.86 km³;
- Muela Dam, a 55 m high, 6 million m³ capacity dam acts as the tailpond of the Muela hydropower station.

Phases II, III and IV of the project foresee the construction of Mashai Dam (3.3 km³), Tsoelike Dam (2.22 km³) and Ntoahae Dam.

INTERNATIONAL WATER ISSUES

The LHWP Treaty was signed by the Governments of Lesotho and of the Republic of South Africa in 1986. The project is aimed at harnessing the water resources of the highlands of Lesotho to the mutual advantage of South Africa and Lesotho, transferring water to South Africa to alleviate its water shortage while providing Lesotho with facilities to generate its own electricity. After completion of all phases by 2020 the project will convey 2.2 km³/yr (66 m³/s) of water to South Africa. The Treaty provides for negotiations to be held between Lesotho and South Africa before further phases of the LHWP can be implemented. Such negotiations are ongoing, and as South Africa has reduced its forecasts for population growth, the water demand is growing more slowly than previously expected and Phase II of the LHWP will start later.

Lesotho, together with Botswana, Namibia, and South Africa, is located in the Orange River basin, and consequently a member of the Orange-Sengu River Commission (ORASECOM) created in 2000.

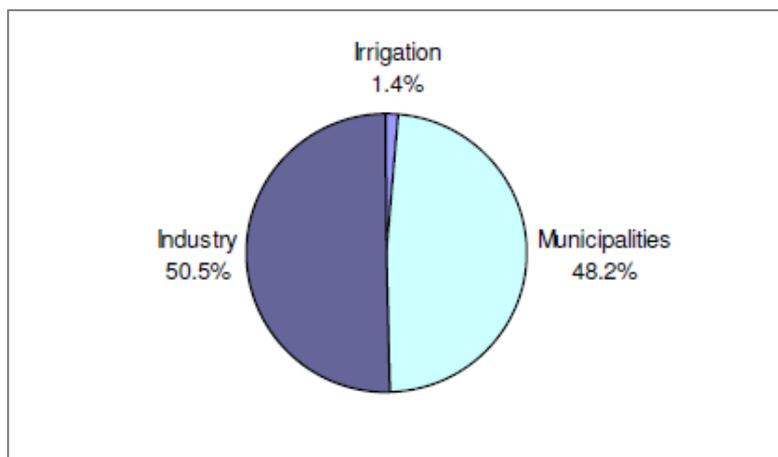
WATER USE

In 2000, the total water withdrawal was estimated at 43.6 million m³ (Table 3 and Figure 2). Industry is the main water user with 22 million m³ (51 percent) followed by municipalities with 21 million m³ (48 percent) and agriculture with only 0.6 million m³ (1 percent).

TABLE 3
Water uses

Water withdrawal:			
Total water withdrawal	2000	43.6	10 ⁶ m ³ /yr
- irrigation + livestock	2000	0.6	10 ⁶ m ³ /yr
- municipalities	2000	21	10 ⁶ m ³ /yr
- industry	2000	22	10 ⁶ m ³ /yr
• per inhabitant	2000	24	m ³ /yr
Surface water and groundwater withdrawal	2000	43.6	10 ⁶ m ³ /yr
• as % of total actual renewable water resources	2000	1.5	%
Non-conventional sources of water:			
Produced wastewater		-	10 ⁶ m ³ /yr
Treated wastewater		-	10 ⁶ m ³ /yr
Re-used treated wastewater		-	10 ⁶ m ³ /yr
Desalinated water produced		-	10 ⁶ m ³ /yr
Re-used agricultural drainage water		-	10 ⁶ m ³ /yr

FIGURE 2
Water withdrawal
Total 0.0436 km³ in 2000



IRRIGATION AND DRAINAGE

The long-term irrigation potential in Lesotho is estimated at 12 500 ha. In 1996, it was estimated at 2 520 ha for the foreseeable future. The distribution of this latter area over the districts is given in Table 4.

