

Second State of the  
**Environment**  
2002 Report

# Lesotho





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**Second State of the Environment Report**  
2002

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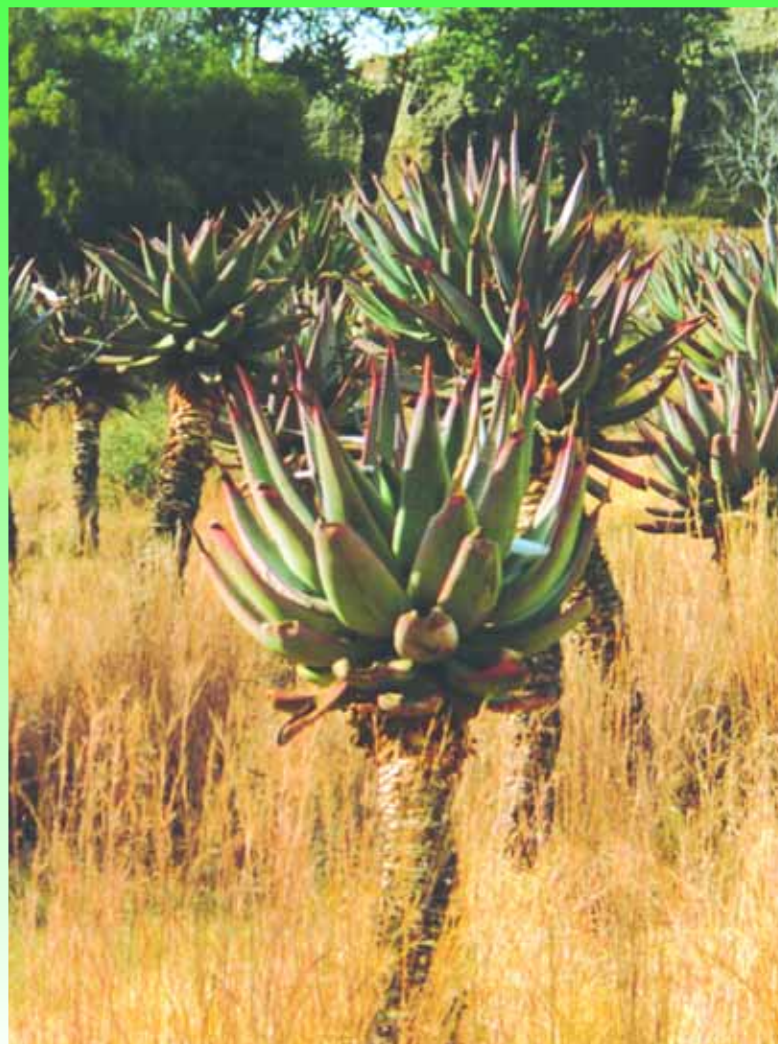
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**J.T. Metsing**

Principal Secretary

Ministry of Tourism, Environment and Culture



# Foreword

The frequency at which the country is expected to produce state of environment reports is enshrined in the Environment Act, 2001. In terms of section 10 (q) Government is expected to produce state of environment reports once every five years. This is the second State of the Environment Report (SoER) for Lesotho and it provides an update on the first SoER that was prepared in 1997.

SOER is one of the tools which provide an analysis of the state of environment and the driving forces behind environmental change, and consequences on the social and economic activities. It also discusses government's responses to the changes. These are in the form of policies, programmes and projects.

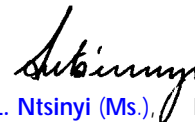
Every attempt has been made to write this book in an accessible language so that people at various levels of decision-making can be able to use it in making informed policy decisions. As part of facilitating the use of this book, a number of products will be made e.g. policy briefs, factsheets and posters.

The majority of Basotho are living below poverty line. They are struggling to survive and in their quest for survival they often turn to mother nature for help. These are the people that are most vulnerable to environmental change, and suffer most from its vengeance against human abuse. It is the Government's top priority to give these people a chance to live a better life. This report therefore acts as one of the mechanisms which are intended to report on progress made regarding poverty alleviation strategy.

Government is in the process of decentralizing its services, and natural resource management forms a critical part of this programme. It therefore follows that state of environment reporting will be of vital importance in giving the extent to which interventions in various areas have performed. It is also seen as a means of empowering people with information which they need to make decisions pertaining to their natural resources. They will have information on which resources are dwindling, and at what rate this is happening, and more importantly, what can be done to reverse the negative trends.

There is a paradox in the interaction of humans and ecosystems. The demands for environmental services such as food, pollution sink, clean water, etc are ever increasing while at the same time human action are decreasing the ecosystem's ability to meet these demands. It is a well-known fact that implementation of sound policies can reverse or halt environmental degradation but the nature of interventions and their likelihood of success are depended on an in depth understanding of ecological and social systems. Information is of vital importance to sound decision-making.

It is my sincere believe that a better managed environment can contribute tremendously towards poverty eradication and sustainable development ☐



L. Ntsinyi (Ms.), Hon. Minister - Tourism, Environment and Culture







# Executive summary

## Socio-economic and cultural environment, people, economy and development

In this chapter, we present the socio-economic framework adopted in Lesotho with particular reference to how it interacts with the natural environment. An analysis of both economic and social policies, which have been pursued in Lesotho since independence is attempted. The environmental impact of these policies is then assessed by analysing the impact of each policy on the natural environment.

From the analysis in this chapter, it is evident that the main driving force behind environmental change in Lesotho has been, and continues to be, the policies that have been adopted by the government as encapsulated in the five-year development plans. To this end, it is noted that before and shortly after her 1966 independence, Lesotho was largely an agrarian country with agriculture constituting approximately 40% of the Gross Domestic Product (GDP) in the 1960's.

It is worth noting that this pursuit of agriculture as the mainstay of economic growth was a result of a conscious policy decision to make agriculture "the back-bone of the Lesotho economy". The result of this policy was to act as a remarkable driving force for environmental change since the agricultural sector is by nature highly reliant on the environment. Indeed, such highly environmentally intensive policies were the norm in the early days following Lesotho's independence as sectors such as Mining,

Construction and Tourism were among the most vibrant. It is, for example, not unreasonable to observe that due to poor farming methods that were used, a lot of soil erosion was caused by mainly subsistence agriculture that was the norm in those days.

Economic performance as measured by growth in GDP declined over time along with the decreasing importance of agriculture. For example, whereas GDP grew at around 8% in the 1960's and part of the 1970's, the agrarian era, it took a knock in the 1980's, growing at an average of 3.9%; 50% decline compared with the previous decades.

The adoption of the Structural Adjustment Program along with the Lesotho Highlands Water Project in the latter part of the 1980's decade saw the economy growing at a moderately better rate of 4.2% in the 1980's. Though an improvement over the previous decade, it still underscores the fact that there has been a gradual decline in the economic performance over time. This is indicative of the rising poverty levels in the country ever since independence.

In cognisance of this worsening state of affairs, the Government of Lesotho adopted its sustainable human development policy in 1996 thus ushering in a new strategy of poverty alleviation. The policy also had significant environmental implications that were, arguably, not foreseen. For example, the heavy reliance on labour intensive methods under the '*fata-fato*' of the late 1990's laid more emphasis on giving people livelihoods through the food or money earned than on the actual infra-structure projects. The result of this has been catastrophic on the environments with a lot of road and





dam projects ending up as catalysts of environmental degradation rather than, as was intended, development.

The dominating theme of the sustainable human development policy is based on three elements namely: - to enable people to lead long and healthy lives, acquire knowledge and have access to resources needed to accommodate acceptable levels of human needs. Consequently, poverty alleviation has, since the sixth development plan, heavily influenced all other socio-economic policies, as they too had to be geared towards the overall direction of sustainable human development. In pursuit of these three policy objectives labour intensive methods were adopted under the Lesotho Fund for Community Development to the detriment of the environment. It is in this, and many other ways, that the poverty alleviation policy objective has been, and continues to be, a major driving force for environmental change in Lesotho.

The other policies that have been identified, as driving forces are the export biased economic policies that are predicated on attracting more and more foreign direct investment particularly in the manufacturing sector. The result of this policy has been, as desired, to create needed jobs but on the contrary impacting negatively on the environment by actually transforming the economic structure from the more environmentally friendly tertiary base to a much more environmentally risky manufacturing base. Among other driving forces discussed are the demographic and health policies, which also, due to their importance as per government policy, do get priority in terms of the

fiscal budget. However, it is worth pointing out that due to their close association with the environment, both health and demographic policies seem to benefit rather than degrade the environment thus leading to a positive change in the environment.

With regard to pressures on the environment, the main economic pressures on the environment are brought about by both the industrial structure of the Lesotho economy as illustrated by the sectoral composition and, also, the rates of growth of respective sectors. An industrial structure that is biased towards sectors such as Agriculture, mining and manufacturing that rely heavily on the environment for both raw materials and absorptive capacity of by-products tends to exert a pressure on the environment. Consequently, in such an economy, the attainment of sustainable development requires a conscious effort of mitigating against all possible negative environmental impacts resulting from economic activity.

The Lesotho economic structure has been progressively changing from dominance by the services sector to the manufacturing sector the result of which has been to exert more pressure on the environment. Even more notable is the fact that the manufacturing sector is not only dominant in terms of shares to GDP but also the highest growing of all sectors thus indicating growing pressure on the environment. This clearly underscores the need to encourage growth in more environmentally friendly hence more sustainable sectors such as tourism and financial sectors. Population growth and the associated rural to urban migration along with the high incidence of poverty have also been identified as pressures for environmental change.

A discussion of the State of the socio-economic environment and the impacts reveals the socio economic challenges facing Lesotho. To avoid the usual error of assessing a



country's socio economic development by solely its GDP growth rate, a much more social progress focused measure, the Human Development Index (HDI) compiled and published by the UNDP, is used. A comparison of Lesotho's HDI with other SADC countries reveals the average socio economic performance of the country within the regional context as the country ranks seventh out of 13. Furthermore, Lesotho's HDI has been declining lately from a peak of 57% in 1995 to 54.1% in 1999. According to these HDI trends, Lesotho is, in terms of quality of life, a worse place to live in now than it was in 1985.

Regarding the state of the poverty situation, it is notable that it is getting worse over time. For instance, people spending less than M80 per month, considered as poor, have increased from 49% in 1990 to 68% in 1999. Even worse is the finding that of those falling below this poverty line, 70% (49% of the entire population) are classified as destitute since their monthly expenditure is below M40. Recent studies have estimated Lesotho's income distribution measure, Gini-coefficient at 56, a level that indicates high inequality in income distribution in Lesotho.

To absorb the pressure brought about by the poverty alluded to above, a lot of people resort to agriculture for their survival such that in spite of the declining agricultural productivity, approximately 85% of the population still depends partly or fully on agriculture for their livelihood. Crop production in Lesotho is extensive and involves cultivation of maize (60% of arable land), wheat (10%), sorghum (20%), beans and peas (8%) and vegetables (2%) (GoL, 2001). In the 1990s, Lesotho produced 50% maize, 98% sorghum and 15% wheat of its annual demand but the current demand of cereal crops currently exceeds local production by 90%. Lesotho is therefore heavily dependent on imported cereal crops.

With respect to progress on other socio-economic factors such as health and access to basic resources, the performance has been somewhat mixed. For example, whereas Lesotho, as per the UNDP, has achieved an impressive oral rehydration rate of 84%, it has achieved a somewhat poor rate of immunization of one year olds against measles at only 55% compared with 90% for Mozambique on the same variable. Access to basic resources such as electricity, water and telecommunications the country is still at its rudimentary stages of development with only 1% of population having access to basic telephony.

Economic performance was, on the other hand, very satisfactory in much of the 1990's with economic growth rates in excess of 5%. An exception is 1998 when the economy actually contracted by 4.6%; a substantial change compared to a growth of 8% achieved just a year before in 1997. As an indication of its resilience, Lesotho's economy recovered some lost ground as it grew, in 1999, by 2.2%; a 50% less than the targeted rate of 4% but a positive indication nonetheless when compared with the 4.6% decline a year before. The GDP growth rate further picked up in 2000 as the economy recorded an annual growth rate of 3.3 %. Despite all these economic gains in recent years, Lesotho remains a desperate country with most of its people classified as being destitute.

The rate of inflation stabilised at rates below 10% percent; the so-called single digit rate, which is considered sustainable for economic progress. Over time, the rate of increase of Lesotho prices of goods and services have been declining. However, latest data indicates a sharp increase as the first quarter of 2002 recorded a double-digit inflation figure of 11%. Persistence of this trend would threaten the achievement of the government's Poverty Reduction and Growth Strategy and will also have dire conse-





quences for environmental rehabilitation efforts.

As depicted by a deficit of M177.40 Million in 2000 (after correcting for the effect of the depreciating exchange rate) Lesotho's Balance of Payments actually deteriorated. The implication of this is that the stock of foreign reserves had to be drawn to make good the deficit. As such, the balance of payments position remained very weak.

The government enacted a plethora of responses to these challenges. Chief among these is the poverty alleviation strategy process as encapsulated in the Poverty Reduction Strategy Paper (PRSP). This follows comprehensive work in the form of poverty mapping exercise and the subsequent poverty action plan that were done in 1996. The Government has also initiated Small Scale Enterprises Project aimed at providing credit guarantee for accessing loans to small-scale enterprises and the industrial sector including provision of training opportunities for entrepreneurs

### ***Cultural and historical heritage***

Driving forces identified as currently shaping the current state of cultural and historical heritage are: development initiatives; education systems and the values they promote; the influence of globalization; dominant colonial religions and their impact on the local cultural norms and values; international legal instruments of which Lesotho is a signatory, and special international events that Lesotho participates in. The interplay of these forces has given rise to conditions that create pressures on the environment and

the heritage. These pressures include the burgeoning population, urbanisation, and activities that adversely impact on the heritage due to lack of awareness about its existence and value.

Palaentological work in Lesotho has drawn the world's attention and made a significant contribution to the understanding of the past forms of life. The earliest significant asserts may be traced to 1880s and more recent work is associated with the LHWP operations to rescue valuable resources that would otherwise be affected adversely by the project. The absence of National Museum, lack of framework for training of palaentologists, and the limited role of education are identified as drawbacks to locally driven development of palaentological work.

Archeology also has a great potential and there are many possible archaeological sites. Excavations have been initiated by foreign researchers and expeditions and may be traced to the 1960s under the British colonial rule. Recently LHDA rescue operations have made possible some important finds. There is no framework for systematic archeological explorations, training of archaeologists, and awareness about the heritage is limited

The rock paintings are wide spread in Lesotho and it is estimated that there could be about 3000 sites. The paintings are the work of the San, the earliest inhabitants of Lesotho, and often reflect extinct animals and aspects of San's culture. Vandalism and natural processes are key threats to the heritage. The LHDA rescue operations have conserved a number of rock paintings that were to be affected by the project. The absence of the museum and the functioning national archives to keep and display the findings are drawbacks in protecting the artwork. The Ministry of Tourism and





Environment is currently compiling a list of rock painting sites and holding *Pitso's* to raise communities' awareness about the heritage.

Historic buildings constitute an important heritage and are found mainly in towns, villages of former principal chiefs and Christian missionary stations. Only three historic buildings are legally protected in the country. Many of these buildings are gradually lost, since there is no framework to protect them. The official listing of buildings was last done in 1969.

There are presently nine legally proclaimed monuments and they include rock painting sites, fossil sites, archaeological sites, a tower, and fortresses. The official listing of historic sites was last made in 1969.

There is one Christian mission-promoted Museum at Morija, and a temporary national 'museum' quarters in the Ministry of Tourism, Environment and Culture. A lot of valuable data from Lesotho is still found outside Lesotho due to lack of a developed National museum and the archives. The Government is, however, in the process of soliciting funding for the development of these structures.

National parks and nature reserves are significant aspects of the cultural heritage, in terms of their rich biodiversity and the associated local knowledge; there are up to 9 such areas. Other than biodiversity related local knowledge, there is evidence of knowledge embodied in Sesotho on environmental management, medicinal plants and food plants. More research is required to establish the actual status of this knowledge.

The performing arts, visual arts, literary arts and ethnographic arts have developed over

time with the support of the public and private sectors. In formal education art is part of the curricula at both primary and tertiary institutions. The non-formal is largely supported by the business sector foreign organisations/institutions. There are a number of community-based art associations, but due to the absence of an umbrella body the artwork in has remained uncoordinated at the national level. However, the government is in the process of developing a national policy on culture. The annual 'Morija Arts and Cultural Festival' has played a catalytic role in the promotion of Basotho culture for economic development nationally; the festival has received support from the government and wide ranging donors.

In order to promote the cultural and historical heritage, the government has established Lesotho Tourism and Development Corporation (LTDC). LTDC is semi-autonomous and its key functions are development of marketing and investment promotion.

The government of Lesotho has set up legal frameworks and policies as responses to the threat facing the heritage. This initiative may be traced to the 1960s with the enactment of the *Historic Monument relics, Flora and Fauna Act 41 of 1967*; and recent responses include *The Constitution of Lesotho, National Tourism Policy, National Culture Policy Framework, and a Bill on Traditional Medical Practice*.

### *Land use and management*

The Basotho way of life is underpinned by the principle and an understanding that all land and natural resources are strictly communal; i.e. Land belongs to the nation (*mobu ke oa Sechaba*). It was the inalienable right of every Mosotho to have access to land, water, pasture, woodland and wildlife. This notion, characteristic of the tragedy of the commons, has serious implications in respect of land and land resources use and



management. In most instances proper management and sustainable use of resources is a foreign metaphor to most Basotho. Serious interventions have been undertaken by the Government to foster attitudes of better and appropriate land management, but with limited success. The Government has introduced a series of interventions in an effort of arresting the misuse of the land resources. The interventions however had mixed results as a few of them achieved their intended objectives whereas the majority of them failed to achieve their objectives. Land resources management have been characterized by constraints such as fragmented efforts, lack of clear framework for land use planning, absence of security of tenure, declining traditional authority and mixed rule of law between government institutions and traditional authorities. These dynamic factors have resulted in bad land use practices, such as encroachment on agricultural land by residential settlements, encroachment on steep slopes and marginal lands by crop farmers, uncontrolled mining and road construction in other environmentally sensitive areas of the country such as wetlands.

Population growth and the rapid rural-urban migration in search of opportunities increase urban and peri-urban population density in Lesotho. This has exerted pressure on natural resources by increasing demand for land for various uses and generates competitions among users.

Eighty percent (80%) of the population in Lesotho derives its livelihood from agricultural activities but the total arable land is estimated at 9 % of the country's land base creating conditions for extreme poverty and tremendous pressure on the natural resource base. The Government of Lesotho together with interested and affected stakeholders have embarked on adopting an integrated approach in land use and resource management strategies in order to minimize pressures imposed on land by natural and



man made activities. The initial steps in implementing the land management strategy were to undertake a land resources studies in 1989 and 1994.

The Land Use Division of the Ministry of Local Government – then under the Ministry of Agriculture - used Landsat Satellite Imagery to classify land cover. The interpretation of data was based on 1: 250 000 South African Land Cover Database (NLC DATA) which covered the whole of South Africa including Lesotho. The images used to interpret the land cover were taken in March 1989 and April/May 1994. The images showed a general decrease in rangeland and arable land, an increase of up to 177 % for residential area, 4 % increase in industrial/road infrastructure and 73 % increase in mines and quarries.



Problems have not been encountered in land use and management alone but also in institutional and legislative instrumentation to effectively manage the resource base. In the past different institutions, dealing with land resources problems, have enacted several laws for their own working conditions and thus creating disparity and ineffectiveness in implementation of efforts meant to alleviate land degradation. The main weakness of these laws has been fragmentation and failure to provide sufficient security of tenure required for the sustainable use of land resources. The Land Policy Reform Commission, established in 1999, was charged with the responsibility of reviewing land tenure system as well as all laws governing access to land so as to enable the very illusive attempt of conservation and sustainable use of land and land based resources.

### *Mining, construction, transport and infrastructure*

Mining, construction, transport and infrastructure have contributed to negative environmental impacts change. This is through habitat destruction, water, noise and air pollution and visual impacts. There are three large-scale diamond mining activities in the country - Kolo, Liphobong, and let\_eng-La-terai. Over and above this, there are individuals engaged in diamond mining on a small scale. Slurry from diamond mines impact on water and stone crushing activities create noise and air pollution. Borrow-pits utilized for road construction and other infrastructural activities are not rehabilitated thereby creating the negative visual impact on the natural landscape.

### **Water resources**

Water is the most valuable Lesotho's natural resource. It is a key determinant of economic growth and a resource that must be carefully managed as part of an environ-

mentally sustainable development. Overall, total water resources in Lesotho are abundant in relation to the demand. Nevertheless, there are severe water shortage problems. For surface water sources, which are mostly direct river abstractions, variability of flows and lack of regulation facilities leads to seasonal shortages. Groundwater sources are generally smaller if explored in perched water tables, and a lack of sufficient capacity to drill deeper means that some of these boreholes are often overused leading to local depletion and a shortfall in supply. This problem is realized in those constructed without acquisition of borehole construction permits from DWA.

WASA is the sole provider of reticulated water in Lesotho, provided water services to around 176 000 inhabitants, or approximately 50% of the population, living within its designated area of responsibility in 1997. By the year 2000, 31685 customers were served and this figure rose to 34 492 during the 2000/2001 water year.

Water availability now and in the future heavily depends on climate, water resources use and management and land management practices.

Water abstraction and consumption rates are important factors affecting water resources capacity and use in Lesotho. Surface water is being developed through the Lesotho Highlands Water Project (LHWP) by building a series of dams to transfer of water to Republic of South Africa (RSA) and generation of electricity to Lesotho at Muela Dam. Historically use of surface water for town supplies and naturally occurring springs for rural village supplies did not necessitate examination of groundwater occurrence and availability. However, with the rapid growth in water demand for urban, peri-urban and rural areas, the need for reliable water sources has become a priority. Several Towns have augmented river abstraction systems with water from boreholes and well fields.



Pollution and rates of ground water depletion and the efficiency of water treatment plants to meet demand affect water resources quality and quantity. A holistic catchment management program in Lesotho under comprehensive catchment based rural development programmes may lead to a sustainable water quality management programme. In urban areas, as the number of private connections increase, the total consumption will increase according to the present per capita value for private systems. The urban domestic water consumption for the year 2025 is projected at 61 l/c/d, compared to 30 l/c/d in 1995. .

In 1996 an estimated 58% of the rural population had access to DRWS's public water supply schemes, although there were substantial variations across the country. There is a trend towards higher levels of service; over 70% of water points are based on reticulated systems, and there is increasing demand for private connections. In the last 4 years DRWS has not constructed a single hand pump-based project. Because of the restrictions on WASA's activities, DRWS has played a substantial part in water provision in the expanding peri-urban areas.

The Government in May 1999 adopted a new Water Resources Management Policy, and this sets out the framework for a sector-wide reform. This includes the need for the economic pricing of water resources, recognizing the benefits of introducing private sector participation, the necessity of institutional reform, and the requirement for a strong regulatory framework. The policy recognized the seriousness of the water situation in the lowlands, and the Lesotho Lowlands Water Supply Scheme is specifically included within the new policy.

With regard to rural water supply and sanitation, DRWS produced a Strategy for the

Future in 1997 which included demand-driven expansion, full recurrent cost recovery, private sector delivery of services, increased community participation, and a shift from construction towards maintenance. Water Resources Act 1978 needs to be revised and harmonized with Environment Act 2001.

On international arena, the Protocol on Shared Watercourse Systems in the Southern African Development Community (SADC) Region was ratified in 1995. The protocol set out objectives for the sustainable, equitable and reasonable utilization of shared river basins in the SADC region, promoting regional integration, poverty alleviation and environmentally sounds development and management.

## Climate and the atmosphere

The global concern about climate change has increased since the 1980's due to scientific evidence that linked Green House Gases (GHG's) emissions with global climate change. It has also been discovered that the ozone layer, which filters the sun's harmful ultraviolet rays from reaching the world, is being depleted due to emission of Ozone Depleting Substances (ODS's) - e.g. chlorofluorocarbons. The observation is that population growth affects climate through increased demand for fossil fuels which emit GHG's, and depletion of ozone layer through an increase in demand for ODS's.

Studies carried out in the country show that residential sector is responsible for more than 90% of energy consumption (including fossil fuel that emits GHG's) for household activities. Transport, industry, governmental and other institutions are other sectors that consume fossil fuel in the country. Though the country's contribution of GHG's is minor, its insufficient vegetation cover to absorb these gases makes it a net emitter of





GHG's. As for ODS's, most of them emanate from refrigeration services sector. But emission of these has decreased with time in the country and the intention is to eliminate them by the year 2008.

Due to its geographical location, Lesotho is vulnerable to climate change, with rainfall and temperature varying in all time scales. This climatic variability places critical constraints on crop production. In recent years, the country has experienced droughts associated with El Nino conditions, and studies show that the frequency of these droughts is increasing with time.

In response to climate change and ozone layer depletion, Lesotho has ratified the following conventions:

- The UN Frameworks Convention on Climate Change in 1995.
- Vienna Convention for the Protection of the Ozone Layer, 1994
- Montreal Protocol on Substances that Deplete the Ozone Layer, 1994
- Kyoto Protocol to the Convention on climate Change

Lesotho has also initiated the project *"Enabling Activities for the Implementation of UNFCCC"* with the main objective of assisting the country to meet its obligation under the convention and to help in formulation and implementation of the National Action Programme on Climate Change. The set back is that the country does not have National Climate Policy and the National Plan of Action, which makes it difficult to implement the Convention effectively.

## Aquatic and terrestrial ecosystems

The current data shows that aquatic and terrestrial ecosystems are being degraded at an alarming rate, mostly by human-induced factors. Loss of habitats, extinction of species and reduction in genetic variability can directly be linked to human behaviour. The increases in population density coupled with livestock population pressure have serious implications on the country's natural resources and consequently environmental degradation. Population growth has necessitated a need for increased productivity, which has further contributed, to the loss of biological diversity. Poverty exerts a huge pressure on natural resources; poor people rely on the environment to sustain their livelihoods. Subsistence agriculture, using improper agricultural practices, has become the mainstay of survival, also dependency on biomass as the main source of energy has placed a tremendous pressure on indigenous trees and shrubs. Pollution, invasion of exotic species and overexploitation have contributed to an increase in the number of threatened plant species, and in low diversity in the country's fauna especially in fish, reptiles and amphibians species.

Parliament of Lesotho passed the Lesotho Environmental Act in 2001. When enacted, the law will provide for the management of the environment and natural resources of the country. This law, if enforced correctly, will improve the current decline in biological diversity as well as other environmental issues in Lesotho.

## Environmental governance

Lesotho is a party to a number of Environmental conventions and protocols and to implement them it has affected appropriate policy and legal framework as well as effec-



tive institutional arrangements. The country has prepared a National Environment Action Plan, which incorporates environmental issues into the country's economic development and coordinates its environmental challenges. As a response to implement Agenda 21, it formulated National Action Plan under the guidance of NES.

Also the National Environment Policy was finalized and approved by the Cabinet in 1996 and was further reviewed in 1998. The NEP reinforces powers of sectoral ministries and focuses on areas of high environmental priority in Lesotho. Apart from that the country has established Environmental Units within the planning division of each line ministry. This is to ensure that the role and efforts of NES are effective and to ensure that environmental considerations are incorporated at every level of decision-making in all line ministries.

For NES and line ministries to execute their responsibilities efficiently, it is necessary that their capacity in environmental management be enhanced, and trends over the past years show an increase in capacity of the Government to manage the environment and increase in financial resources allocated to environmental management although

human resources and financial resources are still inadequate. So far, the country has achieved the following:

- In preparation for the implementation of Environmental Act 2001, the government with assistance of DANCED offered 16 short courses to enhance capacity of NES, EU's, Ministry of Planning and some parastatals;
- Despite inadequacy of staffing with NES and absence of legal mandate, the unit has successfully reviewed numerous EIA project briefs before implementation of projects. However, most developers did not follow recommendations made by NES;
- In order to improve the environmental quality, the country has prepared environmental standards and guidelines. These include WASA Effluent Standards, NES Draft Water Quality Standards, NES EIA Sectoral Environmental Checklists, EIA Draft Manual and DRWS EIA Manual;
- A number of committees have also been established to work with NES in implementing mandate of coordination and environmental Management. These are as follows:

- CHEMAC - Chemical Management Committee
- COWMAN - Committee on Waste Management
- NDSC - National Desertification Steering Committee
- CEDAMA - Committee on Environmental Data Management □



# Introduction

This is the second State of the Environment Report (SoER) for Lesotho and it provides an update on the first SoER that was prepared in 1997. It also provides past environmental trends and scenarios of the quality of the environment in Lesotho.

Accurate environmental assessment and access to good quality information for decision making are critical to the implementation of Agenda 21. Similarly, regular environmental reporting with periodic review of data is also an important requirement for monitoring progress towards sustainable development. In this regard, Lesotho, with the assistance of the Danish Cooperation for Environment and Development (DANCED), prepared a report on the state of the environment in the country in 1997. The report titled "The State of the Environment in Lesotho 1997" was published in 1999 (Chakela, eds. 1999). The framework or the approach used in the development of the 1999 SoER was sectoral and covered 16 chapters aligned along the important economic sectors in the country. These were 1) the Environment and Economic Development, 2) the Human Environment, 3) Culture and Historical Heritage, 4) Arable Agriculture, 5) Rangeland and Livestock, 6) Indigenous Forests, Trees, Shrubs and Afforestation, 7) Mining, 8) Roads, 9) Land Use Planning and Soil Conservation, 10) Climate and Climate Change, 11) Water Resources and Water Use, 12) Biodiversity and Protected Areas, 13) Energy Resources and Energy Use, 14) The Urban Environment, 15) Environmental Policies, Legislation and Institutional Arrangements and 16) Environmental Trends and Scenarios. For each chapter, an attempt was made to

address the following key questions:

- What was the previous status of the sector?
- What is the current status of the sector?
- What is happening to the sector?
- Why is it happening?
- How do the changes impact on livelihoods?
- What is our current response and is it effective?
- What can be done to improve the situation?

The Lesotho country plan is to produce the SoER regularly every five-years. Therefore, this second SoER attempts to implement this country plan. Furthermore, the second SoER had in mind a participatory approach in its reporting. In an effort to improve on the first SoER, the National Environment Secretariat (NES) and DANCED facilitated a participatory SoER review process with stakeholders in 2001. The stakeholder review process produced a report with a list of sustainability indicators to be used in subsequent SoER. These were the core datasets for the second SoER, information on depositories of data relevant to the core datasets and reference materials for the authors of the current SoER (Mabote and Molapo, 2001).

The authors for the second SoER have used an integrated environmental reporting approach as opposed to the sectoral approach that was used in the first SoER. The first SoER highlighted the linkages between sectors and used cross-sectoral indicators to



present a more realistic picture of the environment in Lesotho at the time of its reporting. The integration of many of the chapters of the first SoER has resulted in the number of chapters in the second SoER being reduced to five. They are;

1. Introduction
2. Socio-economic and Cultural Dimensions
3. Water Resources
4. Climate and Atmospheric Change
5. Aquatic and Terrestrial Ecosystems
6. Land Use and Management
7. Environmental Governance

The indicator framework used for analysis of information in first SoER was the Pressure-State-Response (PRS) model. This framework was however found to be inadequate as it failed to capture the complexity of interactions in the natural environment. Therefore, to correct this weakness, the analysis and reporting format used in the second SoER is based on the Driving Force-Pressure-State-Impact-Response (DPSIR) model. The DPSIR framework is holistic and integrates various components of the environment as it lays out the relationships among (a) the underlying anthropogenic factors that lead to environmental change, (b) the pressures human society puts on the environment, (c) the resulting state or condition of the environment, (d) the results of pressures on the environment and (e) the societal action taken collectively or individually to reduce the adverse environmental impacts, correct environmental damage or conserve natural resources. Some indicators can be put under one or more categories, depending on the relationship analyzed. The framework, therefore, should be used for complex analysis, rather than rigid and simplistic categorization. For example, policies and leg-



islation can be formulated as a Response to mitigate environmental change (e.g. Environmental Act. 2001) but once enacted can subsequently act as Driving Forces towards environmental improvement. On the other hand, some policies may have a negating effect to the proposed legislation and thus act as a pressure on the environment and its components. For instance, while the National Environment Policy (NEP) of 1998 encourages the Government to respond to environmental problems, some Government policies such as the agricultural subsidy programme promote water pollution resulting from over-use of agrochemicals and a general use of marginal lands.

### *Limitations to the report*

As mentioned above, regular state of the environment reporting is crucial for informed decision-making and this requires good quality data sets and selection of appropriate environmental indicators, which would provide decision-makers with accurate environmental trends. Although the current SoER contains useful information it lacks accurate data sets and therefore does not sufficiently answer some questions about environmental status, trends and scenarios. There is therefore a need to intensify the gathering of accurate and up-to-date primary data and develop digital database for the entire country in collaboration with the Bureau of Statistics and the Environmental Units ☐





# 2 *Socio-economic and cultural environment people, economy and development*

## **Socio-economic dimension**

### *Driving forces*

#### **The macro-economic framework**

**T**he macro-economic framework adopted in Lesotho, as articulated by the economic policies that are being pursued, constitutes the major driving force for economic activity and its concomitant environmental impacts. A discussion of the history of economic policies in Lesotho is attempted in this section with an objective of highlighting their role as driving forces for environmental change over the last few decades. An in-depth analysis of the latest macro-economic framework is discussed and presented as the driving force for the latest environmental change in Lesotho.

In Lesotho, as in many other developing countries, economic development policies have been articulated through five-year development plans. The five-year development

plans however had little regard for environmental effects of economic activities. This has been the case despite the fact that much of the policies advocated in these five-year development plans were natural-environment- intensive i.e. highly reliant on the natural environment for their success. For instance, the first five-year development plan of 1970/71 – 1975/75 laid heavy emphasis on the exploitation of domestic natural resources through enhancing agricultural productivity. This clearly posed a great risk of environmental degradation but did not call for the deployment of clear mitigation strategies.

Agriculture had been a dominant sector within Lesotho's economy but its impacts have been severe on the country's environment. Historically and in particular around the 1960s, agriculture was by far the most productive sector in Lesotho, contributing 40 percent of the country's GDP. During the 1960s, Lesotho was a net exporter of food grains. However, thereafter, food self-sufficiency began to decline steadily as a result of rapid population growth, decreasing arable land and declining sectoral productivity. The relative contribution of the agricultural sector to GDP has been gradually declining, averaging 18.2% in the 10-year period 1980-1990, and 11.3% in the 7-year period 1990-96.

The decline in agricultural productivity can be attributed to a complexity of factors including the rapid growth of the secondary sector, fluctuation in the output of the agricultural sector itself that may be associated with strong fluctuations of climatic condi-



tions, poor agricultural practices and weak policies to support the sector.

Economic policies that advocated for agriculture as “the back-bone of the Lesotho economy” were still evident in the second five-year plan of 1975/76 – 1979/80 and were being complemented by other natural resource intensive sectors such as the mining, tourism, building, construction and civil works. These sectors were ear-marked for the achievement of the theretofore-important government objective of employment creation.

During the first and the second five-year development planning periods, the economy, as measured by the real GDP growth rate, grew at impressive rates of 8% and 7%, respectively. During the same period GNP, on the other hand, grew at an average rate of 8%. The phenomenal economic performance was largely due to migrant labour remittances as migrant labour to RSA increased by 26.5% in 1970/71 – 1975/76, diamond mining activities within the country, relatively good agricultural performance and Southern African Customs Union (SACU) revenues.

During the third and fourth five-year development planning periods, i.e. the period spanning the 1980's decade, economic performance took a downturn as GDP grew at an average of 3.9%, a 50% decline compared with the previous decade. Had it not been of Phase 1A of the Lesotho Highlands Water Project and the adoption of the Structural Adjustment Programmes and its concomitant benefit in the form of higher foreign direct investment inflows into the manufacturing sector, it would not have been possible to achieve the moderately higher, *albeit* still significantly lower than that of the 1970's, average GDP growth rate of 4.2% recorded in the 1990's decade. This gradual decline in the economic performance has resulted in the rising poverty levels within

the country since independence.

### **Sustainable human development policy: poverty alleviation**

The Government of Lesotho, in cognisance of the rising poverty levels within the country had, in both the sixth (1996/97 – 1998/99) and seventh (2000/01 – 2002/03) development plans identified poverty reduction as its highest priority. Therefore, both development plans, the dominating theme is sustainable human development based on the following specific elements:

- Enabling people to lead long and healthy lives
- Enabling people to acquire knowledge
- Enabling people to have access to resources needed to accommodate acceptable levels of human needs

Consequently, poverty alleviation policy has, since the sixth development plan, heavily influenced all other socio-economic policies of Government as they too had to be geared towards the overall direction of sustainable human development. For example, the 2000/2001 Government of Lesotho budget emphasised the need for stabilization of the macro-economic environment for the poverty situation to be significantly reduced.

Therefore, in order to effectively achieve the stabilization of the macro-economic policy, a number of specific policy actions were undertaken. It is worth noting that some of these policy actions, as explained below, had clear environmental implications. This observation underscores the fact that the major driving force for environmental change in Lesotho has been the poverty alleviation policy.



The specific policy actions undertaken to reduce poverty had been the redirection of resources towards labour intensive methods. The first of these is an allocation, during the financial year 2000/01, of M52 million to the Labour Construction Unit (LCU) for the construction and rehabilitation of rural roads under the food-for-work model of remuneration. The Lesotho Fund for Community Development (LFCD) is the second such policy action in support of poverty reduction policy. The LFCD has also been restructured to further support the LCU and other Ministries responsible for rural infrastructure construction.

To ensure that the underlying objective of all these policy actions is poverty alleviation, labour intensive methods of construction are adopted so as to create jobs for rural and urban poverty stricken communities. Obviously, the environmental impacts of these labour intensive construction methods are relatively more severe than those requiring less labour involvement and are more sophisticated and capital intensive. This is a case in point where an overall government policy action acts as a driving force for environmental change.

### Socio-economic policies

The macro-economic policy of the Government of Lesotho is geared towards sustained economic growth and poverty reduction in the context of macro-economic stability of whose pace is dictated by the policy priority of poverty alleviation. More specifically, in the medium term, economic policy is targeted at the following objectives,

(i) to restore annual economic growth, as measured by the GDP growth rate, at 4% with an emphasis of keeping economic growth rate above population growth rate cur-

rently recorded at 2.6% per annum,

(ii) to keep inflation rate at 6% and in line with the South African target, (iii) to increase and maintain foreign exchange reserves, the stock of foreign currencies at the Central Bank, at six months worth of imports. This is to ensure that local importers are able to conduct business with their international counterparts harmoniously and (iv) to restore the overall fiscal balance after grants to a surplus of at least one percent of GDP by 2003/04.

As such, economic policy is structured in such a way that it should have a direct bearing on enabling the poor to meet their needs. To this end, a plethora of strategies have been put in place. These include,

- exploring all means of enhancing export competitiveness and attracting foreign direct investment so as to reduce the level of unemployment while improving the balance of payments position of the economy. For an example, changing the institutional business set-up so as to introduce a new business culture by privatising major state enterprises,
- targeting manufacturing and tourism as engines of economic growth so as to diversify the source of income base from SACU revenues and mining remittances,
- to adopt prudent fiscal and monetary policies. The objective of fiscal management of the Government of Lesotho has been to increase revenue while also keeping expenditure under control. To achieve this objective, Government made plans to introduce Value Added Tax and to overhaul the Government's tax collection machinery by establishing the Lesotho Revenue Authority. Monetary policies of the Government, on the



other hand, had been basically targeted at ensuring a balance between broad money supply and nominal GDP annual growth rates. Furthermore, the Central Bank is already implementing the strategy of efficient and market based indirect money supply instruments and doing away with direct monetary policy instruments.

- to guarantee good access to affordable and quality social services to the people. Government strategy has to privatise the inefficient and costly state owned enterprises within the tertiary sector so as ensure universal access to services such as electricity, water and telecommunications on a more sustainable basis. Furthermore, the Government continues to intensify efforts towards giving priority to and allocating more resources to the health and education sectors.

Clearly, all of these strategies are directly linked with the overall objective of poverty alleviation. In summary, the strategies are for an export led economic growth with an objective of job creation, restructuring of the services sector to enable sustainable delivery of basic services and improvement in the management of the macro-economy and government finances. At the centre of these strategies is an implicit belief in the role of free market forces in providing efficient services to the people.

The problem of this implicit strategy of encouraging industrialisation, increased exports, increased competition and prudent fiscal policies is however not modelled into the overall country picture and as a consequent environmental policies are more reactive than being proactive. Therefore, implementation of the recently enacted environment legislation is expected to solve this problem by internalising the externalities brought about by the adopted policies. It is only in this way that the adopted socio-economic policies and the related strategies which always act as driving forces for envi-

ronmental change, can be ameliorated.

## Demographic policies

As indicated above, one of the major elements of the poverty reduction policy is to ensure that people lead long and healthy lives. One of the prerequisites for the achievement of this policy goal is well articulated demographic and health policies. In Lesotho, the rate of population growth is at an unsustainable level of 2.6 %. To address this problem, the Government has set within its Millennium Goals a target growth rate of 1.8% by 2010 (Table 2.1).

High population densities are often a breeding ground for disease, poor environmental management especially pollution, crime and social conflict. Similarly, poor health strategies lead to low human development as indicated by low life expectancies, high infant and adult mortality rates and the prevalence of infectious diseases.

In cognisance of these demographic problems, the Government of Lesotho is pursuing a population control strategy as articulated in its population policy of 1994. The strategies promulgated by the policy include: improved family planning services nationwide, upgrading of hospitals and clinics, training of field workers and the introduction of population education in the formal education system.

In line with its overall objective of poverty reduction, the government's demographic policy has set some medium term targets on key demographic indicators for the year 2010. These are the minimum targets considered to be necessary for the people of Lesotho to be considered as being on a path towards leading long and healthy lives.





These targets, and the corresponding current rates, are presented in Table 2.1.

**Table 2.1 Current population indicators and targets for 2010**

Indicator	Benchmark - 1996 census	Target for 2010
Annual growth	2.6%	1.8%
Life expectancy at birth	56.1 years	65 years
Total fertility rate	4.1 births/woman	3.5 births/woman
Maternal mortality rate	570/100,000 UNFPA	450/100,000
Infant mortality rate	74/1000	65/1000
Crude birth rate	30/1000	30/1000
Crude death rate	12.8/1000	8/1000

Source: Government of Lesotho (2001)

The pursuit of these targets will undoubtedly act as a driving force for environmental change. For example, given the importance of achieving these targets to the poverty alleviation strategy, it is to be expected that resource allocations in the Government budget to the health and population management sectors will increase. The positive spin-offs to the environment shall be the reduction of the current population density of 69 persons Km<sup>2</sup> and thus reducing the level of dependence on the natural resources such as water and fuel-wood while at the same time significantly bringing about a decline in pollution levels.

## Health policies

From as far back as 1979, the mainstay of health sector policy in Lesotho has been the Primary Health Care (PHC) strategy. The main objective of the policy has always been to achieve countrywide coverage of health care facilities while at the same time ensuring equity and social justice. The policy has been implemented in partnership with Churches and Non-Governmental Organizations (NGOs). The subsequent health sector policies have reiterated the importance of PHC in achieving the vision of good health for all in Lesotho.

Significant achievements have been made in the control of communicable diseases through a programme under the preventive health strategy within the Family Health Division of the Ministry of Health. Women and children are specifically benefiting from nutrition projects, adolescence health, community based village care, safe motherhood and reproductive health programmes. The Expanded Immunisation Programme (EIP) has reached the remotest parts of the country. Consequently, the Infant Mortality Rate in the age group of 5 years and below dropped from 199/1000 in 1970 to 134/1000 live births in 1999. The decline in infant mortality rate in a similar age group was primarily due to the expanded immunisation programme (EIP) undertaken by the health sector. For example, Polio immunisation achieved a country-wide coverage of 84% in 1998.

HIV/AIDS is the main killer in the country with infection rates at 31%. Besides HIV/AIDS, Sexually Transmitted Diseases (STDs) and Tuberculosis (TB) are presently the main health problems and TB being the main cause of mortality. TB infections increased steadily from 159/100,000 in 1991, 249/100,000 in 1995, to 297/100,000



in 1997. The latest recorded figure for 1999 indicates a marginal decline in TB infections of 272/100,000 when compared to the 1997 statistics. The steady increase in TB is attributed to the spread of HIV/AIDS.

The target of meeting primary health care for all by 2000 has not been reached due to a number of factors including lack of human and financial resources. With the current prevalence and trends of HIV/AIDS infections in Lesotho, the health sector is likely to experience major setbacks if effective HIV/AIDS information and control measures are not put in place. The indicators and new targets for health are presented in Table 2.2

Table 2.2 Health indicators and targets

Indicator	Benchmark	Target for 2010
Service coverage: ANC coverage EPI coverage	69% 71% (MICS)	80% 90%
Doctor-population ratio	1:13041 (1999-MOHSW)	1:10000
Nurse-population ratio	1:2035 (1999-MOHSW)	1:1500
Birth-weight > 2.5 kg	108.4/1000 (MICS 1996)	50/1000
Life expectancy at birth	60	65
Maternal mortality rate	282/10000 (BOS 2000)	209/10000 livebirths
Infant mortality rate	74/1000 (BOS 2000)	65/1000 live-births
Contraceptive prevalence	23% (BOS 2000)	45%

Source: Ministry of Health & Social Welfare (2001)

As with the demographic targets, the pursuit of these health targets will also inevitably act as a driving force for environmental change. This is envisaged to be through enhancing the quality of life of the Basotho and, as a result, alleviate poverty levels. A healthier population is able to exploit its potential in entrepreneurial skills so as to encourage diversification of their

dependence on agriculture and other environment intensive sectors. As a result of the changing patterns of production, there shall be changes induced to the environment either as a source for raw materials or as a sink for by-products of the production processes.

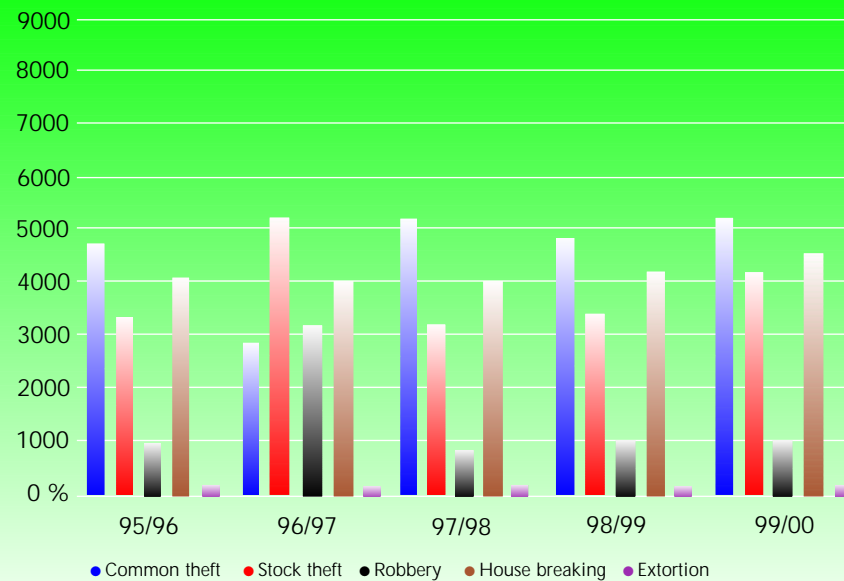
### Crime and safety

One of the main indicators of the quality of life achieved by a country is the degree of crime as a proxy for the level of safety and security within such a country. In Lesotho, the crime wave related to property has remained largely constant over the last five years. The most prevalent crime has been common theft followed by house breaking. Stock theft has increased moderately since 1996 to 2000.

The numbers of offences against persons have remained essentially the same over the same reporting period and are similar in trend to those committed against property. Both types of crimes do not show a discernible trend either downwards or upwards. However, common assault is the highest crime committed by the inhabitants of Lesotho and it shows an increase in the last five years.



Figure 2.1 The number of offences against property from 1995/96 - 1999/00



Social fabric indicators show a general deterioration as offences against persons and morality are on an increase. Statistics show that during 1995/96 to 1999/2000 period, offences against persons were on the increase with common assault as the leading indicator in the deterioration of the social fabric. The statistical crimes against persons as common assault were over 5000 in 1995/96 and increased to over 6000 in 2000. Other crimes against persons reported over the same reporting period show murder and attempted murder relatively lower at less than 1000. Perhaps this is an indication that both forms of crime are related to the incidences of common assault but are forms of crimes beyond the common assault.

With regard to crimes against morality, the most prevalent crime has been that of rape. Despite the decrease in rape cases since 1996/97, the difference between the number of rape cases and other crimes against morality especially indecent assault, is significantly high.

Similarly, crimes against morality show rape cases much higher than any other crime in that category. Whereas, indecent assault, abductions and abortions are of common concern to the general public, their occurrences are much lower to the rape cases reported. Perhaps this is indicative of the interactive nature of Basotho where a common meeting agenda is alcohol. This shows a difficult task of behavioural change in the fight against diseases such as sexually transmitted diseases and HIV and AIDS.

Further describing changes in the social fabric of a nation, is the use of modern technological advances such as the automobile. In recent years, the number of vehicles on the Lesotho roads has increased significantly and so are the associated problems such as the road accidents.

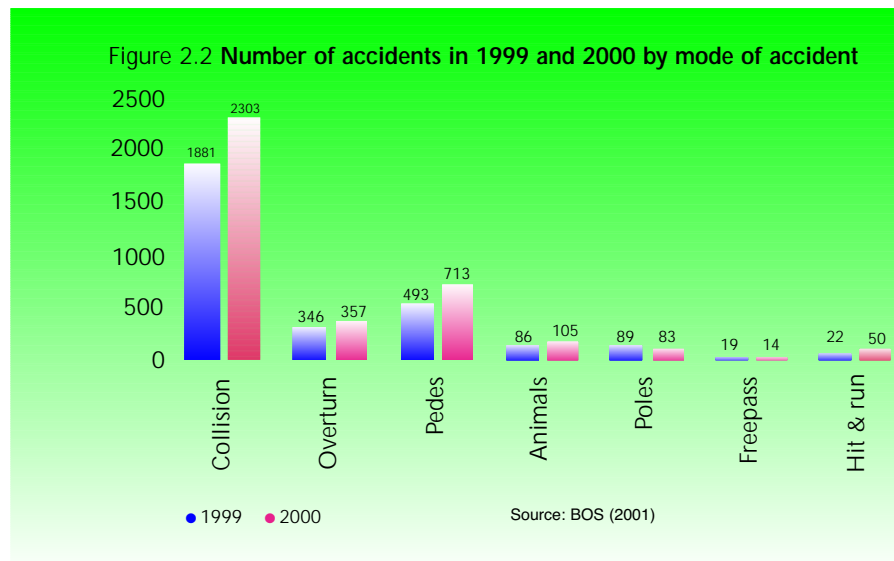
With regard to road safety, unsatisfactory conditions of roads lead to a high rate of road accidents in the country. A general indicative pattern show a direct relationship of accidents to the concentration of vehicles. Most road accidents occur in Maseru, Leribe and Berea. Maseru has the highest number of vehicles in the country and consequently it has the highest number of road accidents. Geographically, the lowlands have more vehicles than other districts and thus more road accidents. These accidents are also related to the age groups of drivers. What is of concern is that the age group of drivers involved is the middle age, within the age group of 30 to 40 years. This age group is followed closely by the 20 to 30 years and the 40 to 50 years. These statistics



are indicative of a fluid social fabric where people learn to drive at an older age and therefore do not acquire skills as would a young person do gaining experience through the years.

In regard to the type of vehicle involved in road accidents, Combis or the commonly called taxis, have the highest frequency of accidents in all the ten districts. In terms of when accidents mostly occur, mid-day to early evening – 12 to 8 pm are accident prone. The accidents trends at all times show an increase over the years. Therefore, adaptation to modern technologies to Basotho seem to be a difficult proposition.

Most accidents are associated with collision followed by pedestrians, overturning and hitting stationary objects like poles. Implications of this may be that roads are narrow, not in good condition or that many people still cross roads at dangerous areas.



Lesotho, 2002

## Land use planning policy limitations

Land use policy limitations also act as a driving force for environmental change, particularly lack of a settlement policy. Lesotho as a country is characterised by unplanned human settlements, especially in the urban and peri-urban areas where there is an increasing encroachment of settlements into productive agricultural land leading to increasing pressure on the natural resources. The poor land-use planning, as seen here in Lesotho, impacts negatively on the natural environment and often leads to overcrowding and the consequent environmental and health problems.