TABLE 4
Irrigation potential in Lesotho districts

District	Irrigation potential (ha)
Hololo	30
Hlotse	500
Phutiatsana	950
Mpetsana	40
Makhaleng	1 000
TOTAL	2 520

Other estimates of irrigation potential, considering only the available water resources and taking into account the reduced availability due to the LHWP, reckon that a minimum of 3 500 ha and up to 7 000 ha could be brought under irrigation if the Senqu River potential is fully exploited. However, others still, taking into account the high cost of irrigation development in the country, conclude that irrigation potential is limited by the market for high value crops and put the potential for new irrigation at about 1 000 ha.

In the last 40 years there have been many irrigation development projects in the country, almost all of them with funding from external donors. Public sector irrigation development has been largely unsuccessful due to a top-down and supply-driven approach on the part of government and donors and little consultation with, or participation by, farmers. Irrigation systems (mainly large sprinkler systems) have mostly been inappropriate for operation by smallholders as well as expensive to install and to run. As a result, farmer commitment and the overall sustainability of the irrigation works have been poor. Many irrigation schemes have been converted back into dryland farming.

The more successful irrigation projects in Lesotho, such as the small-scale irrigation and water harvesting projects, are based on an individual approach to communally owned irrigation schemes, where farmers control the on-field crop production activities. Private irrigation, consisting mainly of home gardens and small market gardens, is successful and is contributing to meeting household food security needs, as well as supplying rural markets.

The Ministry of Forestry and Land Reclamation (MFLR) investigated potentially irrigable catchments requiring water storage infrastructures for long-term development and identified 14 areas in the mountain districts of Mokhotlong, Thaba Tseka and Qacha's Nek. Out of the 14 areas, six are already operational and MFLR has constructed stone water tanks on some of the sites. Collaboration with the Irrigation Section of the Ministry of Agriculture and Food Security (MAFS) should be forged to improve progress on these sites.

The Agricultural Sector Investment Programme (ASIP) intends to improve the viability and sustainability of existing public irrigation schemes by making them more responsive to demand, and, subject to demand, to expand irrigation for fruit and vegetable import substitution, employment creation and enhanced food security.

By 1999, of the 2 637 ha equipped for irrigation only 67 ha were still under operation, and this still relied heavily on government/donor support, although the latter has declined in recent years (Table 5). Of the total equipped area, 175 ha were small schemes (< 100 ha) and 2 462 ha were large schemes (> 100 ha) (Table 5 and Figure 3). In small schemes mostly vegetables are grown and surface and sprinkler systems are used. Large schemes were equipped for sprinkler irrigation, but as the schemes never managed to make a profit, they are no longer irrigated. The two types of irrigation systems commonly used are sprinkler and surface irrigation. Sprinkler irrigation is the most common, while surface irrigation is not so widely used because of the topography of Lesotho.

Depending on pressure, three categories of irrigation are distinguished:

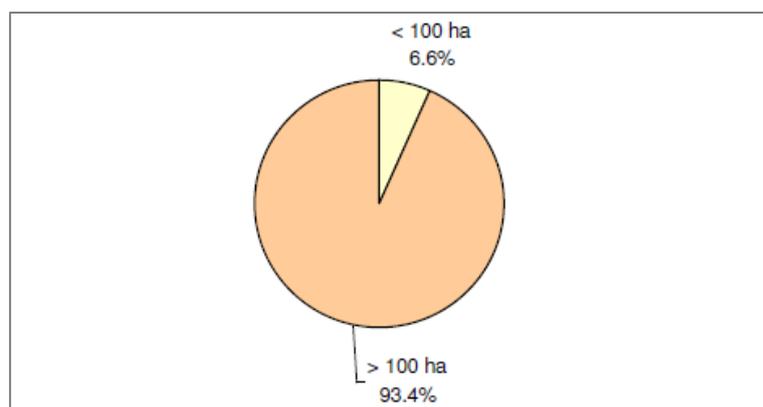
- Pressure < 5 m; taps with buckets or surface irrigation;
- Pressure from 5 m to 20 m; low pressure system;
- Pressure > 25 m; high pressure system.

Pressures over 25 m are normally produced by engine- or motor-driven pumps using petroleum or electricity.