The problem of haphazard land-use planning stems primarily from the *de facto* uncoordinated land allocation system. Under this system, different authorities, namely; Chiefs, Principal Chiefs and Government Departments can allocate and are independently allocating land without any form of co-ordination. The Government is however trying to address itself to the problem by formulating land use policies and initiating some form of a coordinated land allocation system.

At present, land use policies are primarily focused on livelihoods and healthy living environment. For instance, the Environment Act 2001 provides an enabling legal environment for development of sustainable human settlements countrywide. Although the policy and the legal instrument deviate slightly from the Habitat Agenda which stipulates that "A sustainable settlement is one where all have adequate shelter, a healthy and safe environment, basic services, and productive and freely chosen employment" (The Habitat Agenda, 1996), it a step in the right direction to assist alleviate the pressures exerted by uncoordinated and unplanned land settlements on the natural resource base; the land.





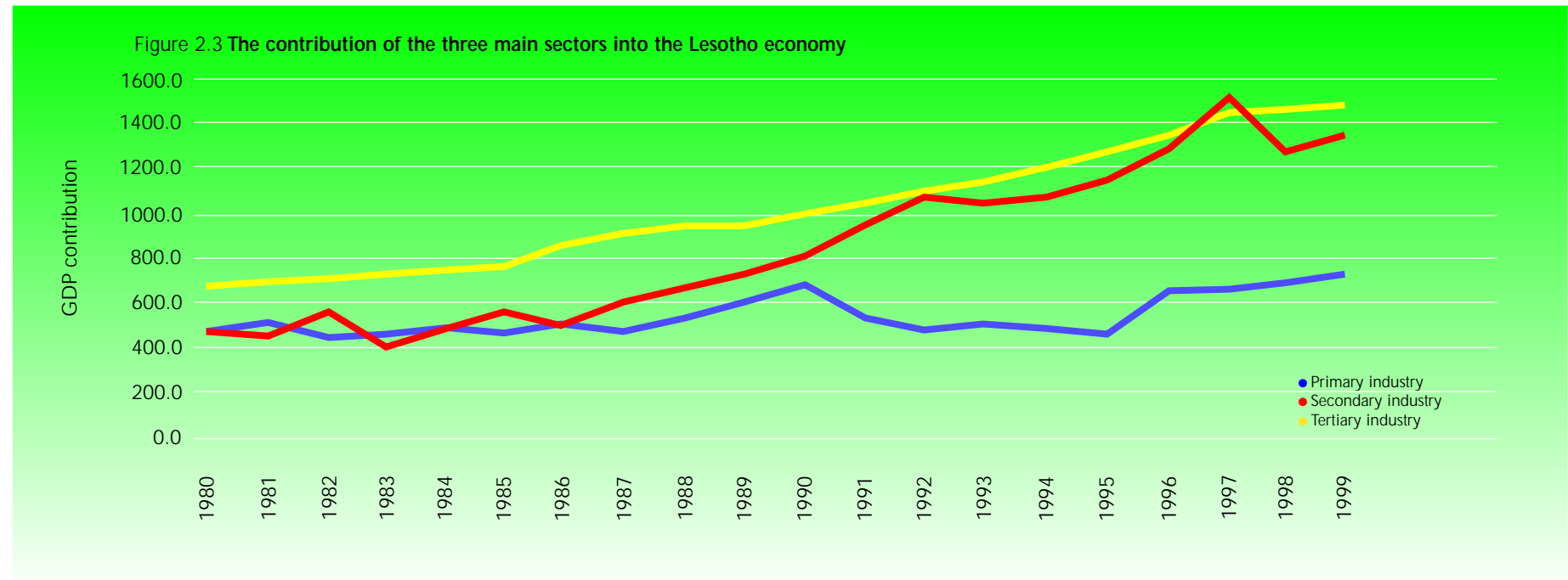
## Pressures

The main economic pressures on the environment are brought about by both the industrial structure of the Lesotho economy as illustrated by the sectoral composition and by the rates of growth of respective sectors. An economic structure that is biased towards sectors such as agriculture, mining and manufacturing that rely heavily on the environment for both raw materials and absorptive capacity of by-products tends to exert a pressure on the natural environment. Consequently, in such an economy, the attainment of sustainable development requires a conscious effort by the people of putting mitigating measures against all possible negative environmental impacts. This section

assesses and discusses the industrial structure of Lesotho and the extent at which it exerts a pressure on the natural environment.

### Industrial structure: sectoral composition

Statistics show that the services (tertiary) sector has, for a long time, been the largest contributor to Lesotho's GDP (Figure 2.3). The secondary sector, comprising largely textile and electronic products has, however, since 1990 been contributing at or equal to the tertiary sector. For an example, in 2000 the secondary sector contributed 43.6% to the GDP whereas the tertiary sector contributed 39.3%. A notable fact from the sta-

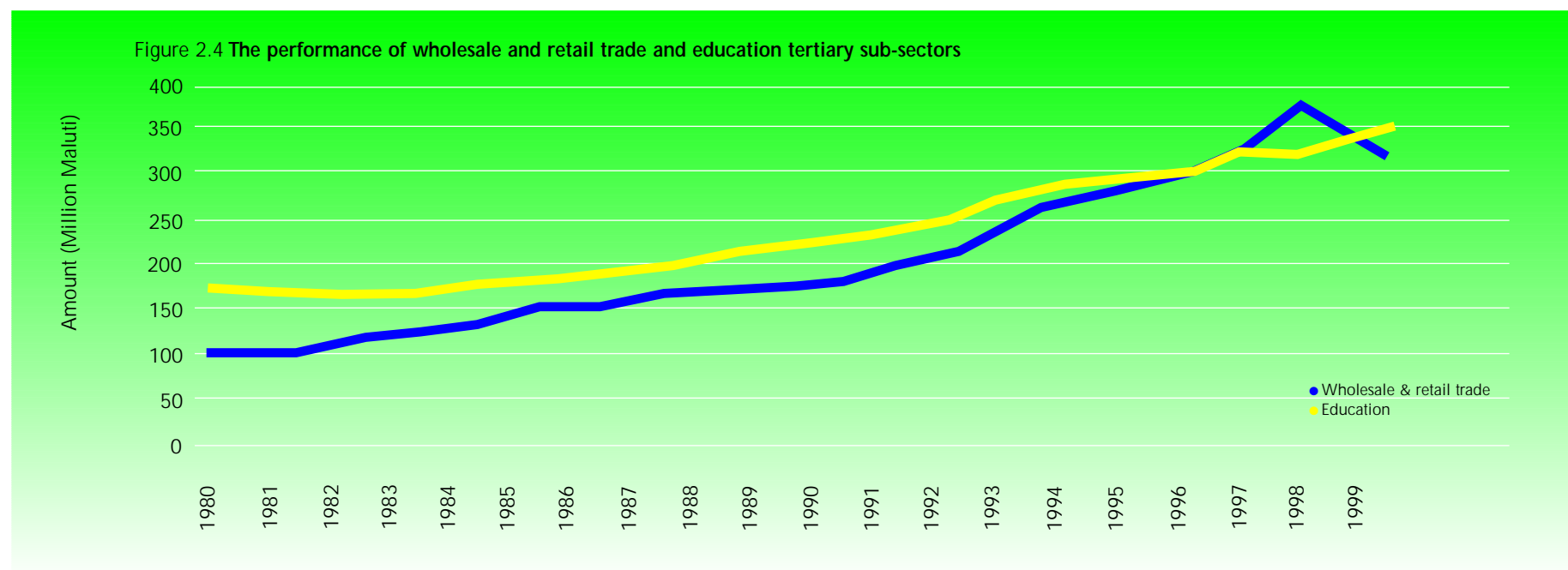


tistics is that although it is widely held that agriculture, a primary sector, is the backbone of the Lesotho economy, it has, for the last twenty years, been contributing less to the GDP than any other sector.

While the services tertiary sector has been consistently dominating, the manufacturing sector has been increasing its share up until 1997, the year Lesotho recorded its highest GDP figure ever, when the tertiary sector contributed lower than the tertiary sector. The good performance of the manufacturing sector has been directly linked to the eco-

The dominance of the services sector underscores the fact that the Lesotho economy is predominantly services based. This sector is mainly dominated by the wholesale and retail trade, education and real estate and business services sub-sectors all of which, in 1999, accounted for 60% of the sector's output. A comparative analysis of the wholesale and retail trade and education is presented in Figure 2.4

As Figure 2.4 shows, the tertiary sector has been largely dominated by the education sub-sector although starting in 1994 the wholesale and retail trade sub-sector took the



conomic policy of adopting structural adjustment programmes from 1998, which led to a huge inflow of foreign direct investment from mainly South East Asia and South Africa.

lead. The large share of GDP taken over by the education sector is the cause of the relatively high literacy rate. Indeed, according to the UNDP (2001), Lesotho spent 8.4%



of its GDP on education during the period 1985-1995 when compared with 4.1% spent during 1985-87.

It is noteworthy that 1997 was the year in which, for the first time in twenty years, the manufacturing sector superseded the tertiary sector. As earlier noted, the good performance of the Lesotho economy in 1997 was clearly due to advances in manufacturing following from massive foreign direct investment inflows in pursuit of the trade preferential treatment accorded to Lesotho under the Lome Convention.

There are important environmental implications of this development. The manufacturing sector is relatively more dependent on the environment both as a source of raw materials and as a sink for any by products of the production process. However, this is not the case with regard to the services sector. Comparatively, the services sector places less pressure on the environment than the manufacturing sector. Therefore, unless adequate mitigating measures are put in place, the recent good performance of the manufacturing sector poses a threat to sustainable development.

### Industrial structure: growth rates

Apart from the relative contributions to the GDP by the three industrial sectors, more pressure may be exerted on the natural environment by the annual growth rates of each of the sectors. That is, even though in absolute value terms an environmentally intensive sector may be dominating in terms of its contribution to the GDP, it is quite possible that its growth rate may actually be negative such that the actual pressure that it exerts on the environment may be declining with the passage of time. Obviously, such a finding would be good for the sustainability of industrial development particularly if

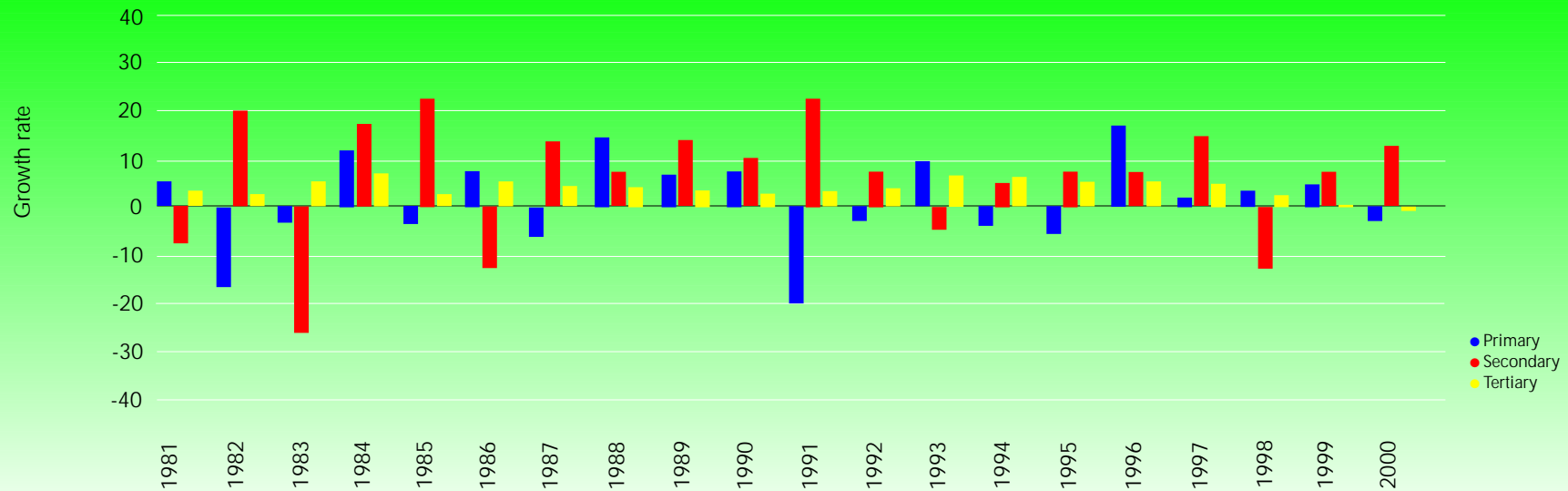
such a contraction is accompanied by a related growth in a less environmentally intensive sector such as the tertiary sector.

Indeed, as evidenced by Figure 2.5, the contrary situation seems to prevail in Lesotho. The relatively more environment intensive secondary sector, mainly manufacturing, is not only recently dominating economic activity in absolute terms but seems to also be fastest growing with a recent growth rate of 13% when compared to the growth rates of -1.8 and -0.2 for the primary and tertiary sectors respectively.

A further point worth noting is that while both the primary and tertiary sectors seemed to be relatively more resilient following the political upheavals of 1998, the secondary sector displayed its underlying strength and imminent capability for dominance by bouncing back in the two subsequent years with growth rates of 6.7% and 13.8% for 1999 and 2000 respectively. It does therefore become apparent that manufacturing related pollution and waste are likely to increase.



Figure 2.5 GDP by three major sectors: annual growth rates



### Population growth

With regard to the demographic situation, the main pressure on the environment is the high population growth rate resulting in high population densities. For example, the average population density is presently 69 persons per square kilometre in the mountain areas whereas it is 745 persons per square kilometre on the arable land in the lowlands and foothills. The increase in population density coupled with high livestock numbers puts pressure on arable land and have serious implications on the country's food security and severe land degradation. Further encroachment of human activities into environmentally sensitive areas is likely to increase, due to industrial and agricul-

tural activities. These problems are further compounded by the poor land use planning policies which lead to overcrowding and its concomitant problems of health, poor sanitation and pollution and, consequently, environmental degradation.

### Rural to urban migration

Related to the issue of population growth is the phenomenon of rural to urban population migration, which also increases the pressure on the natural environment in urban areas. The immediate result of migration to urban areas has resulted in rapid conversion of agricultural land in the periphery of urban centres into unplanned human set-





tlement. Due to rural to urban migration, urban areas in the country are growing at an average annual rate of 6% and Maseru the capital town of Lesotho is growing at 7% annually. Consequently, basic services such as sewerage facilities, water and road transport become very difficult to be sufficiently provided for. For an example, in Maseru only 43% of the population is served with water. The demand for both piped water and sewerage services continue to increase significantly. Furthermore, the rapid growth in road traffic, particularly in Maseru, results in increased pressure on the existing road network.

### **Incidence of poverty**

The prevalence of poverty in the country also exerts a huge pressure on the natural environment since the poorer the people get, the more they rely on the environment to sustain their livelihoods. For example, in conditions of poverty, the need to meet basic needs such as food becomes paramount such that subsistence agriculture becomes the mainstay of survival. The demand for fuel wood increase sharply as people no longer afford other forms of fuels.

### **Inappropriate land use practices and institutional arrangements**

Another pressure on the natural environment is brought about by the use of inappropriate land use practices that often degrade the environment, particularly in the rural areas where people depend directly on the natural resources. Poor farming practices have over the year resulted in serious land degradation in many parts of the country and the situation has led to a vicious circle of poverty currently being experienced in Lesotho. Furthermore, the weak institutional arrangements resulting from poorly

defined roles of local authorities are a problem. The situation of poorly defined roles of local authorities in land management often leads to unhealthy competition and conflict between traditional authorities, especially Chiefs, and the newly elected Village Development Councils (VDCs) or Community Councils. Additionally, the conflicts also often interfere with the smooth implementation of many projects aimed at eradicating poverty.

### **States and impacts: trends**

#### **Human development trends**

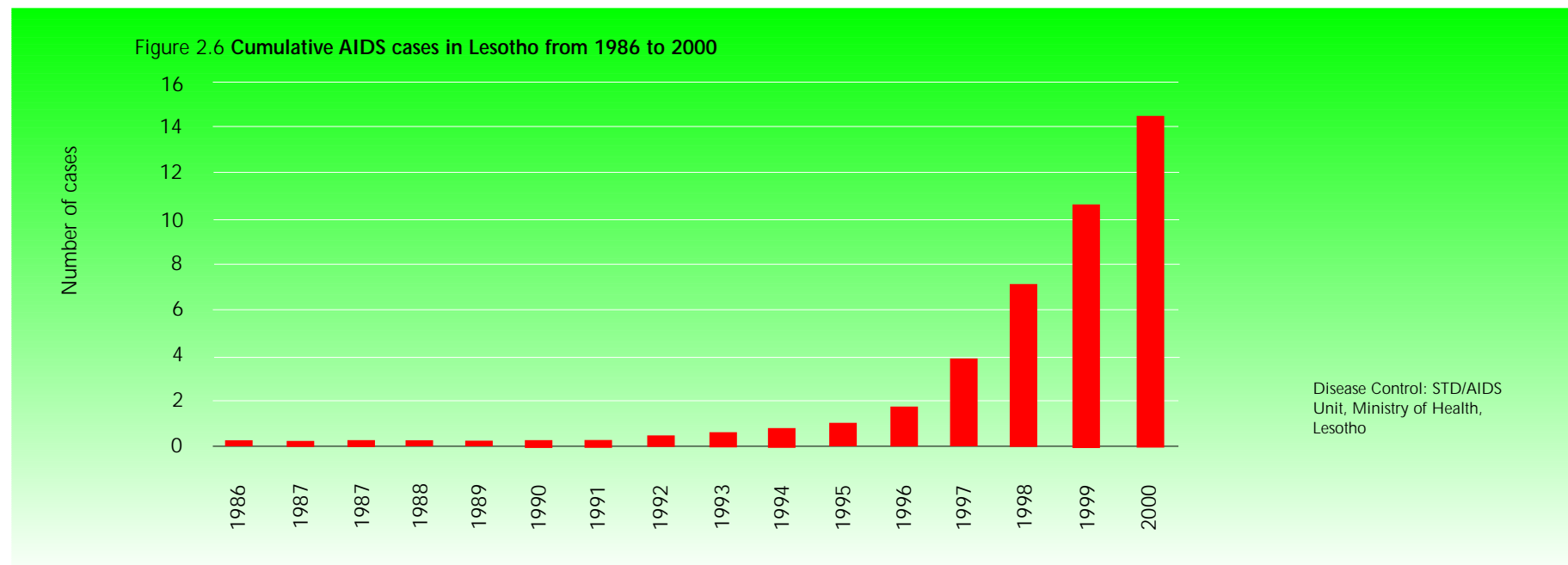
Lesotho in 2003 has a population of 2.4 million and given its small physical size of 30,355 square kilometres, the average population density is 69 persons per square kilometre. Although urban areas are growing at a higher rate, 84% of the Lesotho population still live in the rural areas. The annual population growth rate was 2.8 % per annum in the ten-year period 1976-86 period. However, the growth rate has since 1999 dropped to 2.6 % because of the incidence of HIV/AIDS (Bureau of Statistics 1999). The decline in the growth rate could also be attributed to the national strategies for management of demographic dynamics. The incidence of HIV/AIDS is however the most important contributor to the decline in population growth. HIV/AIDS is therefore the biggest threat to social and economic development in Lesotho.

The first AIDS case was reported in Lesotho in 1986 and since that time, the epidemic has escalated significantly to where 10, 880 cases were reported by the end of 1999 (*AIDS epidemiology in Lesotho 1999*) and UNAIDS estimated that 16, 000 persons died of AIDS in Lesotho in 1999 (Figure 2.6). In 1998, categorization and age distri-



bution of HIV indicated that the adult HIV prevalence rate was 9.8% (*Disease Control Unit, Ministry of Health, Lesotho*) but in particular the adult HIV prevalence was 23.57% among 15 to 49 years age group (UNAIDS / WHO 1999). Further the age group 20 to 39 years is the most affected and constituted 57% of the reported cases.

Although the overall male to female ratio is approximately 1:1 in the younger age groups, females are more affected by HIV/AIDS than males. However among the 15 to 19 year olds, the male to female ratio was 1:4 in 1999



At the end of 1999, UNAIDS/WHO estimated 240,000 people in Lesotho were living with HIV/AIDS and 130,000 of them were women and 8,200 were children (*UNAIDS/WHO Epi fact sheet, Lesotho 2000 update*). These figures show that the trend of HIV infection is increasing at an alarming rate.

in the dynamics of HIV in Lesotho. An Analysis of the 1999 hospital survey showed miners with a high HIV infection rate as compared to persons of other occupations. The infection rate among miners was 58%. Comparatively, the infection rate among ex-miners, teachers, students, and the unemployed persons were 48%, 28%, 27%, and 34%, respectively (*MOH&SW; Report on Lesotho hospital based survey, January 2000*).

The migration in and out of the country to the South African mines plays a major role

Furthermore, rapid urbanisation and increasing number of the job seekers migrating



from rural areas to towns also contribute to the rapid spread of AIDS and other sexually transmitted diseases (HIV/AIDS and STD situation in Lesotho, 2000). The MOH&SW survey did not include data on the sex workers and yet this is the most vulnerable group to HIV and STD infections.

The current population growth rate of 2.6% is expected to change due to lowered life expectancy as a result of HIV/AIDS. Consequently, the projected doubling of the population of Lesotho by 2025 may not be realized.

Other vital statistics of the country include an average literacy rate of 82.9%, life expectancy at birth of 47.9 years and an urbanisation ratio of 27.1%. Table 2.3 shows the Vital Human Development Statistics among the Southern African Development Community (SADC) countries.

Lesotho has a population density that is below the SADC average, which may indicate that the pressure on the resources is not as great as in other SADC countries. However, considering that a big portion of the country is not habitable due its

Table 2.3 Lesotho's Vital Human Development Statistics within SADC

Country	Population density	GDP/Cap	Life expectancy	Literacy (%)	HDI Rank (Out of 162)
Angola	10.1	3,179	45	42	146
Botswana	2.7	6,872	41.9	76	114
Congo DRC	20	801	51	60.3	142
<b>Lesotho</b>	<b>69</b>	<b>1,854</b>	<b>47.9</b>	<b>82.9</b>	<b>120</b>
Malawi	93	586	40.3	59.2	151
Mauritius	568	9,107	71.1	84.2	63
Mozambique	21	861	39.8	43.2	157
Namibia	2	5,468	44.9	81.2	111
South Africa	35	8,908	53.9	84.9	94
Swaziland	56	3,419	47	78.9	113
Tanzania	34	501	51.1	74.7	140
Zambia	13	756	41	77.2	143
Zimbabwe	31	2,876	42.9	88	117
<b>SADC Average</b>	<b>81</b>	<b>3,476</b>	<b>47.5</b>	<b>71.8</b>	<b>124</b>

Source: Human Development Report 2001 (UNDP)



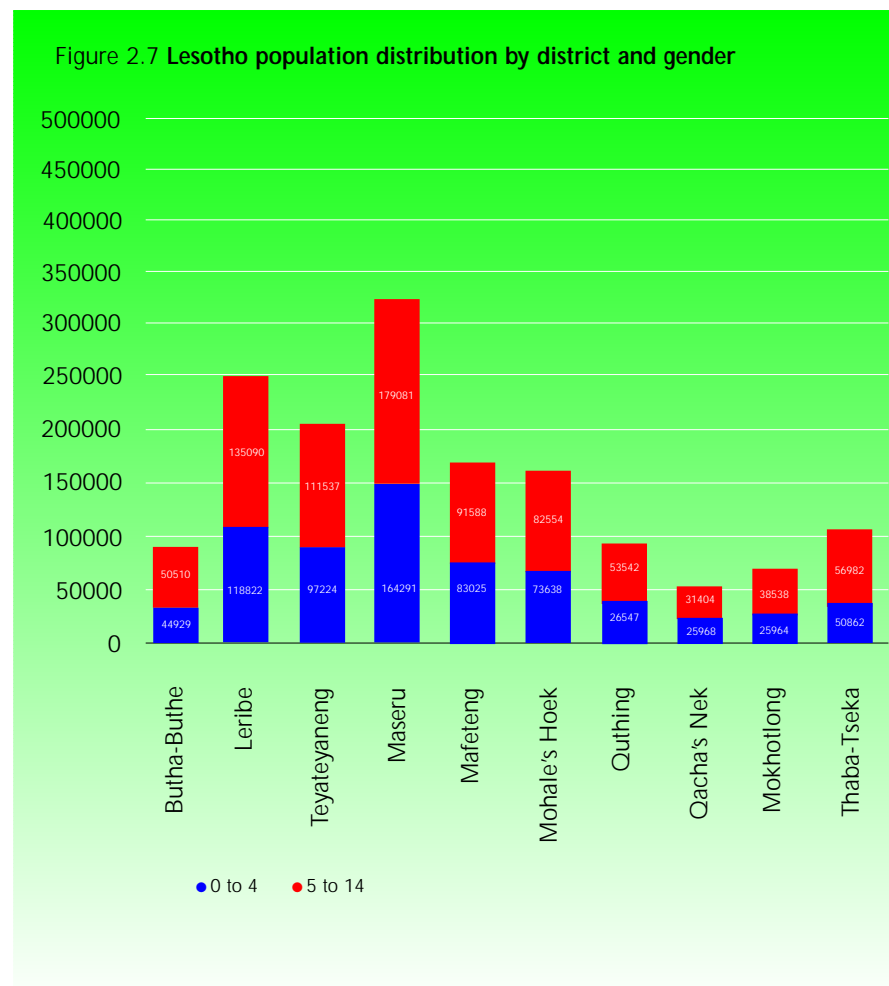
geography, in reality, Lesotho is heavily settled within the Lowlands. The Lowlands physically comprise one third of the country and yet they are home to 60% of the country's population. The 1996 census showed 371,972 households countrywide of which 227,000 amounting to 61% were in the lowlands as compared to 43,000 amounting to 12% were in the foothills, 79,869 amounting to 22% were in the mountain region and a small number of 21,505 amounting to 6% were in the Senqu River Valley. Based on these data sets, population densities within the urban areas are up to 745 square kilometres.

However, with an urbanisation ratio of 27.1%, it becomes evident that the high population concentration within the lowlands does not automatically translate into a high urbanisation ratio. Lesotho is still a rural country and as per UNDP report of ( ), Lesotho is only higher than Malawi and Swaziland with urbanization rates of 23.5% and 26.1%, respectively. For example, according to the 1996 census, 291,520 households amounting to 79% of the country's population were classified as rural despite the fact that 61% of them were located within the supposedly urban lowlands.

The lowlands are mainly in the north and western parts of the country and where most of the population is concentrated. Consequently, most of the economic activity of the country occurs in these areas. Figure 2.7 shows these areas to be mainly Maseru, Berea and Leribe districts.

The concentration of the population in the north-western districts of Maseru, Berea and Leribe is very high and indicates that 50% of the population of the country is resident within these three districts. The nature of causality between population distribution and economic activity makes it reasonable to conclude that the population has been

drawn by the relatively more vibrant economic activity in these districts than in the rest of the country.



The fastest growing sector within the Lesotho economy has been the manufacturing sector and therefore, as it is to be expected, this sector has absorbed a big portion of the labour force. As it stands to date, all but one manufacturing firm, are located within these three districts. However, the region has good fertile soil to support subsistence agricultural production that could sustain a greater portion of the Lesotho population.

According to the latest UNDP compiled Human Development Index (HDI) Report 2001, Lesotho is ranked at 120 out of a total of 162 countries. The HDI is a composite index taking into account the performance of a country on four human development related variables; GDP per capita, adult literacy rate, school enrolment rate and life expectancy. Tables 2.3 and 2.4 show these comparative statistics among the SADC countries. Lesotho is ranked 7<sup>th</sup> within SADC on Human Development Index. The ranking of the country on all indicators is presented in Table 2.4.

Lesotho's position to be 7<sup>th</sup> overall among the SADC countries has been enhanced by the relatively high literacy rate which, at 82.9%, implies that a good proportion of the populace is considered to be adequately able to read and write. The sustainability of the overall performance is however highly undermined by the low ranking with respect to school enrolment rate. A smaller percentage of 61% of 15 year olds and above is currently enrolled in primary, secondary and tertiary schools as compared to many other countries. It is however expected that the newly introduced Government policy of free primary education will cause an improvement in enrolment ratios and therefore further enhance the literacy rate within the country. Lesotho had been doing very well with regard to social development as measured by the HDI up until 1990 when there has been a decline in the HDI (Figure 2.8).

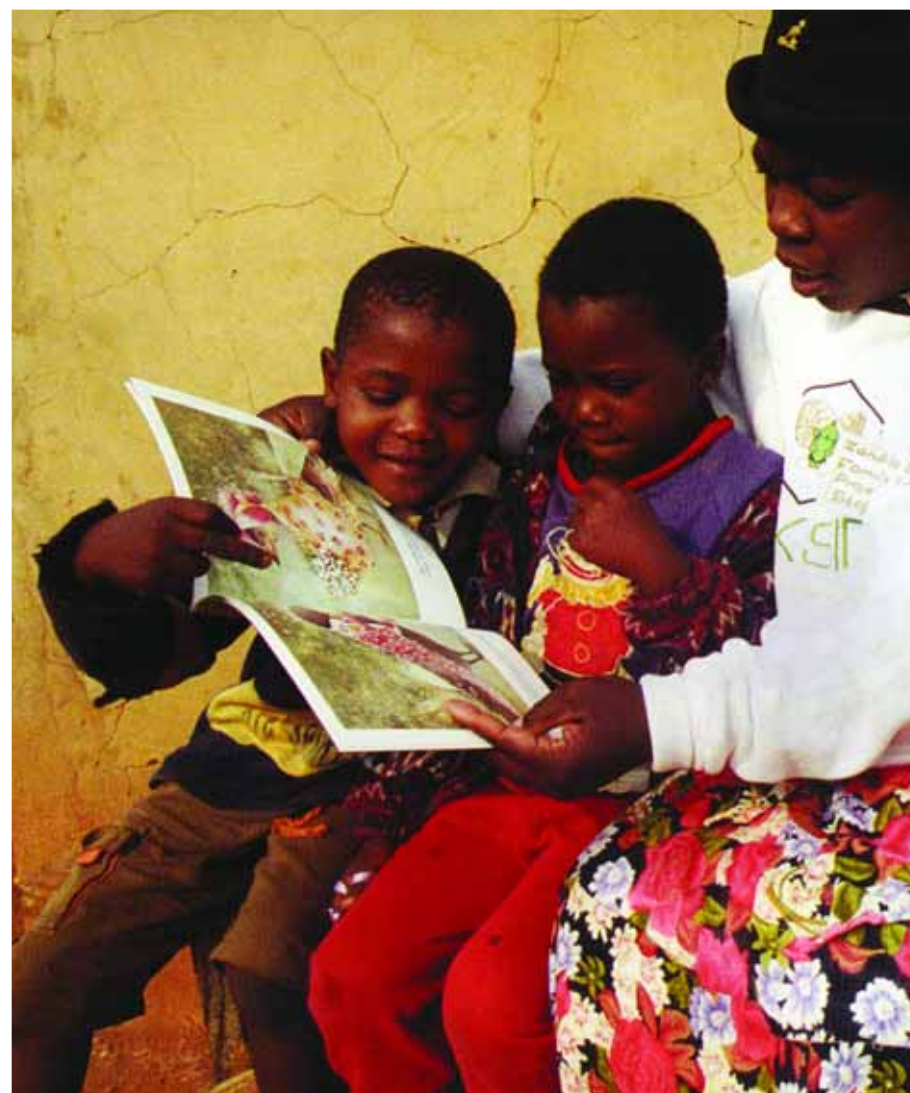




Table 2.4 Comparative statistics within the SADC countries on human development variables

Rank	GDP/Capita (PPP US\$)	School enrolment ratio (%)	Life expectancy at birth	Adult literacy rate (%)	HDI Rank
1	Mauritius	South Africa	Mauritius	Zimbabwe	Mauritius
2	South Africa	Namibia	South Africa	South Africa	South Africa
3	Botswana	Zambia	Tanzania	Mauritius	Namibia
4	Namibia	Tanzania	Congo DRC	<b>Lesotho</b>	Swaziland
5	Swaziland	Swaziland	<b>Lesotho</b>	Namibia	Botswana
6	Angola	Botswana	Swaziland	Swaziland	Zimbabwe
7	Zimbabwe	Zimbabwe	Angola	Zambia	<b>Lesotho</b>
8	<b>Lesotho</b>	Mauritius	Namibia	Botswana	Tanzania
9	Mozambique	<b>Lesotho</b>	Zimbabwe	Tanzania	Congo DRC
10	Congo DRC	Congo DRC	Botswana	Congo DRC	Zambia
11	Zambia	Angola	Zambia	Malawi	Angola
12	Malawi	Malawi	Malawi	Mozambique	Malawi
13	Tanzania	Mozambique	Mozambique	Angola	Mozambique

Source: Human Development Report 2001 (UNDP)

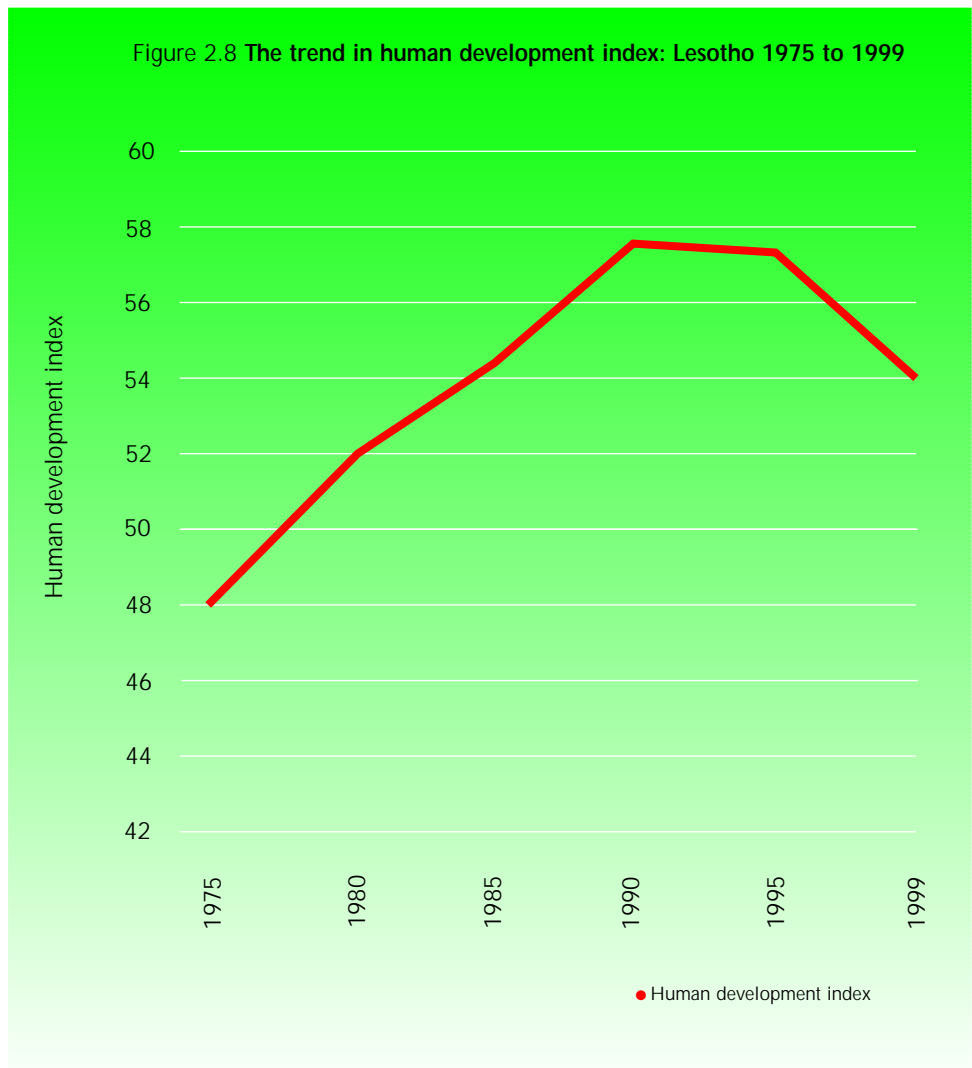


Figure 2.8 shows that the HDI was 48% in 1975 and peaked at 57% in 1990 when it then declined to where it reached 54.1% in 1999. Consequently, as indicated by the HDI, Lesotho has suffered a setback in the quality of life of its people in the latter part of the last decade. Comparatively, Lesotho was better in 1985 than it is today. This decline in the quality of life from 1990 can be attributed to such factors as retrenchments of Basotho workers from South African mines. The retrenchments of Basotho mineworkers from the South African mines has worsened poverty situation in the country.

The quality of the HDI indicators underscores the fact that Lesotho is facing huge challenges of human development. Of all the challenges facing the country, the government of Lesotho has identified poverty as the source of all ills. Consequently, the government has adopted a poverty alleviation policy by ensuring that all its policies are geared towards eradicating the existing abject poverty.

### Poverty and income distribution

The poverty and income distribution in Lesotho has been studied by Sechaba Consultants (1990, 1993, and 1999). Their studies indicated that Basotho are increasingly getting poorer. Accordingly, people who spend less than M80.00/month have increased from 49% in 1990 to 68% in 1999. Furthermore, 70% of these poor people fall below the poverty line and amongst them, 49% are classified as destitute, meaning people who spend less than M40.00/month. Based on these studies by the Sechaba Consultants, the income distribution in Lesotho further shows disparities in earnings and localities.



The Sechaba Consultants reports were further substantiated by the UNDP HDI report (2001). According to both reports 10% of the richest population earns 43.4% of the national (proxied by expenditure) whereas 0.9% of the poorest population earns 10% of the national income. Geographically, poverty is more prevalent in the highlands and the Senqu river valley regions of the country as 80% of the inhabitants of these regions fall below the poverty line.

Consequently, the UNDP HDI report therefore recorded the Gini-coefficient, a conventional measure of income distribution that assumes a value of zero for perfect equality and 100 for perfect inequality, at a value of 56. The implication of this finding is that since 49%, almost half of the population, do not directly benefit from economic activity on account of being poor, it is to be expected that the benefits of economic growth, as conventionally measured by GDP growth, will not reach them through a trickle down effect. The analysis of the poverty and income distribution amongst Basotho is further presented in Box 1.

### **Agriculture and food security**

The Sixth Five-year National Development Plan (1996-2000) identified expansion of agricultural production as a viable means of alleviating poverty and in addressing escalating unemployment as the population increases and the retrenchment of Basotho workers from the South African mining industry increases. Notwithstanding, the declining agricultural productivity, 85% of the population in Lesotho still depends partly or fully on agriculture for its livelihood. Crop production in the country is extensive and involves cultivation of maize, wheat, sorghum, beans and peas and vegetables. The percent of land allocated annually to the production of these major cereal crops is

60, 10, 20, 8 and 2, respectively (GOL, 2001).

Crop production in the country is however very poor and does not meet the annual demand for the cereal crops. The current annual demand for these cereal crops exceeds local production by 90%. In the 1990s, Lesotho produced 50% maize, 98% sorghum and 15% wheat of its annual demand. The difference had to be met through imports and foreign assistance as food donations, indicating that Lesotho is heavily dependent of imported cereal crops.

Crop production in Lesotho is characterised by fluctuations due to episodic events such as periodic droughts and excessive rainfall (Figure 2.9). A significant decline in crop production was experienced during 2001/2002 due to excessive rainfall which damaged most cereal crops. The decline in agricultural production during 2001/2002 cropping year led to the declaration of the state of famine in the country and the Government set aside \$2.3 million as a short-term intervention against food shortages. Continuous mono-cropping, inadequate use of chemical fertilizers and inappropriate tillage methods all contribute to the decline in agricultural production.

Basotho also rear livestock for the sustenance of their livelihoods and most livestock is reared extensively. In 1999/2000, the rangelands of Lesotho supported 755,134 cattle, 98,933 horses, 203,368 donkeys, 1,109,107 sheep and 937,600 goats. Wool and mohair exports are a major agricultural contributor to GDP and a significant source of income for the sheep and goat rearing rural households. The numbers of livestock remained relatively the same for the last 20 years (Figure 2.10). However, the sheep numbers have declined since 1994/95 due to a decrease in international wool prices and increasing incidences of stock theft.



## Ensuring long and healthy lives

The Government's strategy for poverty alleviation is based on the theme of sustainable human development as opposed to reliance on growth in GDP alone. The poverty alleviation strategy is to be achieved by firstly, ensuring that Basotho lead long and healthy lives and acquire knowledge and secondly, ensuring that they have access to resources needed to accommodate acceptable levels of human needs. Below, we consider the achievements of the Government of Lesotho towards poverty alleviation strategy by assessing its performance in ensuring that Basotho lead long and healthier lives and ensuring that Basotho have access to resources.

The health indicators for Lesotho and other SADC countries are presented in Figure 2.11. Life expectancy in Lesotho is 47.9 years and ranks fourth among SADC countries (UNDP 2001). Comparative indicators amongst SADC countries show that 29% of the Lesotho population is undernourished, 16% of Lesotho children five years and under are under weight, 44% of Lesotho children five years and under are under height and 11% of Lesotho infants have low birth weight. Generally, the health statistics of Lesotho are poor to enable a fair judgement of long and healthy lives for Basotho. Therefore, based on the health indicators, the Government of Lesotho has failed in its attempts at alleviating poverty and attaining sustainable human development.

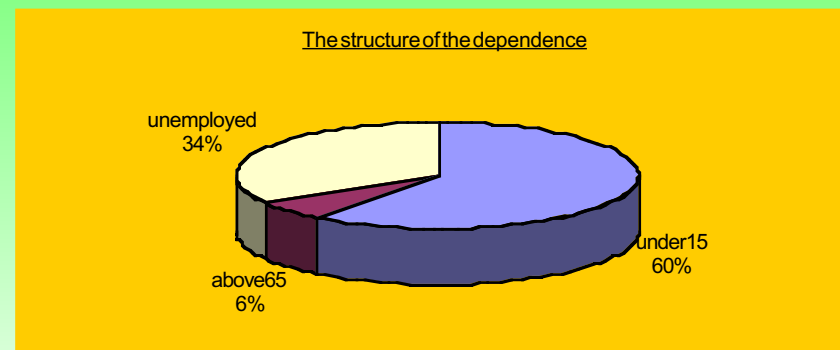
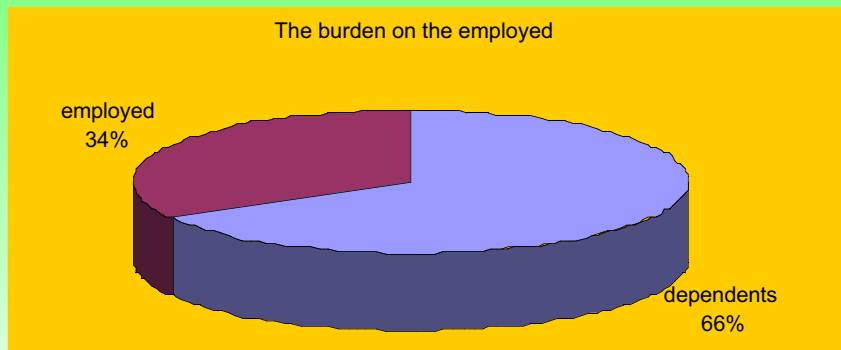


### Box 1.0 The dependence syndrome in Lesotho

Of the two million people in Lesotho, 342,000 are illiterate, 180,000 lack access to improved water sources, 780,000 boys and girls are out of school and 536 children under the age of five die every year of preventable causes- this translates into three children dying every two days. The poverty statistics reveal that around 862,000 (43%) of the population survive on US\$1.00 (M10.00) per day –equivalent to US\$30.00 (M300.00) per month. The following analysis highlights the severity of the dependency ratio, an important factor in analysing the degree to which income earned people's livelihoods.

Population	Under 15	Above 65	Econ-Inactive	Labour Force	Unemployed	Employed	Dependents
2,000,000	800,000	82,000	882,000	1,118,000	447,200	670,800	1,329,200

Approximately 40% of the population is under the age of 15 and they, together with the 4.1% who are above 65, place a burden on the 33.5% (670,800) who are employed. As depicted in the chart below, the dependency ratio is approximately two. That is, on average, every one of the 670,800 working people has to directly support two people.

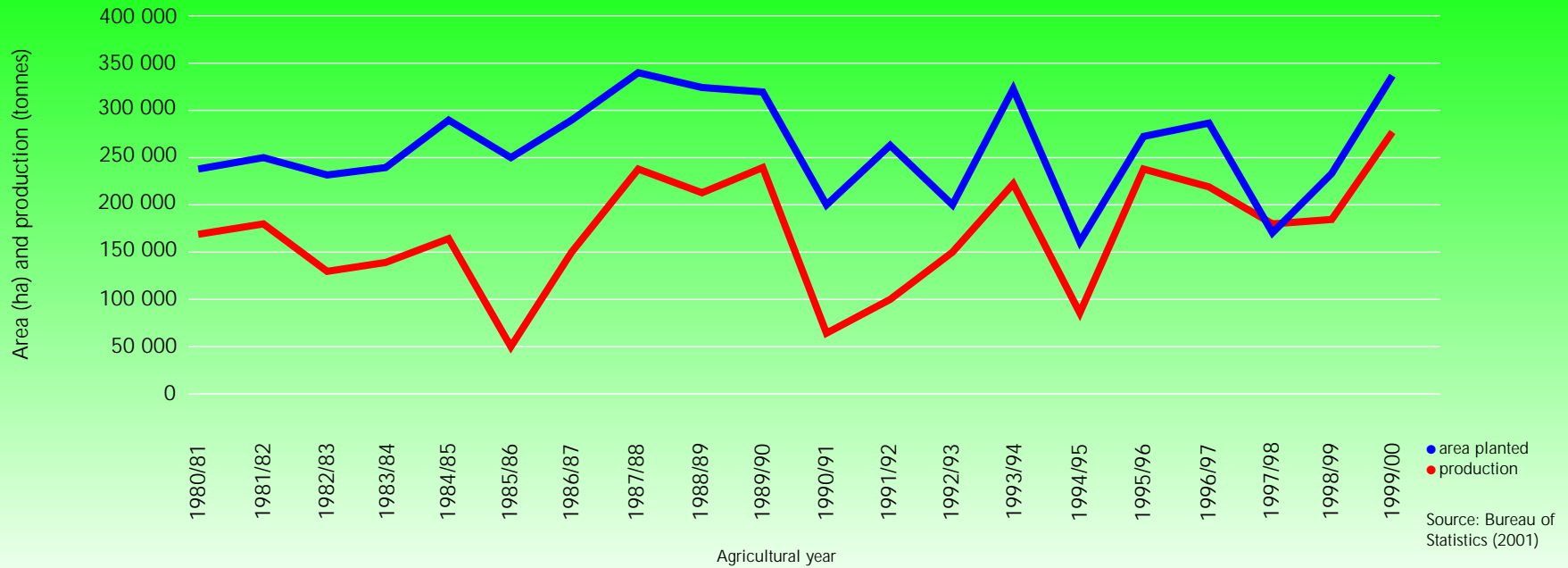


A closer look, as presented in the chart above, at the composition of the dependent population reveals that, perhaps not surprisingly, 60% are children. This bears testimony to the high fertility rate of 4.8 children per woman compared to that of India of 3.3. A more worrying factor, however, is the 34% of economically able and (mostly) willing members of the populace who cannot find gainful employment. These people account for the major part of the poverty situation facing the country.





Figure 2.9 National area of planted and production of major crops



Lesotho is trying very hard to address other health problems such as Tuberculosis (TB) and measles. Statistics indicate that 68% and 55% of the one-year old infants have been immunized against both TB and measles, respectively. Lesotho's immunization percentages for both diseases are better than those of Angola and Congo DRC only in the SADC region (Figure 2.12). In 1999, two hundred and seventy two per 1000 persons TB cases were recorded in Lesotho (UNDP 2001) and it translates to 27% of the

total population. Other countries with more serious cases of TB are Botswana with 303, Zambia with 482, Swaziland with 433, Namibia with 480 and South Africa with 323 persons per 1000. Although the 272 cases per 1000 cases of TB are relatively low for Lesotho when compared to other SADC countries, the TB pandemic is expected to increase due to its association with AIDS.