TABLE 5
Irrigation and drainage

Irrigation potential		12 500	ha
Water management			
1. Full or partial control irrigation: equipped area	1999	2 637	ha
- surface irrigation		-	ha
- sprinkler irrigation		-	ha
- localized irrigation		-	ha
• % of area irrigated from groundwater		-	%
• % of area irrigated from surface water		-	%
2. Equipped lowlands (wetland, ivb, flood plains, mangroves)		-	ha
3. Spate irrigation		-	ha
Total area equipped for irrigation (1+2+3)	1999	2 637	ha
- as % of cultivated area	1999	0.8	%
- average increase per year over the last ... years		-	%
- power irrigated area as % of total area equipped		-	%
- % of total area equipped actually irrigated	1999	2.5	%
4. Non-equipped cultivated wetlands and inland valley bottoms		-	ha
5. Non-equipped flood recession cropping area		-	ha
Total water-managed area (1+2+3+4+5)	1999	2 637	ha
• as % of cultivated area	1999	0.8	%
Full or partial control irrigation schemes: Criteria:			
Small-scale schemes < 100 ha	2003	175	ha
Medium-scale schemes	2003	0	ha
large-scale schemes > 100 ha	2003	2 462	ha
Total number of households in irrigation		-	
Irrigated crops in full or partial control irrigation schemes:			
Total irrigated grain production		-	tonnes
• as % of total grain production		-	%
Total harvested irrigated cropped area		-	ha
• Annual crops: total		-	ha
- vegetables	1995	203	ha
Irrigated cropping intensity		-	%
Drainage - Environment:			
Total drained area		-	ha
- part of the area equipped for irrigation drained		-	ha
- other drained area (non-irrigated)		-	ha
• drained area as % of cultivated area		-	%
Flood-protected areas		-	ha
Area salinized by irrigation		-	ha
Population affected by water-related diseases		-	inhabitants

FIGURE 3
Irrigation schemes by size
Total 2 637 ha in 1999



Role of irrigation in agricultural production, the economy and society

Vegetables are produced in fairly large quantities under irrigation but production remains very seasonal. The main crop is cabbage, but carrots, spinach and a variety of other crops are also grown. There are both large-scale farmers (often using rented land) and smaller farmers working under irrigation programmes.

Home gardens are an important source of horticultural produce in Lesotho, where an estimated 70 percent of rural households produce some vegetables. Most home gardens are rainfed, supplemented with irrigation from household and/or community municipal water supplies, although some families have invested in small pumps supplied by streams and ponds. The produce from home gardens is mainly for self-consumption, with limited quantities appearing on the local village market.

Vegetable cultivation in the Small-Scale Irrigation Vegetable Project gave a net income of US\$ 2 300/ha in 1992. Yields achieved in various projects range from 1.9 to 3.6 t/ha for maize, between 3.5 and 13.5 t/ha for potatoes, and from 2 to 11.5 t/ha for onions.

Farmers in Lesotho may be categorized as shown in the Table 6.

TABLE 6
Categories of farmers in Lesotho

Farmer type	Farm size (ha)	Crops	Irrigation system
Subsistence farmer	0.1 – 0.2	Maize, sorghum, beans	None
	> 0.2 – 1	Cereals, maize, sorghum, legumes, potatoes,	None
Micro-irrigating farmer	0.025 (home garden)	Vegetables, fruit trees	Watering can, hose pipe/low pressure sprinklers
	0.1 – 0.5	Vegetables, fruit trees	Gravity-fed irrigation
Small-scale semi-commercial farmer	1 – 4	Vegetables, fodder	High-pressure irrigation system
Medium commercial farmer	10 – 20	Vegetables	High pressure system with traveling guns

Irrigation development in Lesotho is expensive and figures of up to 12 000 US\$/ha are given for previous schemes. At present the cost of a system comprising gravity-fed, low-pressure sprinklers, excluding mainline pipe from tank/reservoir to the edge of the field and without installation, is estimated at about US\$ 2 500 /ha. High-pressure systems are estimated to cost about US\$ 7 900/ha, leading to the conclusion that the high-pressure system is expensive and will need high-level management to recover the costs.

The following costs for small-scale irrigation development are given:

- Treadle pump system: US\$ 200-370 (for irrigated areas of 0.6 and 1.8 ha, with one pump);
- Drag-hose sprinkler system fed by a pump: US\$ 1 500-2 300 /ha;
- Low-pressure gravity-fed sprinkler: US\$ 1 950-2 750/ha.