Figure 2.10 National area of planted and production of major crops

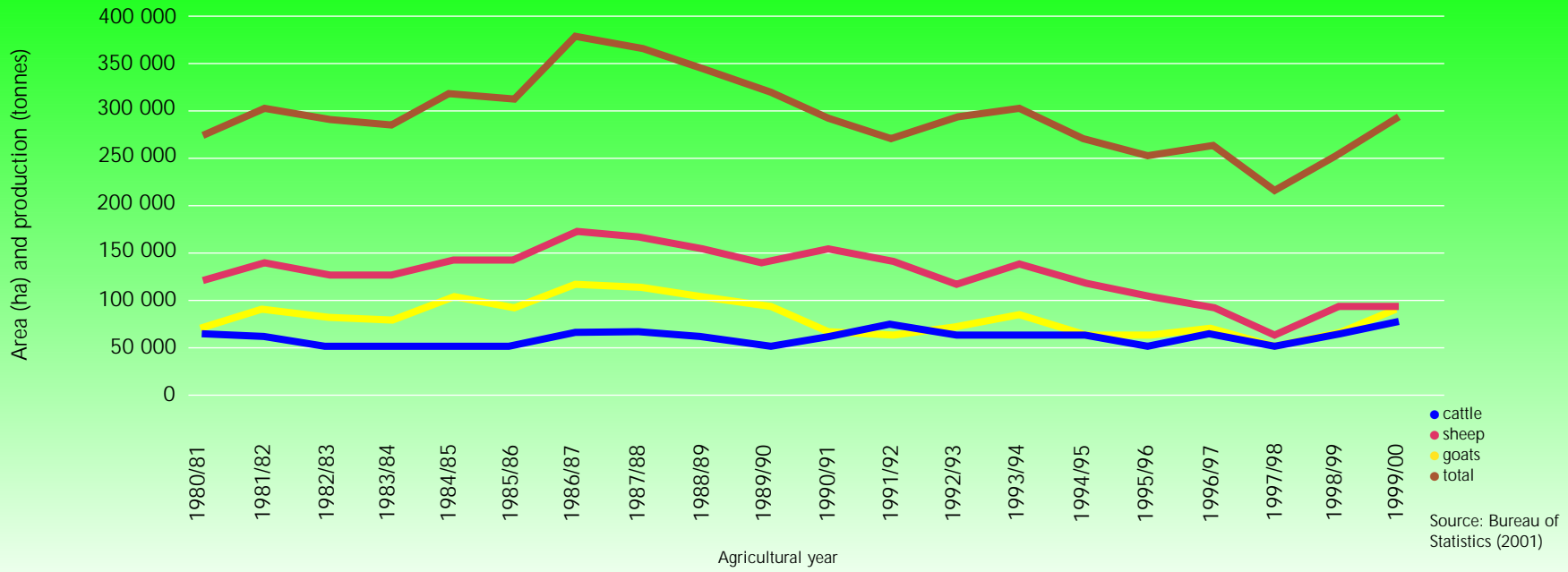


Figure 2.11 Critical health indicators for Lesotho and other SADC countries

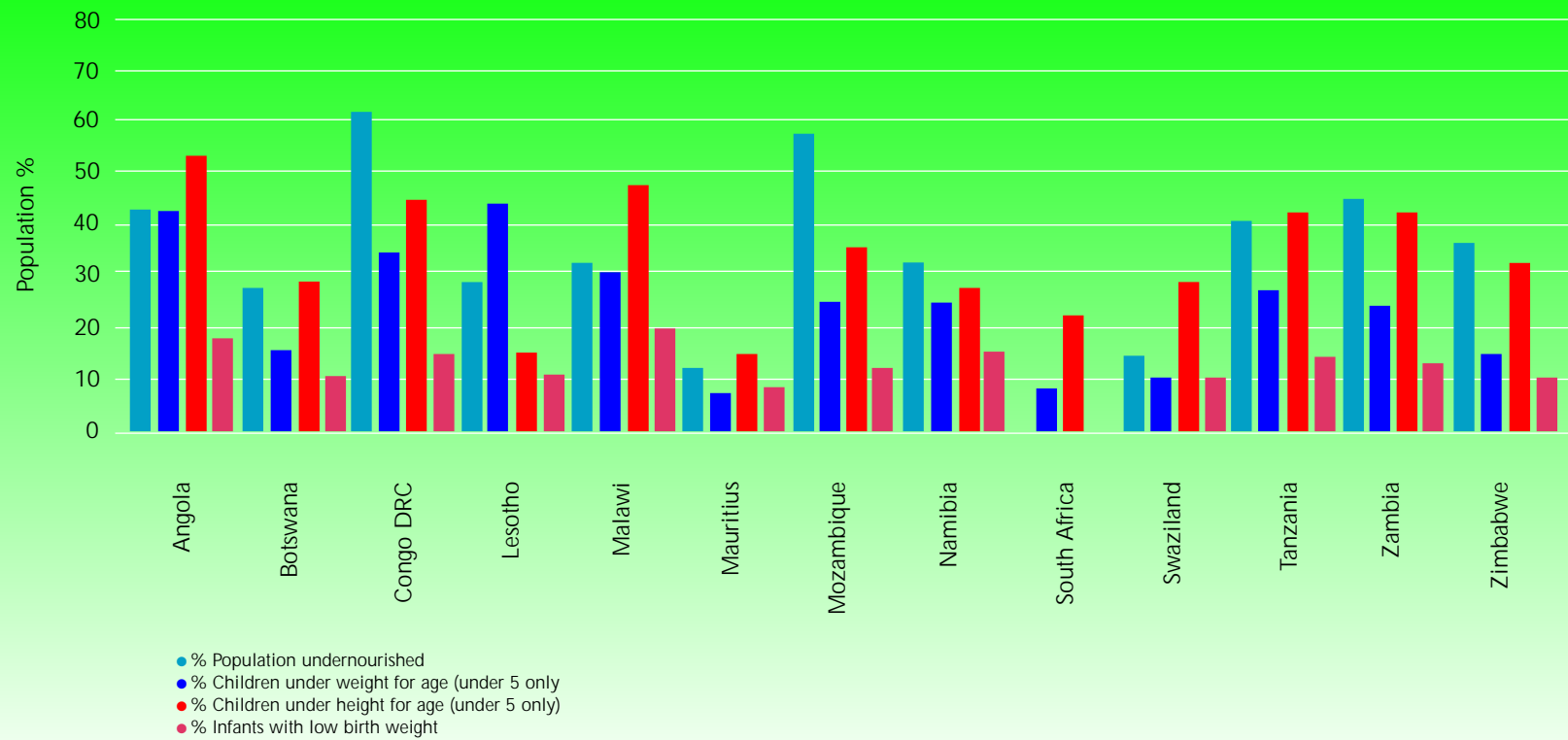


Figure 2.12 Percent of one year olds immunized against TB and measles

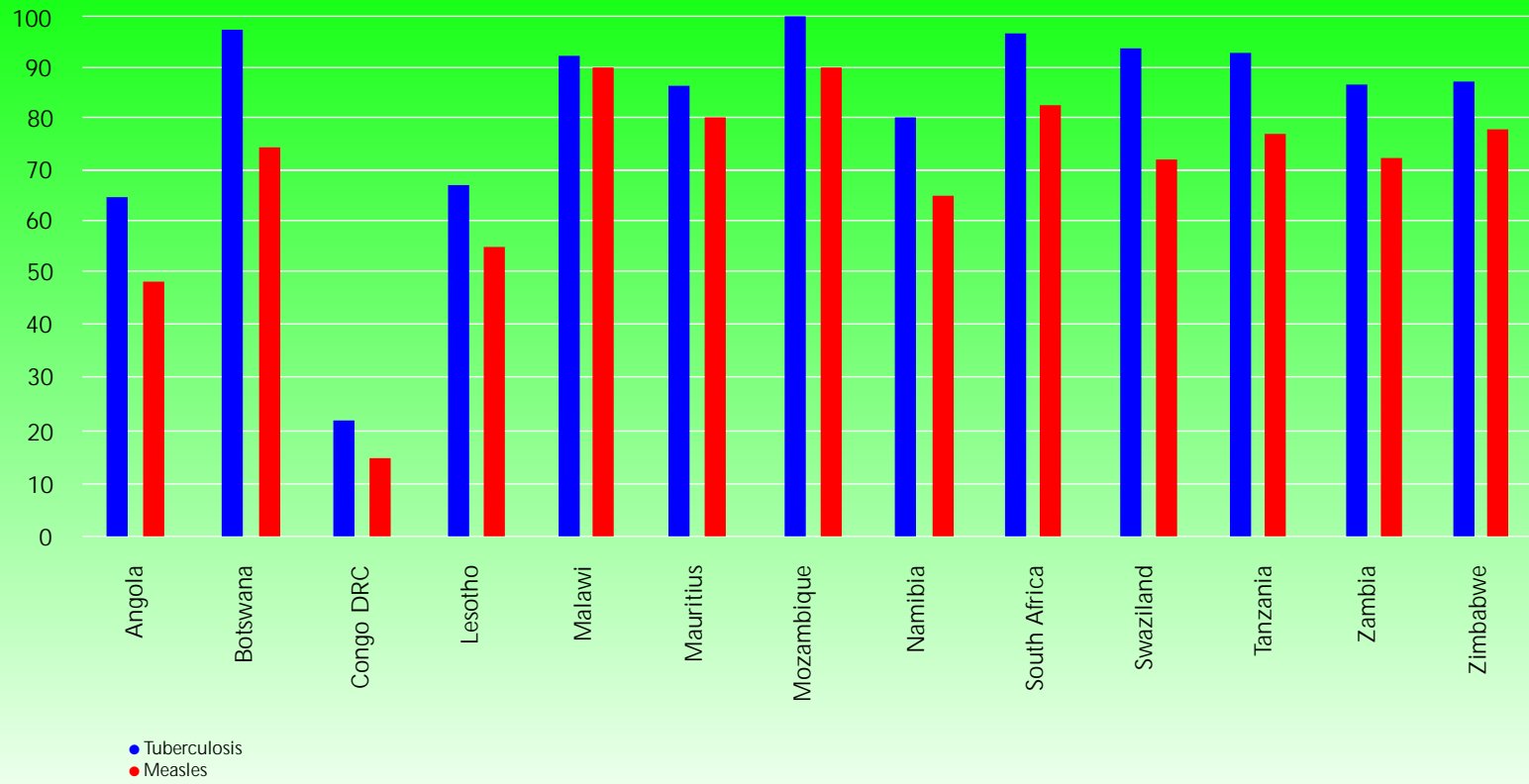
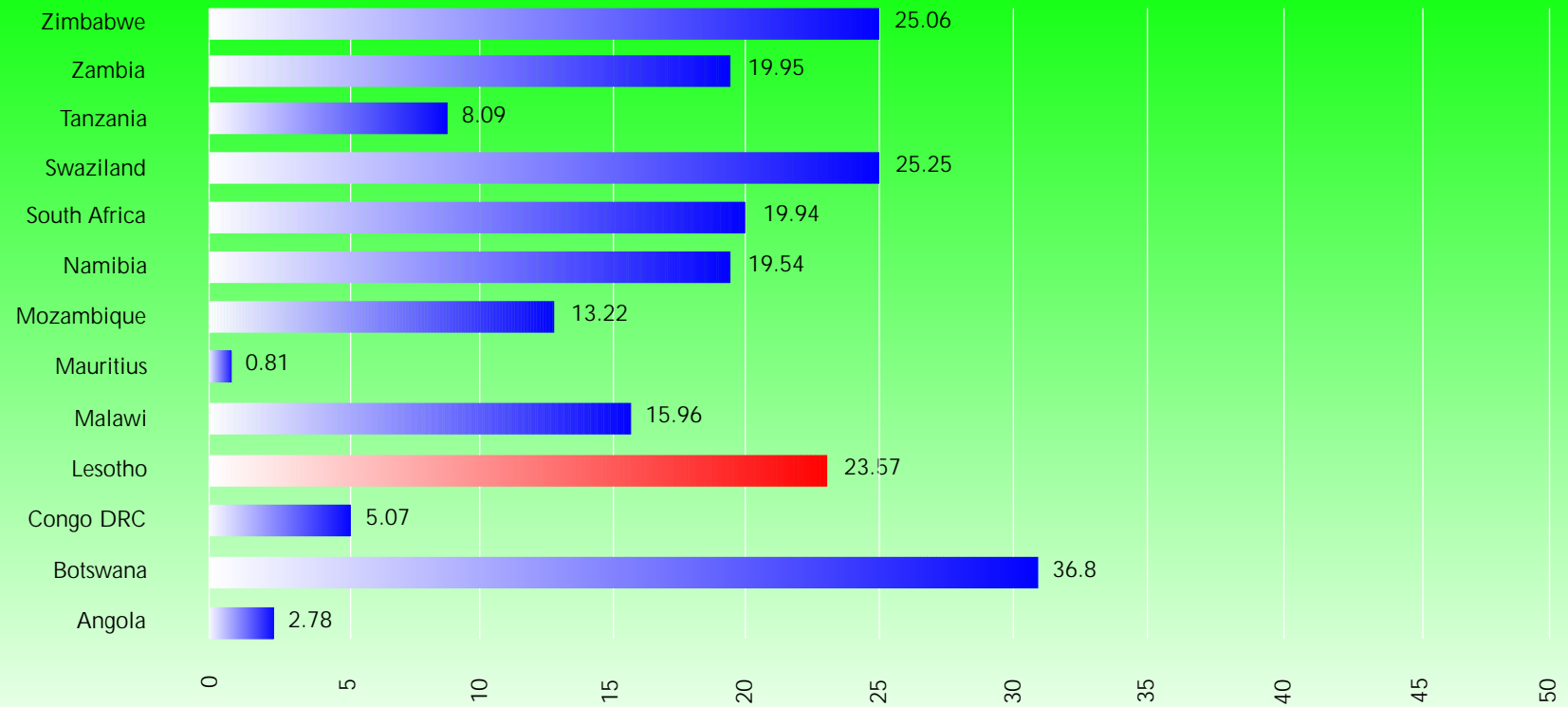


Figure 2.13 Percent of adults (15 - 49 years) living with HIV in 1999 in SADC countries



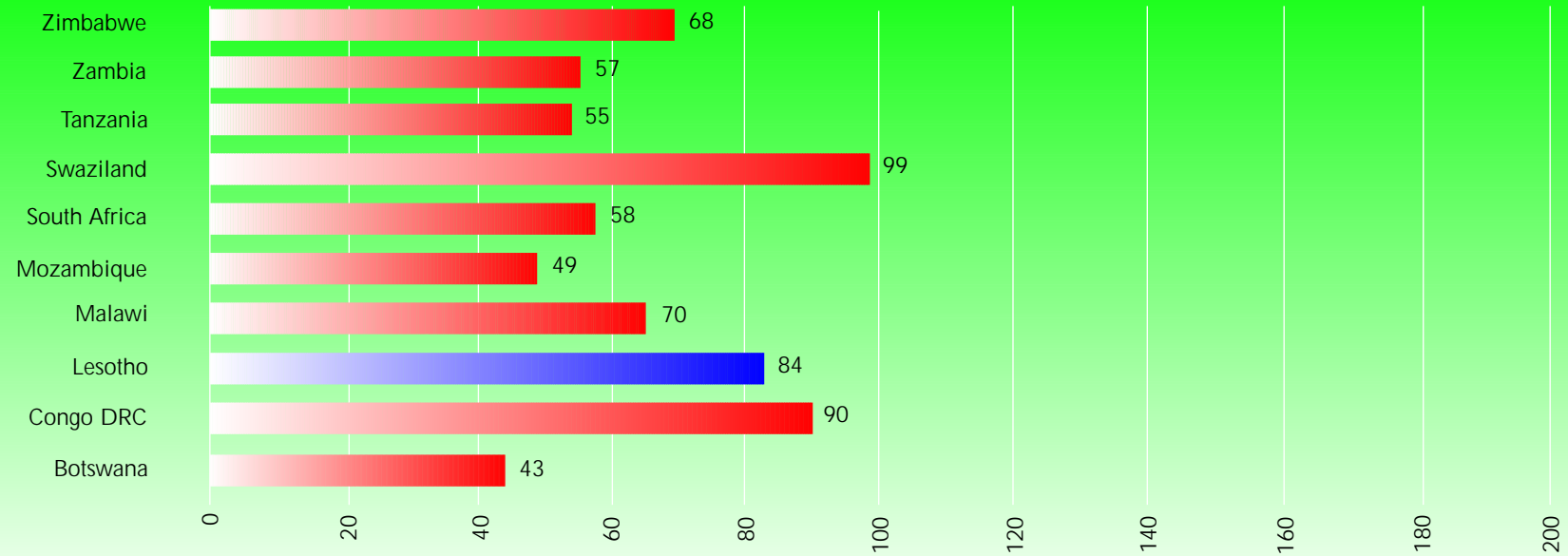
The rate of use of rehydration therapy, regarded as perhaps the single most important development in saving infant lives in the developing world, has been relatively better in Lesotho within the regional context. Figure 2.14 shows Lesotho's use rate of oral

rehydration therapy of 84% has been the third highest amongst the SADC countries. However, the high rate of oral rehydration for Swaziland with 99% underscores the fact that there is still room for further improvement.





Figure 2.14 Oral rehydration use rate (%) in SADC countries

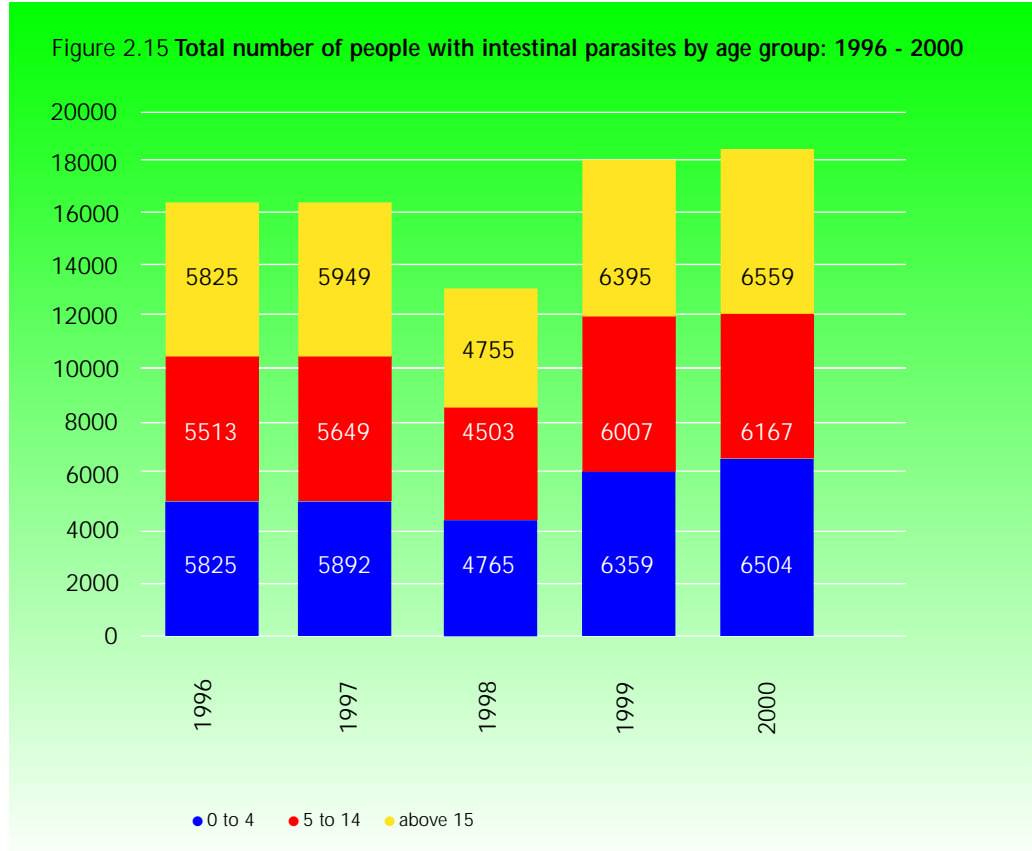


Based on this information and the limited resources the country has, it can be concluded that the Government of Lesotho is facing serious challenges in ensuring good health for all. Compared to other SADC countries, the poor performance of the Lesotho Government on these health indicators could be attributed to its ineffectiveness in adopting appropriate health policies.

Apart from the policies pursued by the Government, the quality of the natural environment has played a role in the deterioration of the health of Basotho as shown by the

health indicators. For example, air pollution resulting from industrialization causes an increase in respiratory diseases. Furthermore, polluted waters also cause other disease problems. An analysis of the prevalence of intestinal parasites related diseases due to polluted water for people in all age groups revealed an increase in these diseases over the last decade. The Figure 2.15 shows the total number of people in Lesotho with intestinal parasites and related ailments. The studies were carried out by the Ministry of Health since 1996 (Ministry of Health 2001).

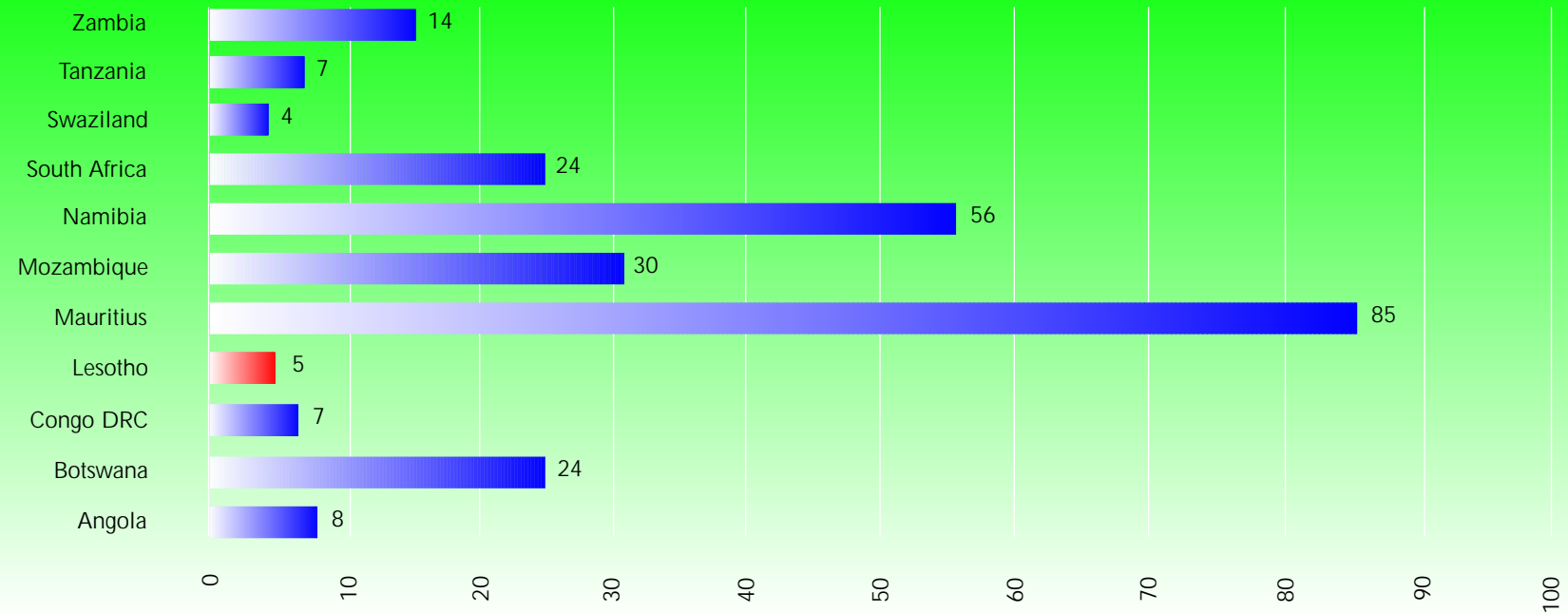




The problem of low health indicator for Lesotho is further compounded by lack of physicians. Lesotho, among the SADC countries, has the lowest patient:physician ratio with five doctors per 1000 patients (Figure 2.16). Swaziland is the next lowest with seven doctors per 1000 patients. It is therefore safe to conclude that the low status of the country's health indicators may be due to, among others, the evident lack of physicians to serve the population.



Figure 2.16 Physicians per 1000 of population: SADC comparison



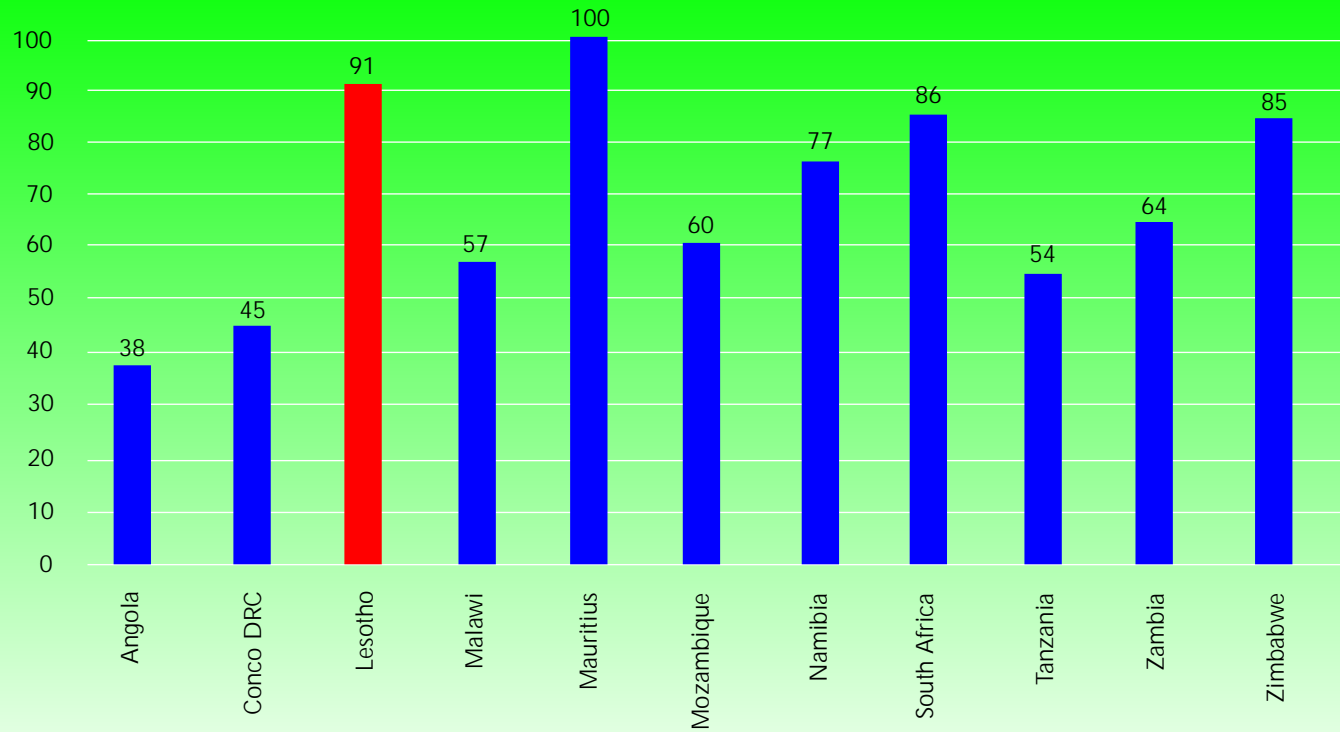
The other important pillar of the poverty alleviation strategy is to ensure that people have access to the resources necessary to accommodate acceptable level of human needs. Similarly to those of the health sector, the indicators relating to the strategic objective of ensuring access to basic services reveal a mixed picture as water and sanitation are sufficiently supplied but facilities such as telephones and electricity are not adequately supplied. One of the most important resources for sustenance of basic needs is access to drinkable water and adequate sanitation facilities. According to the UNDP (2001), Lesotho is well supplied in regard to ensuring access to both amenities. Figure 2.17 compares Lesotho with other SADC countries with regard to access to

improved water sources.

The percent of people having access to improved water sources in Lesotho is 91 and is only lower to that of Mauritius (Figure 2.18). The Government of Lesotho reported, in Review and Appraisal of the Implementation of Habitat Agenda report (GOL 2001), that a significant number of Basotho households in rural areas have access to piped water within 200 meters. The report indicated that fewer households drew drinking water from wells and rivers. The report further stated that the highest percentage of households drawing water from catchment tanks was recorded at Mafeteng where only



Figure 2.17 % population using improved water sources: SADC comparison



3% of the households did not have access to piped water.

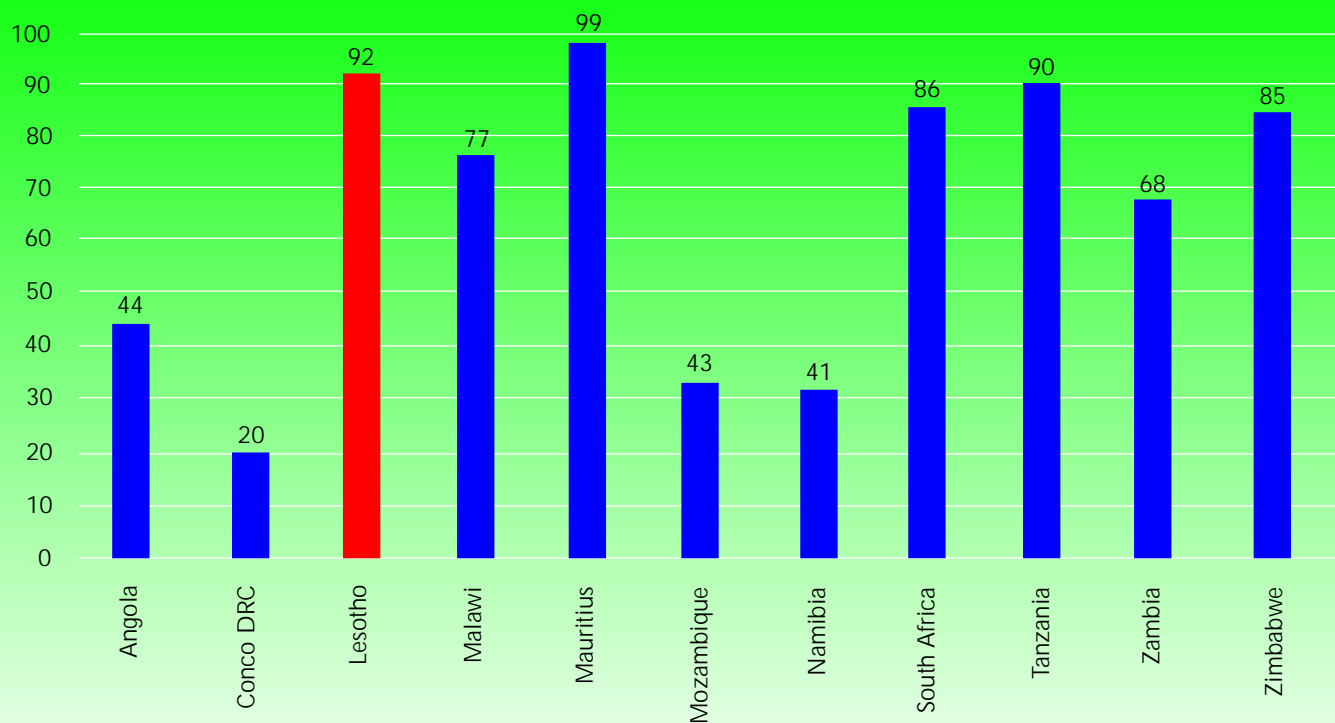
However, with regard to household connectivity, there are still huge challenges faced by the Water and Sewerage Authority (WASA). In 1998, the WASA served 43% of

urban households with water and 3.6% of urban households with sanitation facilities.

The problem of sufficient sanitation facilities was further compounded by a serious lack of equipment maintenance. However, according to the UNDP (2001) and the GoL Agenda 21 Report (2001), the level of access to adequate sanitation facilities is good



Figure 2.18 % population using adequate sanitation facilities: SADC comparison



even in comparison with other SADC countries (Figure 2.18).

The percentage of people having access to sanitation facilities is 92 and is lower only to Mauritius (Figure 2.18). The Government once instituted the VIP latrine programme

in many parts of the country and it has contributed significantly to the improved coverage inside the country. The programme has thus contributed to improved performance of the country in regard to sanitation facilities when compared to other SADC countries.





Access to other basic services such as electricity and telecommunications has, on the contrary, been seriously lacking in Lesotho. Only 2.9% of the households are connected to the national electricity grid (GOL Habitat Agenda Report 2001).

The low connectivity rate has improved to 3% in 2003 following the reforms undertaken by Government to privatise the state owned Lesotho Electricity Corporation.

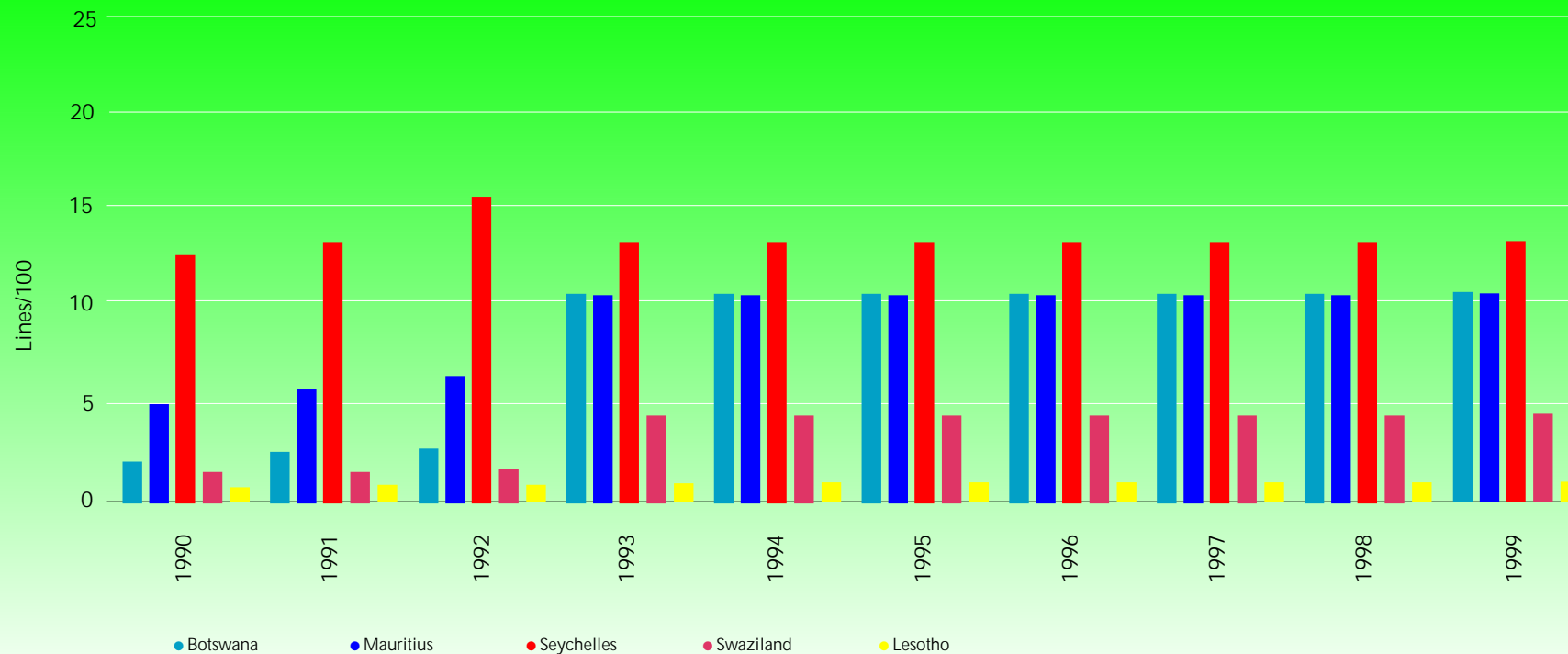
However, even a 100% growth in households connected to electricity would still be too low. In these circumstances therefore, it could be expected that paraffin, fuel wood and gas would remain the primary sources of energy to most Basotho.

Telephone connectivity is another service with a low supply to Basotho. With a tele-density (number of landline phones per hundred of population) of one, the Lesotho telecommunications sector is still in its rudimentary stages of development. There were only 22,000 residential and business subscribers to the Telecom Lesotho, the sole fixed network operator, network during mid 2002.

Lesotho fares very badly when compared with other SADC countries in respect to telephone lines connections (Figure 2.19). Lesotho has not only been the worst performer in telephone connectivity but also the most stagnant of the five selected SADC countries. Even more striking is that Lesotho's tele-density has been consistently less than that of Swaziland over the last decade.



Figure 2.19: Main lines per 100 of population



The main drawback to the development of the fixed network telephony in Lesotho has been lack of adequate infrastructure to meet the demand coupled with high inefficiency in utilising the existing network. The telephony infrastructure is a problem and it shows that, despite a lot of demand for telephone services as depicted by the waiters, the network had reached full capacity in most districts as at June 2001. An interesting observation is that, with the exception of Maseru, there are generally more waiters than

serviced customers in the other nine districts. This is more evident in Mafeteng, Mohale's Hoek and Quthing where the waiting list twice exceeds both the existing lines and the capacity.

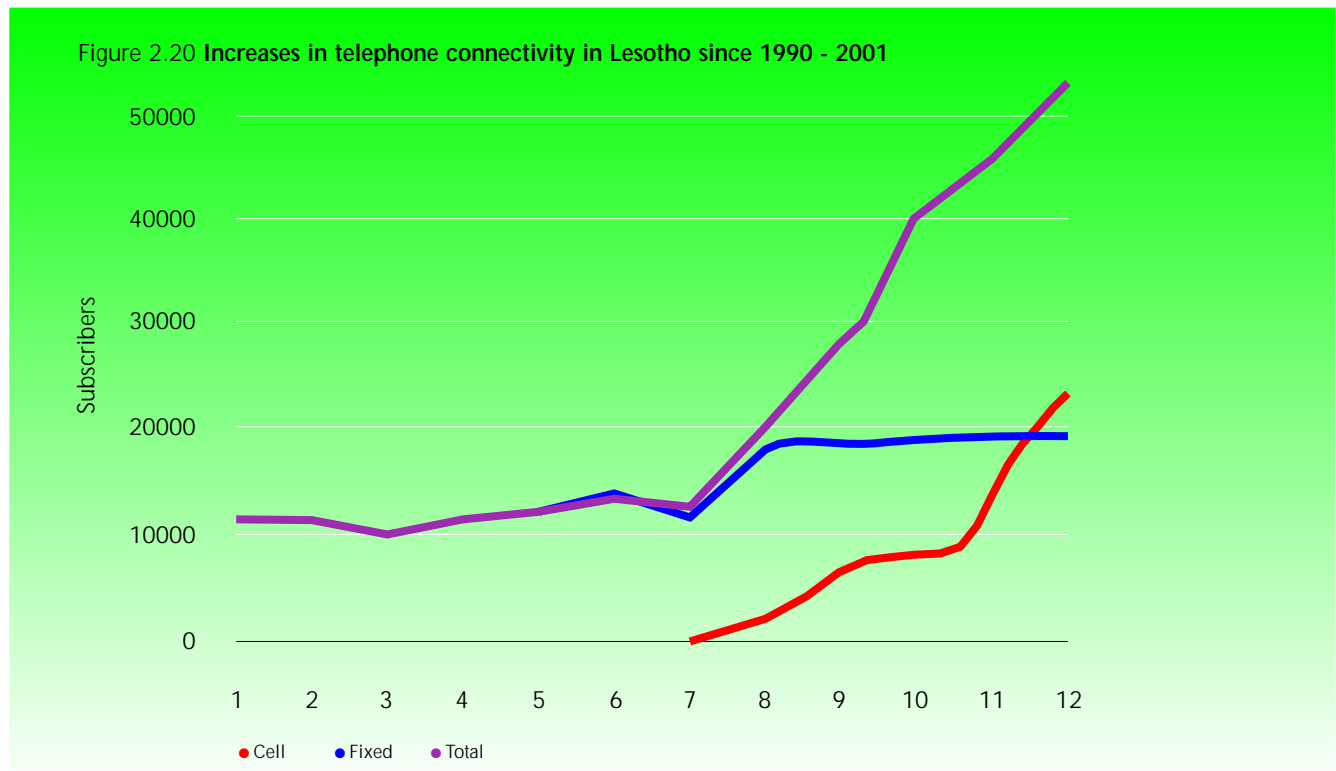
As with population distribution, the already strikingly few telephone lines are concentrated in Maseru where 71% of the main lines are situated. Lack of telephones in



Lesotho is a serious problem with only Maseru recording significant telephone lines even though, given its population, the lines are still very few.

As in many other countries, there seems to be a great potential for mobile telephony to overtake fixed telephony. In Lesotho, since its introduction in 1996, mobile telephony has grown substantially and continues to do so at an exponential rate (Figure 2.20). Comparatively, there are now more mobile subscribers than landline subscribers. Figure 2.20 shows that that mobile subscribers surpassed fixed subscribers in 2000.

By mid 2001 there were 27,000 mobile subscribers resulting in a penetration rate of approximately 1.35 mobile phones per hundred of population. At the same time, fixed telephony had 22,000 subscribers with a penetration rate of 1.1 per hundred of population. Together, both mobile and fixed telephone subscribers were 49,000 in 2000 resulting in a total tele-density of 2.4 phones per hundred of population.

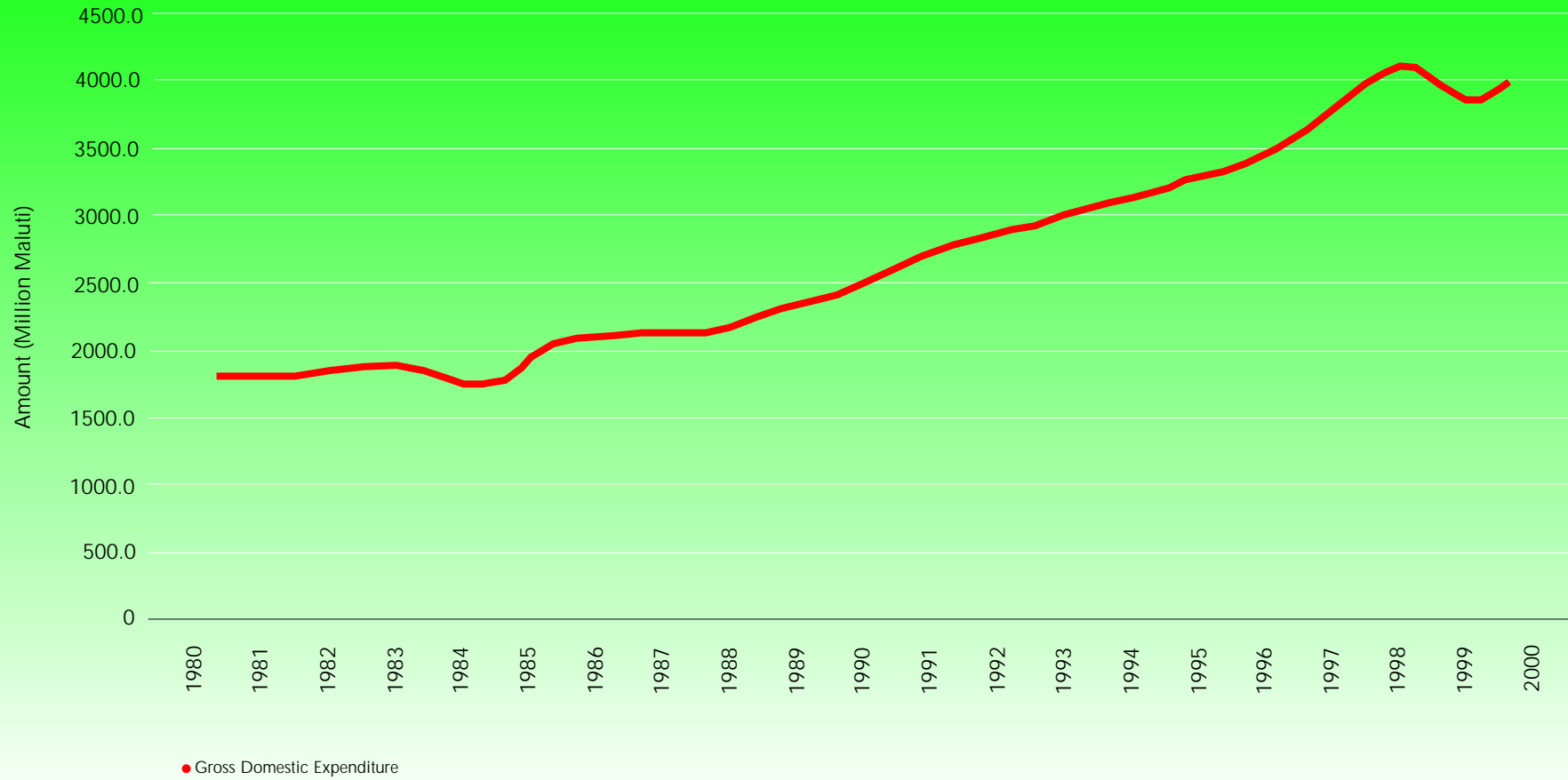


**The macro-economy: gross domestic expenditure/product**

Given these evident challenges of human development, the government has had to adopt a complete paradigm shift with respect to how it conducts its business. The impetus of this paradigm shift was the adoption of the structural adjustment programme in 1988 with far reaching reforms in many sectors of the economy. As a result, economic wealth, as measured by the gross domestic expenditure (GDE), has been growing at a steady pace from 1988 culminating in a highest ever figure of US\$1,992 GDE per



Figure 2.21 The growth of Gross Domestic Expenditure from 1980 to 1999 in Lesotho



capita in 1997 (Figure 2.21).

The GDE decreased by 4.6% following political unrests in 1998 but quickly regained momentum and increased to M3.9 billion or the equivalent US\$0.9 billion in 1999. As at the end of the decade, Net Factor Income from abroad, a major source of incomes sustaining rural households, largely comprising migrant labour remittances from South Africa accounted for 22% of Lesotho's GNP.

An economic boom mainly driven by construction under the Lesotho Highlands Water Project (LHWP) and rapid advances in the manufacturing sector was experienced in the last decade. For some time these two activities dominated the economic developments in Lesotho. Furthermore, attempts by the Government to implement programmes sponsored by the IMF and the World Bank through Structural Adjustment Programme (SAP) assisted the country to see some economic gains.

The SAP brought a number of positive economic developments. For instance, the Lesotho economy grew by an average of 6.3% between 1988 and 1997 (Bureau of Statistics 2000). Similarly, the national budget improved from a 10% deficit in 1987/88 to a 2.1% average surplus over the period 1992/93 to 1997/98.

Inflation figures dropped from 18% in 1991 to an average of 9% in the latter part of the decade. Over and above these, since the adoption of SAP in 1988, the balance of payments registered an annual average surplus of approximately 8 months worth of imports.

However, during 1998, the GDP saw a significant turnaround in economic perform-

ance as GDP contracted by 4.6% as opposed to 8% the year before. The decline was owing to a plethora of events including;

- (i) The political unrest, which shaved off around M145 million from the country's income. Given the current income per capita and the country's demographics, the loss translates into an income that could have sustained some 9,000 households.
- (ii) The after effects of the El Nino weather phenomenon that adversely affected agricultural output in 1996/97 season.
- (iii) The slump in the performance of the manufacturing sector due to constraints in productive capacity and, most notably, the inefficiency of the entire utilities sector.
- (iv) The winding down of the phase 1A of the LHWP adversely affected the construction sector which was one of the main contributors to GDP.
- (v) The poor performance of the state owned companies.

As shown in Figure 2.22, trends in GDP growth indicate the volatile nature of economic growth in Lesotho over the last two decades from 1981 to 1999. However, it is important to note that growth rates stabilised in during 1990 to 1995 thus reflecting the success of Structural Adjustment Programme policies that were adopted in 1988 and other positive developments experienced early during the 1980s decade.

The main factors behind the good performance have been quoted as the adoption of the structural Adjustment programmes in 1988 and the subsequent Enhanced Structural



Adjustment Facility of 1991, a prudent fiscal policy stance by Government, the Lesotho Highlands Water Project (LHWP) and the significant foreign direct investment into the manufacturing sector.

The Lesotho Highlands Water Project and the direct foreign investment into the manufacturing sector are indicative of the heavy reliance of the economy's performance on the environment. This is because both the manufacturing sector and the LHWP rely heavily on the environment. Pursuit of economic policies that encourage reliance on activities such as these will therefore act as a driving force behind environmental change.

A further analysis of the GDP growth rates indicates the success of the policies in achieving the intended economic growth targets. For example, between 1995 and 1999 the annual real GDP growth averaged 12% as compared to 3% during 1990 to 1994. During this period, Lesotho recorded one of the highest economic growth rates within the African continent.

Due to the political disturbances during 1998, the GDP contracted by 4.6% and the related after effects of such disturbances have been the diversion of foreign direct investment flows away from the country as business confidence dropped sharply.

During 1998 the net private inflows declined by 50% as the country experienced a huge exodus of investors and other potential investors got dissuaded from investing in the country. In 1999, the economy however recovered, *albeit* marginally relative to previous year's performance. In 1999 GDP grew by 2.2% which was 50% less than the targeted rate of 4%. The GDP growth rate further grew by 3.3% in 2000.





Figure 2.22 GDP growth from 1981 to 2000



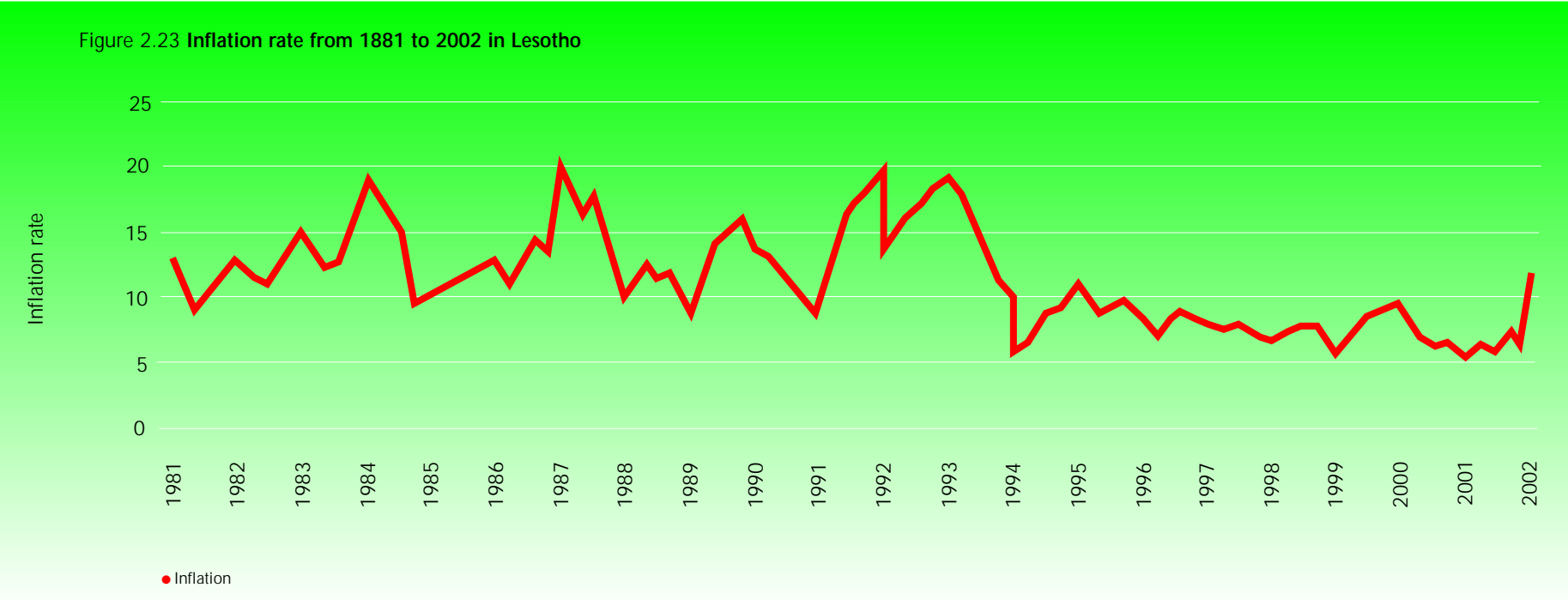
**The Macro-economy: inflation rate**

The increase in the average prices within the economy, as proxied by the inflation rate, stabilised at rates below 10% percent; the so-called single digit rate which is considered sustainable for economic progress. Figure 2.23 shows that although there were significant fluctuations in inflation rates from 1984 to 1993, the rates in inflation since 1994 to 2001 have been relatively stable.

However, latest data for 2002 indicate a sharp increase as the first quarter of year recorded a double-digit inflation figure of 11%. An increase in inflation rate would

threaten the achievement of the Government's Poverty Reduction and Growth Strategy and will also have undesired consequences for environmental rehabilitation efforts.

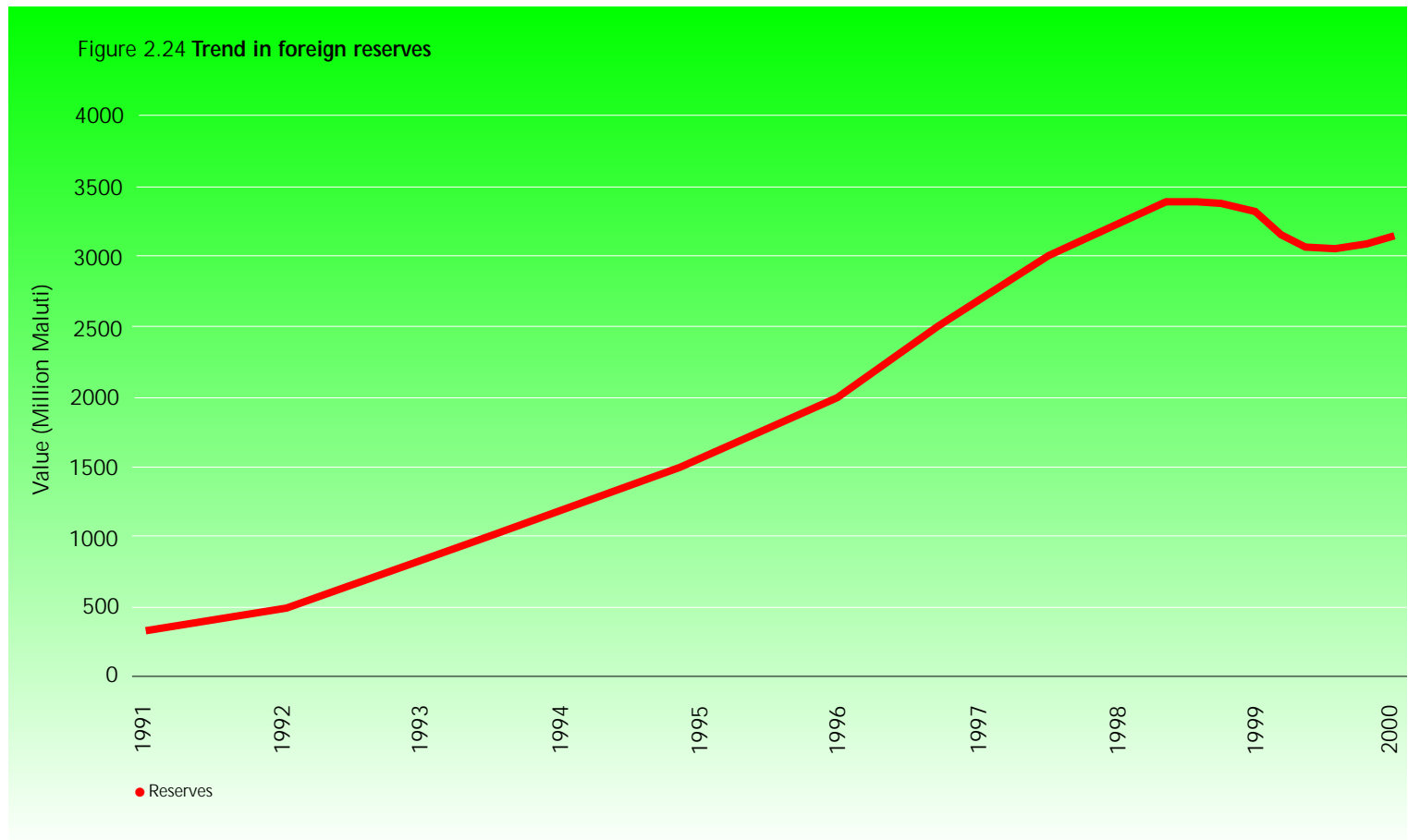
When inflation rates are high and goods and services are unaffordable the logical thing to do by most people is to utilize natural resources for survival. In such cases, utilization of the natural resources is in unsustainable manner. Furthermore, inflation has the effect of worsening the distribution of income by eroding the value of fixed monthly incomes earned by the majority of the employed while those who earn above average, such as big business entrepreneurs, can protect themselves against the price increases by increasing their prices.