The rates of return from irrigation schemes according to energy used to bring water from source to the field are shown in the Table 7.

TABLE 7
Rate of return to farmer capital employed by energy used to bring water from source to the field

Type of system	Rate of return to farmer capital employed (%/yr)
Gravity-fed	41
Solar pump	19
Diesel pump	15
Electric pump	11

From the previous table, studies concluded that probably only gravity-fed systems produce an adequate, commercial rate of return. Investments in pump-based irrigation in Lesotho should rather be considered primarily as social investment.

WATER MANAGEMENT, POLICIES AND LEGISLATION RELATED TO WATER USE IN AGRICULTURE

Institutions

The institutions involved in the irrigation sub-sector are:

- The Irrigation Section in the Engineering Division of the Crops Department of the Ministry of Agriculture and Food Security (MAFS) is involved in the investigation of new irrigation technologies that can be applied in Lesotho. Its maintenance and repair workshop has the capacity to repair irrigation equipment. There is a lack of appropriate equipment for planning and design.
- The Engineering Division of the Crops Department of MAFS itself provides planning, design and implementation support for, amongst many others, irrigation.
- The Agronomy and Horticulture Divisions of the Crops Department of MAFS also have potential links to irrigation development.
- The Soil and Water Conservation Division of the Department of Conservation, Forestry and Land Use Planning of MAFS is involved in irrigation development as far as dam planning, design and construction (using its own equipment) is concerned. Unlike the Irrigation Section, this Division has qualified staff engaged on small dam design and implementation.
- The Extension Division of the Department of Field Services of MAFS is involved in irrigation through its decentralized District Agricultural Offices (DAOs) in the 10 districts. These offices do not have designated posts for irrigation and thus no extension service in irrigation as such exists. The DAOs meet irrigation information needs through staff with general qualifications, who are limited in undertaking irrigation activities due to lack of skills and expertise.
- The Agricultural Research Division of the Department of Field Services of MAFS has an Irrigation Unit in its Engineering Section. One of its aims is to provide smallholder farmers with appropriate irrigation technologies and services to improve irrigation systems and, by doing so, productivity. However, activities related to irrigation systems are very limited due to lack of staff qualified in irrigation.

Irrigation services are available from a number of departments and units in MAFS but are uncoordinated and poorly resourced. The situation deteriorates the further away from the Maseru Headquarters a service is located, because specialist staff is difficult to attract to rural districts. Few officers have specialist knowledge of the economics of irrigation schemes. If the irrigation strategy of the Government is to benefit all farmers including those in remote rural areas it will be necessary to provide properly staffed irrigation teams in each district

Water management

It was found in the Irrigation Community Action Programs, which are being developed in mountain districts under the IFAD-funded Sustainable Agricultural Development Programme for Mountain Areas (SADPMA), that there are organizational and/or administrative problems because farmers are not organized into formal structures, let alone a legal entity, and therefore there are no regulations. This should be of primary importance however, as the farmers share water storage and conveyance facilities and some form of regulatory framework is needed to manage these facilities.

The need for proper management of water resources at all levels has come to be understood as one of the most important problems in the sector. It must be overcome before the full potential for agriculture in the country can be realized.

Policies and legislation

Currently the National Irrigation Policy of the Government is in disarray, as the Government and its donors recognize that previous policies have failed, but so far no comprehensive alternative has been developed. It is however government strategy to wean farmers away from growing traditional cereals and move to high value crops.

A proposed mission statement for Lesotho's irrigation policy is: "To manage and develop water and land resources for diversified economically sound and sustainable irrigation and drainage systems under organized smallholders and private commercial farmer management and to maintain an effective advisory service."

In Lesotho, all land is owned by the people and allocated by and through the traditional structure of chieftainship. Until very recently, when new forms of land holding were introduced, there was little legal (as opposed to customary) security for the tenants. For irrigation projects this has had major consequences, as the high fixed costs of providing the systems are only justifiable when the benefits can be shared between many recipients. The existing framework of land tenure is not likely to change rapidly and thus any effective irrigation scheme would in the short- to medium term have to work within it.