## The macro-economy: balance of payments

With regard to the Balance of Payments, a measure that shows the country's position with regard to the relative sizes of payments and earnings to and from the rest of the world, the country recorded a deficit of M177.40 in 2000 after correcting for the effect of the depreciating exchange rate.

The implication of this is that the stock of foreign reserves had to be drawn to make good the deficit. As such, the balance of payments position remained very weak. Figure 2.24 illustrates that the weakness of foreign reserves has persisted ever since 1998.

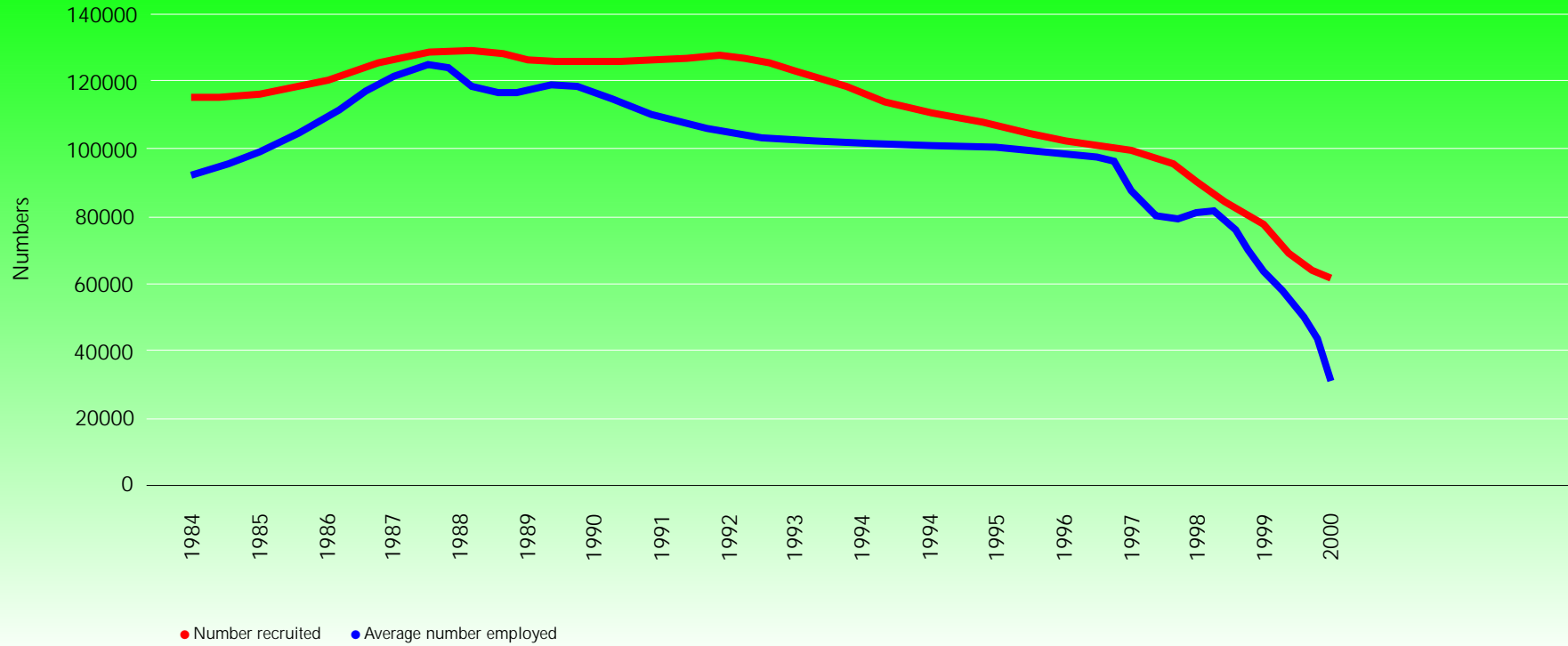


As evidenced by Figure 2.24, a significant pressure has been exerted on the country's foreign reserves by the persistence of deficits hence the sharp drop in 1998 up to 2000. The main factors that have been attributed to

the deficit in the Balance of Payments (BOP), particularly in the current account, is the sharp drop in migrant labour remittances from South Africa due to massive retrenchments from South African mines. For example, Figure 2.25 show the number of migrant workers declining by 50% from 127,000 in 1990 to 64,000 in 2000.



Figure 2.25 Mine migrant workers in RSA: 1984 to 2000



## Responses

### Poverty alleviation

In an attempt to addressing the problem of poverty in the country which is the main

priority for achieving sustainable development, the Government has commissioned a number of studies and formulated several policy documents which would assist in ensuring that informed intervention are made to arrest poverty. These include:

- Study of linkages between poverty and environmental degradation (1995);



- Poverty Action Plan (1996);
- Poverty mapping exercise (1996);
- Poverty investment programme in the context of good governance (1997); and
- Nutrition Master Plan (1997).

Furthermore, in 1999, the Government in collaboration with UNDP formulated a Poverty Reduction Strategy Paper (PRSP) process, which focuses on employment and income generation in various sectors. The overall objective of the PRSP is to promote poverty reduction strategies that are domestically driven, partnership based, result oriented, comprehensive, and framed within the medium term macro-economic strategy of the country. The PRSP specifically places emphasis on creation of non-farm employment, promotion of labour intensive works and income generating activities.

The Government has also initiated Small Scale Enterprises Project aimed at providing credit guarantee for accessing loans to small-scale enterprises and the industrial sector including providing training opportunities for entrepreneurs. In addition to these incentives, anti-poverty measures in various sectors have been supported through the Lesotho Fund for Community Development. Ninety eight percent of the fund has been used to support labour-intensive infra-structural projects such as road construction. The fund has been administered since 1996 and has made significant impact on reduction of poverty in the country.

The second poverty reduction project is the UNDP supported Environmental Management and Poverty Reduction (EMPR) Project. The achievements of the EMPR are discussed in Box 2.1. The overall objectives of the project are the creation of employment and income generation for young people and to rehabilitate and protect

the environment. Specific project activities include rehabilitation of land through re-vegetation and construction of dams. The Netherlands funded, within the project, income-generating activities and these covered activities such as fruits and vegetables production, broilers and stone cutting. To date, the project has made considerable progress in providing environmental rehabilitation training to the youth and has produced training manuals on environmental restoration.

#### Box 2.1 Some Specific Achievements of Environmental Management for Poverty Reduction Project - EMPR

- Training of over 1410 youth in rural environmental rehabilitation and management since 1996.
- Establishment of over 420 soil conservation structures covering about 300 hectares, raising 25000 seedlings in collaboration with NGOs.
- Planting 1000 fuel wood trees (community forestry) and 100 fruit trees, and construction of one dam for irrigation purposes.
- Formation of Advocates for Lesotho's Own Environment (ALOE) organization which promotes healthy surroundings, undertakes soil erosion control measures and establishes community parks.
- Engaged in environment friendly arts and crafts (recycling plastic and paper) and water recycling.

**Source:** GoL (2001) Country Paper for Lesotho: Third United Nations Conference on the Least Developed Countries. Ministry of Development Planning, Maseru, Lesotho.



Community Based natural resources Management (CBNRM) approaches can contribute significantly to ensuring that poverty alleviation programmes are sustainable. The main reasons for the success of many CBNRM regimes in the sub-region are effective stakeholder participation and security of tenure. Such a CBNRM is the Quthing Wildlife Development Trust. It is further discussed in Box 2.2.

### Box 2.2 Quthing Wildlife Development Trust variables

The Quthing Wildlife Development Trust was established in 1999, through the efforts of individuals from 23 villages within the southern district of Quthing. The overall goal of the Trust is to ensure that the natural resources around the 23 villages are conserved, managed and used in a sustainable manner for the benefit of the adjacent communities. Planned programmes under this initiative are in the areas of Conservation and Environmental Protection, Ecotourism Development and Income Generating Projects such as in agriculture, tree planting and bee keeping. It is hoped that the Trust will serve as a viable model of integrating poverty alleviation with conservation that could be applied in other parts of the country.

In recent years, industrial development has appeared to be the quickest and the most effective means of job creation in the country and therefore the *creation of enabling investment environment and facilitation of industrial development* would help speed up job creation and poverty alleviation in Lesotho.

### Global partnerships in industrial development

In April 2001, Lesotho became the fifth country in the Sub-Saharan region to be certified to benefit under the African Growth and Opportunity Act (AGOA) in the United States of America. One of the key elements of this Act is, amongst others, to provide duty-free treatment to a potentially wider range of products including textiles and apparel articles that were previously considered to be import-sensitive in the USA. The Minister of Industry, Trade and Marketing recently revealed that promoters from various parts of the world, including Taiwan, Singapore, the Republic of South Africa and Fiji have inquired about investment opportunities in Lesotho as a consequence of the announcement of AGOA.

The positive investment climate created by AGOA is also enhanced by the improving political climate in the Southern African Development Community (SADC) region and commitment shown by SADC member states in collectively promoting political stability and security in the sub-region. The strategy of promoting industrialisation as a result of AGOA is attracting many investors and is promoting employment in Lesotho. This may however not be sustainable given the fact that these industries are not linked to local businesses and the informal sector and therefore have little or no impact on the growth of local indigenous business.

Another opportunity for industrial development in Lesotho is the Africa Caribbean Pacific-European Union (ACP-EU) partnership agreement signed in Cotonneou, Benin on 23 June 2000. The agreement replaced the Lomé Convention which, focused mainly on trade issues. The Cotonneou agreement is more comprehensive and emphasises the economic, social, political, cultural and environmental dimensions of sustainable development, trade and economic growth in ACP countries. The ACP-EU agreement is based on five pillars:





- Reinforcement of the political dimension of relations between ACP countries and the European Union;
- Involvement of civil society, the private sector and other non-State players;
- Poverty reduction, confirmed as a key objective within the context of the objectives and strategies at national level;
- An innovative economic and trade cooperation framework;
- Rationalisation of financial instruments and a new system of “rolling programme”.

The new partnership will provide benefits such as duty free treatment to products from the Least Developed Countries (LDC's) for a period of eight years during which a Protocol will be negotiated. The new arrangement will however apply once the Protocol is adopted.

In addition to the Cotonneou agreement, the New Partnership for Africa's Development (NEPAD) which was formulated by African Leaders in 2001 is expected to contribute to alleviate poverty in Africa, by narrowing the gap between the poor countries and highly industrialized countries. The NEPAD recognizes the importance of peace, security, democracy, and good governance as conditions for sustainable development. The initiative presents clear objectives for sustainable development and proposes specific actions to be taken to achieve the objectives.

### **Industrial development: domestic policy reforms**

Two policy reforms have been instituted by Government to speed up industrial development in the country. The first is the Government's facilitation of industrial development through investment promotion. The second is the establishment of the Revenue

Authority to increase efficiency of internal revenue service.

The Government of Lesotho is facilitating industrial development through investment incentives such as provision of industrial infrastructure. The policy would enable the Lesotho National Development Corporation (LNDC) based Investment Promotion Centre to attract increased flows of Foreign Direct Investment (FDI) and to provide an input into the privatisation and private sector development programmes through the creation of an enabling investment environment in Lesotho. To achieve the policy, the Government strategy towards industrial development has the following objectives;

- To speed up privatisation in order to reduce Government expenditure while promoting efficiency and competitive business environment in Lesotho.
- To encourage the establishment of linkages between indigenous businesses and the expanding Asian dominated textile industry.

The Government of Lesotho is in the process of establishing a revenue authority, the Lesotho Revenue Authority (LRA) in an attempt to improve the efficiency of tax collection thereby allowing the anticipated increase in revenue to be used in the implementation of the poverty alleviation strategy. In January 2002, the British Government, through the Department of International Development signed an agreement with the Government of Lesotho to provide financial assistance required for the establishment of the revenue authority.

The following policies have been identified to have had a positive impact on the economy (GoL, 2001):



- The Fiscal policy led to elimination of budget deficit since 1992 as a result of adjustment programme and improved management of public resources. Through the policy, Government expenditure has also been rationalised and the collection of revenue has improved.

- The Privatisation policy has been the core of Government strategy to encourage efficiency and competitive business in Lesotho as well as to reduce Government losses on state-owned enterprises. To date the privatisation unit has sold off a number of enterprises and is in the process of privatising more enterprises.

- The Water Resource Management Policy focus is on the exploitation of the country's water resources for improvement of the economy. The LHWP achieved high levels of investments and the royalties from the project are presently being used for the implementation of the poverty alleviation strategy.

- The Transport Policy has improved the road network in Lesotho and led to improved economic development.

- The Decentralisation Policy is considered to be important towards effective delivery of services and improved management of natural resources. Full implementation of this policy is however not yet achieved due to uncertain political climate and indecision on the roles of local authorities, especially with regard to land allocation.

### **Agricultural sector: policies and strategies**

In an attempt to enhance agricultural production while controlling land degradation

the Ministry of Agriculture (MoA) initiated the *Agricultural Sector Investment Programme (ASIP)* in 1996 with the support of the European Union (EU). The programme has six sub-sectoral strategies; 1) Agricultural Policy and Strategy Development, 2) Privatisation and Market Liberalisation, 3) Land Reform and Natural Resource Management, 4) Agricultural Diversification, 5) Reorientation of Agricultural Support Services and 6) Strengthening of Capacity Building Programmes. The ASIP programme has identified priority areas within the different sub-sectoral strategies but the implementation of these was deferred due to lack of capacity and absence of the required policy framework. The Agricultural Policy and Capacity Building Project (APCBP) was therefore initiated in 1998 as a foundation for the implementation of ASIP through the improved institutional and policy arrangements, financing and delivery of public and private services in the country. The APCBP covers a period of three years, while the ASIP will be implemented over a period of 10 to 15 years. The APCBP has four components:

- sectoral strategy and management ;
- agricultural support services;
- land management and administration ;
- change process management.

The *Sectoral Strategy and Management* consists of three sub components: policy analysis, planning and budgeting and monitoring and evaluation.

*Agricultural Support Services* component aims at the rationalisation, decentralisation and effective delivery of agricultural support services and consists of three components: extension, research, marketing facilitation and technical services.



*Land Management and Administration* component aims at strengthening the Department of Lands, Survey and Physical Planning in Ministry of Local Government. The Ministry of Local Government is responsible for the implementation of this component.

*Change Process Management* consists of four sub components: institutional restructuring, human resource management, financial management and privatisation and divestiture.

The MoA has also drafted an Irrigation Policy for utilisation of the country's water resources for agricultural purposes. When adopted, the policy will assist in enhancing crop production and reducing the effects of periodic droughts.

### **Agricultural sector: partnerships**

The Ministry of Agriculture is not alone in delivering agricultural services. There are many other partners but the most important is the Lesotho Highlands Development Authority's Rural Development Project (LHDA/RDP). The LHDA/RDP was initiated as part of the bilateral agreement between Lesotho and South Africa to help alleviate the affected communities in the LHWP operational area. Under this project South Africa is funding activities in livestock, fodder crops and rangeland development. The filling of Katse dam submerged 2,800 ha of grazing land and in effect reducing the available rangelands to the local communities. The project is importing fodder to compensate for the loss of grazing land. The LHDA/RDP also finances and administers the development of two existing Range Management Areas (RMA) and is helping to establish Grazing Associations (GA) at Pelaneng/Bokong and Malibamat\_o/Matsoku which will

be associated with the two RMAs. The project will further establish another RMA/ GA within Katse catchment area.

Additionally, LHDA assisted the MoA by providing technical and financial assistance to the livestock and Range programmes in the project area. The assistance was providing a social economist to investigate existing production systems. Further assistance was providing Coordinators for each of the RMA. Other assistance was provided in the form of training for Ministry of Agriculture staff who would replace the project's staff when the project terminated. Capital funding was also provided for the relocation of an existing woolshed and Livestock Improvement Centre (LIC) and for the establishment of other LICs at each RMA.

The MoA and LHDA have also signed a Memorandum of Understanding (MOU) regarding co-operation on the following programme areas within Phase 1A of LHWP. These were 1) animal husbandry and range management project, 2) horticulture and field crops, 3) fisheries, 4) social forestry and 5) land-use planning. Further, LHDA is to provide funding for programmes that the MoA will implement. The MOU has since been revised due to delays in its implementation and new institutional arrangements that include a coordination office, a joint management committee and a steering committee will be put in place for the implementation of the programmes. Under this agreement, the LHDA will ultimately hand over the programmes to the Ministry of Agriculture.

### **Agricultural sector: sustainable farming practices**

To promote sustainable agriculture, two projects aimed at improving agricultural pro-



duction have been implemented. These are Production Through Conservation (PTC) and Soil and Water Conservation and Agro-forestry (SWaCAP) projects. The PTC, in collaboration with Non-Governmental Organizations (NGO) and Community Based Organizations (CBO), provided technical and financial support to the District Agricultural Offices in the southern districts of Lesotho in water conservation, land use planning, rehabilitation of degraded lands and rural income generation. The SWaCAP project was community-driven and was implemented by Extension Service of MoA in the four northern districts of Botha Bothe, Leribe, Berea and Maseru.

Helvetas, an international Swiss NGO with offices in Lesotho in collaboration with various NGOs and CBOs is also presently promoting a number of innovations to promote sustainable farming practices. These innovations are the Machobane Farming System (MFS), use of appropriate Agricultural Implements, Low Cost Irrigation and Development of Seed Varieties (Lekholoane, 2002). If successful, the innovations may significantly contribute to sustainable agricultural production in the country.

The MFS is named after a local farmer who developed the system in order to assist a subsistence farmer to improve production and in so doing assist in alleviating poverty in the country. The system is premised on minimum tillage, the use of local agricultural inputs, inter-cropping, labour intensive year-round production. The faculty of Agriculture at the National University of Lesotho is currently analysing data on the yield potential and actual yield of crop components of the MFS. Although no conclusive scientific evidence is currently available to prove the effectiveness of the MFS many local farmers are already benefiting from the system.

In 2001, two types of farming implements namely, the ripper-tine and hand push rip-

per were manufactured and tested by 32 farmers involved in the MFS in the districts of Mafeteng and Mohale's Hoek with positive results. However, identification of local artisans and entrepreneurs for manufacturing and marketing of the implements have not been successful.

Helvetas facilitates the distribution of low cost drip irrigation to various training centres such as the Taung Skills Centre, Bethel Business Community Development Centre (BBDC) and to individual farmers for testing. The system was found to be effective and appropriate for Lesotho conditions especially where rainfall is variable.

Seed testing is another attempt at ensuring that sustainable farming practices are promoted in Lesotho. A number of NGOs, including Rural Self-help Development Association, GROW, and the Machobane Agricultural Development Foundation (MADF) have been assisted by Helvetas to collect and test different varieties of maize, sorghum and potatoes in different ecological zones in the country. The Faculty of Agriculture at the National University of Lesotho also played an important role in undertaking field research to test and produce potato seed with local farmers in the mountains areas.

Another NGO, which is involved in the promotion of sustainable agriculture in Lesotho and advocates organic farming, is PELUM. The organisation has drafted its action plan and is in the process of finalising the constitution. In February 2002, PELUM convened a national workshop on sustainable agriculture with the aim of reviewing the draft action plan. The workshop among other issues identified chemical handling, seed policy, partnership between NGOs and Government, organic certification and intellectual property rights as some of the main challenges for farmers in Lesotho.



As a means of assessing progress in sustainable farming practices in Lesotho, some indicators and targets for agricultural sector are in the Table 2.5.

**Table 2.5 Agriculture Indicators and Targets for Lesotho (2010)**

Indicator	Benchmark - 1997	Target for 2010
GDP	Average share of GDP 12%	Increase to 20%
Irrigation	600 ha small scale irrigation (MACLR, 1997)	Irrigated 10,000 ha medium scale  Increase irrigation to 1000 ha small scale
Household food security	10% households in commercial intensive livestock production	Increase commercial livestock entrepreneurs by 25%
Dryland crop farming	5% arable land operated by entrepreneurs	Increase to 30%
Extensive livestock farming	Carrying capacity exceeded by 30% MACLR (1997)	Reduce to 15%

Source: MDP (2001) Action Programme for Development of Lesotho

## The HIV-AIDS pandemic

In an effort to address the AIDS pandemic and its associated socio-economic effects, the Government is intensifying its efforts to implement the HIV/AIDS and population policy by ensuring that all citizens have access to information, necessary facilities and services. These strategies are depicted in the National AIDS Strategic Plan (MOH&SW)– a *Three-Year Rolling Plan for the National Response to HIV/AIDS Epidemic in Lesotho 2000/2001 – 2003/2003*.

The objectives of the plan are to 1) ensure effective coordination of programmes, 2) mobilize resources for the programme, 3) strengthen awareness programmes, 4) provide support to the infected and the affected, 5) involve the youth in the programme, 6) reduce high rates of STDs, 7) intensify surveillance of and testing of HIV/AIDS, 8) monitor and periodically evaluate National Action Programmes (NAP) on HIV/AIDS and 9) conduct baseline study and update information on stated strategic aims.

## Deepening democracy

Lack of discipline and political tolerance together with dual system of governance are the main stumbling blocks for good governance in Lesotho. The culture of democratic rule has shallow roots in Lesotho as the country was under undemocratic rule for over two decades. The lack of discipline and political tolerance coupled with the legacy of colonial rule has resulted in a culture of non-tolerance, destructive competition and lack of respect for democratic principles.

One of the main constraints to economic growth in Lesotho during the past decade has



been political instability. During September 1998 the excellent economic performance of the country was reversed, as shown in Fig. 2.30, due to political unrest that caused looting and destruction of property and businesses. Investor confidence also declined drastically as a result of the unfortunate events. The political disturbance of 1998 clearly confirmed that without political stability, sustained economic growth can not be achieved.

Therefore, to address these problems, the Government together with other stakeholders undertook to implement the following response measures:

- Invest more in education for reconciliation and peace and encourage nation-building programmes that would promote political stability and in so doing promote investor confidence;
- Maintain macro-economic stability and fiscal prudence;
- Ensure that donor aid captures long-term inputs required to sustain activities and realize desirable impact. Whilst important agendas are set at international level and Lesotho is a Party to most of them, it should be realized that it lacks resources to implement these programmes such as Agenda 21 and WSSD. Even where projects are funded, such capital expenditures soon have to be translated into recurrent expenditures, which the government is not able to sustain;
- Increase capacity for rigorous and effective project appraisal and management to ensure economic efficiency and realization of development outcomes.
- Influence global economic development policy changes to favour developing countries through economic integration;
- Improve economic efficiency in all sectors and facilitate trade, technology transfer and investment to Lesotho;
- Lobby support for increased capacities for complex policy research.

The impact of current Government policies on the economy is positive and economic growth is expected to improve further. However, political stability is a pre-requisite for

the success of these policies. The productive and economic service sectors are the main drivers of the economy. In order to realize sustainable development and eradicate poverty, substantial improvements in productivity and efficiency in resource use are required especially in productive and service sectors to absorb unemployed masses and those released from public sector through restructuring and natural attrition as well as creating opportunities for expanding the tax base.

Policy formulation and review guidelines and processes should be innovative, participatory and contextual for economic policies to be responsive to the needs of the country. Focus should also be on development projects and programmes that are locally driven.

Political stability and democracy are prerequisites for sustainable development. The SADC member states including Lesotho have in recent years accepted this reality through their commitment towards achieving political stability, which would in turn provide an enabling environment for sustained economic growth in the sub-region.

The country has reviewed the electoral system to make it more inclusive by forming a combined *First past the Post and Proportional representation* so as every person is represented in the national parliament. The fourth democratic elections were held May 2002 and has ushered this new political dispensation. In addition to these measures, the Government of Lesotho has further taken major step to depoliticise and professionalise the security forces for long-term sustenance of law and order in the country.

The Parliament of Lesotho enacted the Local Government Act in 1997 and the Local Government Elections Act 1998 as initial steps towards promoting good governance





through inter alia decentralisation and establishment of local Government. The process of implementation of the Local Government Act has been very slow. This is particularly due to delays in the implementation of the provisions of the Act and the existence of a dual system of Government at local level where there is conflict between the newly established Local Government structures and the traditional regime of Chiefs, which is still prevalent. This problem has had adverse impact on the management and conservation of natural resources nationwide.

To further entrench the principles of democracy, the Government has formulated and is implementing the Public Service Reform Policy with the aim of rationalising the public service so as to reduce excessive cost while improving performance and productivity. In previous years, the public service was highly politicised and therefore lacked discipline and coherence. As a consequence, the public service was bloated and very inefficient.

## Cultural and historical heritage

### *Introduction*

The cultural and historical heritage in Lesotho is unique to the region and provides opportunities and interest for regional and international tourism market and scholarly work. The discussion of the Lesotho cultural and historical heritage will follow a similar pattern as has been established within the previous section, i.e. to state the driving forces, pressures, states and impacts and the responses.

### *Driving forces*



The driving forces that give rise to changes on the state of the Lesotho's cultural and historical heritage are

- 1) **Development Projects/initiatives:** The drive to meet people's basic needs. Developments such as construction/upgrading of roads, supply of water and sanitation, development of agriculture, job creation through industrialisation causes conditions that pose threat to Lesotho cultural and historical heritage. For example, the expansion of industry in the attempt to alleviate poverty and to meet the needs of the people give rise to pollution which sets pressure on natural resources. Rock art sites have either been blasted away in road construction, or covered in soil debris.
- 2) **Education:** The silence of the education curricula and programmes about Lesotho's cultural and historical heritage, limit awareness and knowledge about the heritage.
- 3) **Globalisation:** The rapidly increasing rate of information exchange, trade, communication, mobility, transportation across nation states is associated with potentials for great influences on material conditions and cultures of societies. This process provides opportunities for improvement of livelihoods but may also adversely impact on powerless cultures.