The National Environmental Policy of Lesotho recognized that the sustainable development of small-scale irrigation schemes, based on surface water resources via the construction of small dams and diversion of rivers, is totally dependent on the improvement and stabilization of soil conservation and afforestation measures in the catchment areas serving these schemes and adopted this as a guiding principle for water resources management. Furthermore, regular audits of, among others, irrigation schemes shall be undertaken with the aim of ensuring that they comply with this environmental policy.

The main legislation in the water sector is the 1978 Water Resources Act, which provides for use, control and conservation of water resources. However, legislation relevant to water resources is scattered over several orders and acts administered by different departments without any consistency or overall guidelines. Another piece of legislation dealing with water resources is the LHWP Treaty entered into by Lesotho and South Africa. The treaty provides for the protection of the quality and quantity of water in the LHWP area, but does not consider other relevant components of the utilization of shared water courses between the two countries.

ENVIRONMENT AND HEALTH

Lesotho's ecology is fragile because of the mountainous topography, the thin soil layer and the limited vegetative cover. Population pressure has forced settlement in marginal areas, resulting in overgrazing, severe soil erosion, soil exhaustion and desertification.

Poor management practices and infrastructure improvements have had serious negative impacts on water resources, through the destruction of wetlands and their hydrological functions, changes in water regimes due to overgrazing and inappropriate cropping practices, and increased sediment production caused by mining and road construction.

Water pollution by slurry from diamond mines is recognized as an environmental problem.

PROSPECTS FOR AGRICULTURAL WATER MANAGEMENT

The failure of the irrigation policy of the past was recognized by the Government, which is now focusing on farmer- and market-led irrigation development based on small-scale schemes provided for and managed by the farmers themselves. In all parts of Lesotho farmers are anxious to expand irrigation schemes, provided the schemes complement existing farming practice including land-holding, crop-selection and marketing and the control over decisions remains with the farmers.

To implement successful schemes, the developing authority will have to keep in mind the following:

- The agricultural sector in Lesotho exists within a very complex set of family, community and national relationships. Irrigation development, i.e. the introduction of a major technical change, has to be seamlessly inserted into this complex socio-economic culture in order to ensure the success of the project in the long-term, when the sponsor has withdrawn.
- The irrigation sub-sector is currently not represented in the extension services of the District Agricultural Offices; this will have to be addressed to ensure appropriate on-site farmer support.
- The level of training in the country is insufficient, and any irrigation initiative taken will have to provide extensive training at all levels, including academic.

Because of the high cost of development, irrigation potential will be limited by the market for high value crops, rather than by the available land and water resources.

It was announced by the Government in early 2004 that an irrigation master plan is being developed to enable the networking of irrigation infrastructure throughout the country, and that in the meantime 59 irrigation sites in the foothills region are being surveyed for the possible installation of simple gravity irrigation systems.

MAIN SOURCES OF INFORMATION

Chakela, Q. K. (ed). 1999. *State of the Environment in Lesotho 1997*. National Environment Secretariat. Ministry of Environment, Gender and Youth Affairs.

FAO. 1996. *Assistance in soil and water conservation*. TCP/LES/4555(A). Project Document.

FAO and World Bank. 1999. *Lesotho smallholders irrigation initiative*. Exploratory Mission Report.

FAO. 2003. *Country Policy Profile for Lesotho on the State of Policy, Strategy and Foreseen Support*.

FAO. 2004. *Water control component of the Special Programme for Food Security - Phase III of TCP/LES/8922 (D)*. TCP/LES/3001 (D). Project Document.

Government of the Kingdom of Lesotho. 1997. *National Environmental Policy of Lesotho*.

Lesotho Highlands Development Authority. 1990. *Lesotho Highlands Water Project, Environmental Action Plan*.

Ministry of Agriculture. 1991. *The history of irrigation in Lesotho*.

Ministry of Natural Resources. 1994. *Hydrogeological map of Lesotho*.

NUL-CONSULS. 2002. *Studies on the small-scale Irrigation Sub-Sector Input to the National Irrigation Policy & Development Strategy*. Report prepared for FAO and the Ministry of Agriculture, Cooperatives & Land Reclamation (MACLR) of the Government of Lesotho. Maseru, Lesotho.

TAMS Consultants Inc. 1996. *Water Resource Management: Policy and Strategies*. New York.