**Table 2.6 Legal Instruments and Special Events as Driving Forces for Environmental Change**

Legal Instrument/Special Event	Brief Description	Year
SADC Tourism Protocol formulated by Member states in Mauritius	-	1998
Stockholm International Conference on Cultural Politices for Development	The UNESCO initiated a meeting that resulted in the establishment of an 'International Network on Cultural Policies' in 1998. Membership is free and open to interested parties.	1998
The 'Draft' SADC Protocol on Culture, Information and Sport	SADC Heads of States and Governments signed the Protocol in 2000 in Malawi. Ratification in Lesotho was to have been done in 2002.	2001
Constitution of Lesotho [section 36]	"Lesotho shall adopt policies designed to protect and enhance the natural and cultural environment of Lesotho for the benefit of both present and future generations..."	1993
World Decade for Cultural Development	Involved members states undertaking projects on cultural development and increasing awareness of the importance of culture for economic and human development	1988-1997

UN International Year for Cultural Heritage	1992 marked the 30th anniversary of the adoption of the World Heritage Convention (1992). Projects and activities aimed at promoting and protecting the world cultural heritage will be undertaken.	2002
The OAU Cultural Charter for Africa	Concerned with the respect of fundamental right of people to practice and enjoy their culture and lives in harmony with their political, economic, social, philosophical and spiritual ideas.	1976
The Protection of the World Cultural and Natual Heritage Convention	The foremost international legal instrument aimed at protecting cultural and natural treasures. Lesotho has not ratified the Convention	1972
The World Heritage Convention	The protocol provides a framework of UNESCO support for member countries to protect their heritage. Lesotho is in the process of ratifying the convention.	1972
The International Copyright Convention	International Convention relative to the protection of literary and artistic work. By UK signature.	1908
World Intellectual Property Organisation	Concerned with copyrights on musical compositions, book writing etc. [Lesotho has not signed the convention].	1986



4) Religion: The dominant religious institutions, of European origin, devalue local belief systems, knowledge and practices. Thus cultural heritage has remained largely on the periphery of formal mainstream knowledge.

Other Driving Forces are international protocols, conventions and special international events that Lesotho is a party to (Table 2.6) since once Governments have signed and ratified the instruments, they are obliged to live by the spirit of the convention, protocol or special international event.

### *Pressures*

The changes in cultural and historical heritage are exerted by many and varied pressures but important amongst which are the 1) urban and population growth due to aligned industrialization, 2) lack of awareness of the inhabitants of the country upon the cultural and historical heritage and 3) the development projects and initiatives.

**Urbanisation and Population Growth:** More often urbanization and population growth follow industrial development. Development initiatives and more especially industrialisation, driven by the need to meet people's basic needs, give rise to landscape modification due to construction of buildings, roads and other infrastructure. Often these developments result in the demolition of buildings of historic significance and destruction of the biophysical environment. Expansion of settlement in urban centres to accommodate growing population results in loss of endemic plants and animals and other valuable natural resources.

**Lack of Awareness:** A report by Chakela (1997) indicated that school pupils in Lesotho

know very little about Lesotho's cultural heritage. It is therefore indicative that people in Lesotho may unknowingly be creating pressure on cultural and historical heritage of Lesotho, as people who may not be aware of, or are not knowledgeable about their cultural and historical heritage are likely not to value and protect it. Also contributing to this condition is lack of developed national cultural infrastructure such as national museums, national art gallery and national archives.

**Development projects/initiatives:** The assumptions underpinning development initiatives often disregard the value of local knowledge and often times their orientation often threaten and destroy the cultural heritage of the people whose livelihoods they are intending to improve (Quilan, 1995). Similarly, development initiatives that are not informed in respect of cultural and historical heritage of Lesotho, such as construction of buildings and roads, are likely to destroy that heritage. There are reported examples where road constructions and upgrading have destroyed or put under pressure important cultural and historical heritage of Lesotho. These include rock art sites that either have been blasted away or covered in soil at the dumping sites.

### *State and impact-trends*

The state and impacts of the Lesotho cultural and historical heritage are discussed in respect of 1) the palaeontological resources which are the remains and prints of animals that died thousands of years ago, 2) archaeological resources which are the buried remains of humans who lived many thousands of years ago and their artefacts such as tools, 3) ancient rock paintings, 4) historic buildings, 5) historic sites, 6) museums and archives, 7) nature reserves, 8) traditional environmental knowledge and 9) Arts in the country.



## Palaeontology

Palaeontological discoveries in Lesotho have drawn the world's attention and made an important contribution to the understanding of the past forms of life (Ambrose, 1991). The first recorded fossil footprints in sub-Saharan Africa were discovered at Morija in the 1880s. Many more palaeontological findings that were considered to be significant asserts in Lesotho were later discovered. They include discovery of *Tritylodon* a mammal-like reptile which is a fossil that was considered as the worlds earliest 'mammal' for more than fifty years, *Lesothosaurus* which is a dinosaur of about a meter long, *Megazostrodon* which is about 13 cm in length and is generally considered as the world's earliest mammal and *Erythrotherium* which is one of the earliest known mammals (Ambrose, 1991).

Further discoveries were made during the Lesotho Highlands Water Project's operations to rescue valuable resources from damage by project activities. Palaeontological surveys discover some fossils. These include excavations of plant remains from the road construction survey of *Maseru By-pass* in 1997 (Prasad, 1998).

The drawbacks to the development of palaeontology have been cited by Chakela (1997) as 1) lack of National Museum to facilitate the exploration and storage of fossils, 2) although the Ministry of Tourism, Environment and Culture has formulated tourism plans to palaeontological sites, such as the one at Moyeni, these sites are underutilized and 3) the school curricula do not reflect any content on Lesotho's fossils. Fossil sites in Lesotho are better known to school pupils outside Lesotho, more especially from Europe and America (Ambrose 1991). There are presently no plans to include palaeontology content into the school curricula. Furthermore, there is no framework for train-

ing locals in palaeontology. It is expected that the recent signing of cooperation, in 2002, between the Government of Lesotho and the South African Government will enable increased interaction between Palaeontologists from S.A. and Lesotho and promote training and research in the field. Since external researchers coming to do palaeontology related work are presently not legally bound to provide the Ministry of Tourism, Environment and Culture with their research findings, their studies often remain unknown locally.

## Archaeology

Similar to palaeontology, archaeology has a great potential in Lesotho but has not been explored adequately. There are many archaeological sites in Lesotho, but there has not been any locally initiated excavations. Excavations have however been carried out by researchers from South Africa and the United Kingdom as there is lack of capacity to undertake archaeological surveys in the country. In 1997 there was only one professional in Lesotho trained in archaeology. Formal excavation work may be traced back to the 1960s, during the colonial rule. Presently, discoveries include the large rock shelters at Sehonghong which was inhabited for over 50,000 years. The diggings uncovered stone age and iron age implements.

The LHDA rescue operations have initiated some archaeological excavations. They include, archaeological excavation at a rock-shelter in 'Muela in 1993, and within the Senqunyane river catchment, at Lithakong rock shelter, in 1995 where some stone tools, animal remains, bone tools, pottery and other material were found (Kaplan, 1993, 1996). The material is in Cape Town where it was analysed. A variety of artefacts, dating from the later Stone and Iron Ages, have also been excavated at Hololo



Valley at the Hololo Crossing rock-shelter in 1990 (Kaplan, 1992). The findings added to archaeological records of Lesotho and are kept at the University of Cape Town where they were analysed. The artefacts will be transferred to Lesotho when appropriate storage facilities have been developed.

The shortcomings inhibiting the development of archaeology in Lesotho are 1) lack of a National Museum for exhibition of findings, 2) lack of local professional archaeologist in the country, 3) lack of archaeological content in the school curricula. For example, the history syllabuses cover about 200 years of Lesotho's history but are silent about the 100,000 years of human inhabitation.

### Rock paintings

The San (*Baroa*) people once inhabited Lesotho and have left an extremely rich rock art heritage. The paintings they made on rocks and cave walls reflect the ancient environment and their beliefs. The total number of rock painting sites is estimated at 3,000 throughout Lesotho but is diminishing as a result of natural processes and vandalism. There is much diversity in the San rock paintings but many showed animals that have now disappeared from Lesotho such as lions, hippopotamus, baboons, bush pigs, ostriches, elands and many kinds of antelopes. The paintings that reflect aspects of the religion of *Baroa* have also been identified (Lewis-Williams, 1981). The first rock paintings to be copied and published in Southern Africa were recorded in Lesotho (Orpen, 1874).

The Lesotho Highlands Water Project rescue operation has conserved a number of painted rocks that would have been inundated by the impounding of the dam. The sal-

vage programme recovered painted panels or rocks from the sites affected by the project at Muela rock-shelter for storage and curation (e.g. Loubser, 1993). Liphofung project, phofung meaning 'Place of the eland', has undertaken to protect Bushman paintings at the site. Liphofung is located in the base of a tributary of the Hololo River in the Lesotho highlands. The place has been developed into a tourist site. The development of Liphofung involves construction of a Basotho village, Rock Art interpretation centre, protection of paintings and archaeological deposits.

Preservation of the rock art in Lesotho is limited by 1) lack of museum facilities and a functioning national archives to keep and display the findings and 2) lack of protective measures against natural processes and vandalism. However, the Ministry of Tourism, Environment and Culture is developing strategies to protect Rock Painting sites. Furthermore, the Ministry is engaged in making regular visits to such sites and to raise awareness among communities of the adjacent sites. The Ministry is also compiling a list of rock painting sites.

Most of the Ministry's activities are at Ha Baroana, where there are organised visits to the caves and the community participates in the management and protection of the paintings. Other developments have been undertaken at Ha Baroana to enhance its tourism potential. The Ha Baroana site has a nature reserve and cave rock paintings. A bridge and a 4kms road from Ha Matela to Ha Baroana have been established to enable easy access to the site. Offices for caretakers and structures for a site museum have been built, though the latter is not yet functioning.

### Historic buildings



Historical buildings are old buildings associated with certain significant historical developments in the country. They are located mainly in district headquarters or towns, villages of former principal chiefs Christian missionary stations. Whilst many of these buildings have been lost and many are threatened, there are some that are still intact.

The problems of preserving the integrity of the historical building are many but the most important ones have been identified as firstly, minimal attention is given to buildings of historical importance as only three historic buildings are legally protected. These are the *Major Bell's Tower* at Hlotse, the remains of a Fort at *Fort Hartley* in Quthing District and the Christian *Mission Cave House* at Masitise.

The latest report indicates that the *Major Bell's Tower* has now been affected by the elements and neglect (*Molibeli 2002, Pers.Comm.*). Secondly, many buildings of historic significance have been or are being lost. These are mainly Church buildings and District Administration buildings in Major towns. Many of these historical buildings have been lost through developments.

The existing development framework does not provide for the Ministry of Tourism, Environment and Culture to be informed or consulted when construction of roads or buildings that would affect the buildings of historic importance is being undertaken. Thirdly, there is no National Museum to guide activities needed to preserve the historical buildings.

An abbreviated inventory of historic buildings was undertaken in 1987 and since then none has been undertaken. Therefore, there is a need for an inventory or systematic

listing of historic buildings for purposes of preservation in Lesotho. The official listing was last done in 1969 and has not been updated since (see Legal Notice No.36).

### Historic sites – proclaimed national monuments

Historic sites are important places in the history of Basotho. The importance of these places has let them to be proclaimed as National Monuments in terms of the Proclamation of Monuments, Relics, Fauna and Flora Legal Notice No.36 of 1969. The sites may include archaeological and rock art sites, group of buildings, fortresses and battlefields.

There are presently nine legally proclaimed monuments. They are 1) the rock Painting site at Ha Khotso in Maseru District, 2) the deposits of petrified wood on the top of the slopes of Thaba-Tsoeu in the Mohale's Hoek District, 3) the fossil bed and fossil footprints site of Maphut\_eng in the Mohale's Hoek District, 4) the fossil footprint site at Moyeni in the Quthing District, 5) the nature reserve archaeological site and cave house of Masitise Seqhobong in the Quthing District, 6) the top of Thaba-Bosiu Fortress in the Maseru District, 7) Major Bell's Tower at Hlotse in the Leribe District, 8) the remains of the Fort at Fort Hartley in the Quthing District and 9) the top of the Mount Moorosi Fortress in the Quthing District (Protection and Preservation Commission, 1983). The Dutch inscription, dating 1868, on the summit of Qeme is a historic site but it is neither legally protected nor officially recognised.

The listing of historic sites was last made in 1969. However, more information on possible historic sites is being compiled by the Ministry of Tourism, Environment and Culture. Compilation of information would also include an evaluation of existing and





officially proclaimed sites for protection and suitability as National Monuments.

## Museums and archives

Lesotho is one of the three African Countries without a working National Museum. Museum development has been undertaken by a mission-promoted enterprise at Morija, where attractive small displays are both for visitors and schools. The situation for archives is a little better, thanks to pre-independence efforts by the colonial administration to keep records satisfactorily. In any-event, their keeping is now wanting as their access and updating are no longer undertaken. A well functioning National Museum and National Archives are required. A national Museum should work hand in glove with the national archives and must participate in the work of the national Monuments Commission. In their present form these facilities are neither able to protect and promote Lesotho's cultural heritage nor compile existing information into a National Museum and Archives system. A lot of valuable data from Lesotho is still found outside Lesotho due to lack of a National Museum and functioning Archives.

The problems faced by the Museum and Archives facilities are many and varied but the following represent an abbreviated compilation of these problems. First, temporary 'museum' quarters, situated in the Ministry of Tourism Environment and Culture, are presently used to store items intended for display. The Ministry of Tourism, Environment and Culture has developed a proposal for building of the National Museum in Maseru city, but its implementation has not occurred due to lack of finances. Second, the Museums Act of 1967 does not provide for any direct financial support from Government for the operation of the museum. Third, the national archives are not well functioning. The archives were transferred from NUL in 1997 to Maseru, where they

were reported to be inaccessible (Chakela, 1997). Presently the archives are in the Department of Culture and plans are to move them to the National Library in Maseru where they will receive more efficient storage and management. Funding for the construction of the National Museum and Archives as well as the National Library has been sourced from the People's Republic of China.

## National parks/nature reserves

National Parks and nature reserves are sites where natural heritage of the country can be preserved in-situ. Nature reserves have enhanced the protection to aspects of Basotho natural heritage in terms of conservation of biodiversity and the Basotho cultural heritage in terms of traditional knowledge in medicinal plants and animals. Several sites have been proposed for inclusion as nature reserves and national parks but the following have received official recognition.

- *Sehlabathebe National Park*. It was proclaimed a "Wild-life Sanctuary and National park" and therefore a protected Area on 27th February, 1970 (NES, 2000). It is situated in Qacha's Nek, has an area of 6, 475 hectares and lies at an altitude between 2, 300 and 2, 500 meters above sea level. It has subsequently been established that the Part contains several important rock art (archaeological) sites.
- *Masitise Nature reserve*. This also included an archaeological site and historic mission cave house. It is proclaimed a National Monument in Outhing District. It is a small reserve of about 20 ha, 3 ha of which is thickly wooded.
- *National University of Lesotho (Roma Campus)*. It was declared a bird sanctuary by



the council of the University on 3rd April 1965. It has an area of about 95 ha and is situated in Highveld Grassland Zone, but the area has been modified by introduction of exotic trees and creation of water areas.

There are other initiatives to include some areas of biodiversity importance into the national listing of officially declared national parks and nature reserves. The two initiatives are along the border with South Africa. The first of these is the Maloti Drakensberg Area and the second is the wetland area in southern Lesotho.

- The Maloti-Drakensberg Transfrontier Conservation and Development area Programme is a World Bank financed Project intended to put measures in place for the conservation of the Biodiversity values of the Maloti Drakensberg area as well as development of the peoples of the adjacent areas along the border between Lesotho and South Africa. The programme is a joint initiative of the Governments of Lesotho and the Republic of South Africa. It is a transboundary conservation and development programme aimed at amongst others, establishing protected areas while promoting sustainable tourism in the Maloti Drakensberg mountains.

- Letseng-la-letsie Protected Area is a wetland area in Southern Lesotho. The current efforts are to engage support to enable declaration of the area as a protected site. Financial support for the initiative is through the Conserving Mountain Biodiversity in Southern Lesotho project. The project is financed by Global Environment Facility (GEF) and is implemented by the United Nations Development (UNDP). The National University of Lesotho has undertaken a comprehensive Environment Impact Assessment for the establishment of a protected area at Leteng-la-Letsie.

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As part of the strategy to conserve the environment around the Malibamat\_o river at Katse the Lesotho Highlands Water Project established three protected areas.

- The *Bokong Nature Reserve* is about 1970 hectares and lies between 2, 600 and 3, 200 meters above sea level (m.a.s.l.). It is essentially a sub-alpine grassland with a number of endemic animals and plants species. The numerous endemic wetlands characterising the highlands region support the perennial nature of the mountain streams. The nature reserve has a visitor centre, a bird watching, distinct wetland areas with characteristic vallyhead fens and a lepaqoa waterfall.

- The *Tsehlanyane National Park* is over 5, 600 hectares covers a range of altitudes from 1, 600 to 3, 000m.a.s.l. It is very rugged, with sharp mountains crests and deeply incised ravines. The plant species within the park include one of the few indigenous Leucosidea woodlands in Lesotho that are well preserved there than anywhere else in the country. Activities and facilities include, bird watching, small game viewing, crafts, swimming in the streams and picnic sites.

- *Liphofung Reserve* is 4 hectares in size and has a cave area which was inhabited by the San and other Stone Age people some 150 years ago. It also has a historical importance in that the founder of the Basotho nation, King Moshoeshoe I, used it. It has been created mainly for its historical importance, but has its own distinctive fauna and flora. Rock art and rich archaeological deposit of stone age implements are found in the cave. Activities and facilities provided include bird watching, rock art lectures and pony rides.

- *Muela Nature Reserve* is 45 ha around 'Muela reservoir and is being developed as a



Nature Reserve. The current plans are to fence it and create a miniature zoo with indigenous plants and animals both terrestrial and aquatic species. This may include reintroduction of species now extinct in Lesotho but still found elsewhere.

LHDA engaged the services of Earthplan consultants to develop the three sites in terms of planning, design, implementation and management for five years. Local communities were engaged in the development of the reserves and the associated eco-tourism facilities. The project also drew on the communities' natural resources related indigenous knowledge. The local communities benefit directly and indirectly from the protected areas in many ways and including 1) employment opportunities during the development and during the subsequent operational stages of the reserves, 2) entrepreneurial and business opportunities within park management and the tourism market and 3) sustainable resource management and use, providing for improved environmental conditions.

**Other Conservation Areas include the following:**

- A small botanical garden has been established at Katse, although it does not yet have formal protection. There are also proposals to establish a botanical garden in Maseru in the area formerly occupied by the racecourse.
- Range Management Areas (RMAs) specifically designated in the mountain rangelands in which rights to graze one's livestock have been restricted by the chief to a specific group of livestock owners who have formed themselves into a Grazing Association (GA).

- Forest Reserves and Plantation Areas are Government-owned plantations on non-arable land which have been specifically set aside for the establishment and sustainable management of exotic tree plantations. They derive from the Lesotho Woodlot Project, which was set up in 1973. The total area planted to trees was reported by Maile (1999) to be more than 7 000 ha and tree types are mainly pines and eucalypts in the Lowlands and Foothills of Lesotho and few areas in the Maloti.

- Restricted Access Areas (RAAs) are Military Bases and Training Areas, the fenced area of the Letseng-la-Terae Mine, and the Moshoeshoe 1 International Airport. These RAAs have the ability to conserve biodiversity as they limit access to the general public who would otherwise utilize the resources within these areas had they not been fenced off. In so doing they have removed the pressures on biological resources that the public and to domestic animals would have on the flora and fauna within them.

- Agricultural Research Station shares a common site of about 230 ha on the outskirts of central Maseru with the Lesotho Agricultural College. This site may also be considered as a Managed Resource Area.

**Indigenous knowledge systems**

The knowledge that people have acquired and developed for many years through their interaction with the environment is important in interpreting the state on the natural environment. People use the environment for many and varied ways for the sustenance of their livelihoods. Consequently, there is ample evidence that Basotho have a rich knowledge of their environment and environmental components. Their knowledge in of the environment is embodied in their language - Sesotho, on environmental man-



agement and medicinal and food plants.

#### *Traditional management/conservation systems*

Studies need to be undertaken to explore traditional knowledge systems that could meaningfully contribute towards management and conservation of the environment. An example of such knowledge would include the *Maboella* regime, a communal system governing access to rangeland resources to effectively regulate the use of rangelands: certain areas under the control of chiefs and headmen are set aside as reserved grazing areas. Maboella also include set aside areas for the production of thatch grass, particularly *hyparrhenia hirta* (*mohlomo*).

After the grass has been harvested, the area can be declared open to grazing again. A tree known as '*makatlala*, meaning 'the cause of famine' (*Heteromorpha arborescens*), is said to cause famine when used as firewood. The species can look quite attractive in Autumn when the stem and branches peel off, leaving a shiny appearance and could be conserved for aesthetic purposes. The effectiveness of this and similar knowledge forms needs to be explored.

#### *Medicinal and food plants*

Over 70 species of wild plants are edible (Prasad et al, 1993) and about 400 species have some medicinal value (Jacot-Guillardmod, 1971). Table 2.7 presents medicinal uses of plants in Lesotho and the proportion of the total useful flora.

Maliehe (1997) has also published a book on medicinal plants of Lesotho entitled

**Table 2.7 Medicinal Uses of Lesotho Flora**

Uses/Treatment	% of the total useful flora
Digestive System/Genito-Urinary System	5.0
Central Nervous System	4.0
Infections	3.6
Problems affecting Nutrition and Metabolism	10.7
Respiratory System	2.0
Cardiovascular ailment	2.0
Dermatological disorders	2.0
Ophthalmic problems	2.6
Antidote to snake poison	2.6
Ear, Nose and Oropharynx problems	2.0
Charm	2.0
Others (Genetic disorders, contraceptive agents and pesticides)	35.0
Other conditions (fire, huts etc)	2.6



*Medicinal Plants and Herbs of Lesotho*. The book gives descriptions of some 60 species plant species.

Africa (Cunningham, 1988) largely contributes to their over-harvest and loss. Both the medicinal and food plants have limited recognition within formal structures, and this contributes to their loss. For example the marginalisation of the traditional medical practice from the mainstream of the formal health delivery system, has left the practice

The commercialisation of the medicinal plants, and their exploitative export to South

**Table 2.8 Some projects/activities to address marginalisation of traditional practitioners**

Activity	Focus of Project/Training	Date
Training workshop for Traditional Medical Practitioners (TMP) organised by LHDA	Conservation of medicinal plants	1994
Training workshop for Traditional Medical Practitioners organised by NES	Conservation of medicinal plants	1999
Participation of Traditional Medical Practitioners in the Fight against HIV/AIDS in Lesotho. Project Funded by Bristol-Myers, US.	Education on AIDS and exploration of herbs for its treatment. Establishment of centres for coordinated selling of medicines and health-care centres	2002



and the associated harvest of medicinal plants outside Government development plans. Traditional medical practitioners have however undertaken some collaborative activities to remedy this problem of marginalization (Table 2.8).

## Arts

The Performing Arts, Visual Arts, Literary Arts and Ethnographic Arts constitute an important cultural heritage in Lesotho. The state of arts in Lesotho may be understood in terms of the role played by the public and private sector and by the community-based informal groups.

### Public and private sector

Some aspects of art are taught at the primary school curricula, the teacher training college and the National University of Lesotho. The Lesotho Academy of Arts institution, established in 1993, offers extra-curricula art courses to students enrolled in the institution for secondary education. Much of the support for non-formal art initiatives have been supported by the business community and foreign organisations.

The annual *Morija Arts and Cultural Festival* signifies an important large-scale initiative in the promotion of the Basotho culture for economic development. The festival has received much support from both the government and the private sector, and has drawn many participants locally and abroad. There is also evidence of a rich culture of music and dance, often displayed as free entertainment on special occasions such as official rallies and feasts; such heritage proffers opportunities for economic development that have not yet been fully exploited commercially.

### Associations and Community-based informal groups

There are several registered art associations and numerous informal groups distributed throughout the country, many of which are committed to performing arts such as music, drama and dance. Some associations, such as Southern African Theatre Initiatives-Lesotho Chapter are linked to regional art development initiatives. Studies have been undertaken to establish the number of Art Associations in Lesotho and they include studies supported by the British Council and Lesotho Manufacturers Association. Helvetas also funded a study - *A Situational Analysis of the State of Arts in Lesotho*, and it explored the formation of the umbrella body or council for the associations for an effective coordination of artwork in the country. There is presently no policy guiding the development of art in Lesotho and the Ministry of Tourism, Environment and Culture is in the process of developing a national policy.

### Cultural heritage and tourism

Lesotho has a wealth of cultural and historical heritage of great value and international attraction. In order to promote the heritage for tourism and economic development (eco-tourism) the Ministry of Tourism, Environment and Culture has abolished the Lesotho Tourism Board (LTB) and replaced with a supposedly more efficient and demand-driven Lesotho Tourism Development Corporation (LTDC). The legal instrument establishing this change has been enacted and has been operative since September, 2002.

The Lesotho Tourism Development Corporation is semi-autonomous and will, among others, undertake to develop and market tourism in Lesotho and further promote invest-



## 2.9 Some Significant Projects by the Department of Tourism

Project Title	Brief Description	Status	Date of Impelementation
Thaba-Bosiu Cultural Village Project	Protection and presentation of the Basatho traditional culture through the establishment of cultural village, straw hut, Moshoeshoe I statue, museum, botanical garden, arena, lodge and environment protection.	Project is in Progress; but funding not available	2000
Qeme Flora and Fauna Plateau Project	Conservation of endemic flora and fauna; introduction of a variety of species; creation of jobs for the residents of Qeme	Project is in Progress; but funding not available	2000
Maluti Tourism Forum	A cooperative joint venture between Lesotho, Eastern Cape and Free State to promote development and marketing of tourism along the Maloti route	Project is in Progress; but funding limited on the Lesotho side.	2000
Mahlasela Skiing Report in Butha-Buthe	Project to attract skiing enthusiasts worldwide and provide jobs for Basotho	Project is in Progress	2002
Mohale High Altitude Sports Centre	Development of Mohale into world class sports centre and provide economic benefits to local communities e.g. handicrafts, pony- trekking	Has high Government support and funding is available	Not yet started
Ha Ramokhosi Picnic Spot Project	Preservation of the natural environment and construction of amenities for outdoor activities and attraction of tourists; creation of employment opportunities for local communities	Project is in Progress - phase 1 complete	1999
Morija Cultural Festival	Projected Coordinated by the Morija Museum in collaboration with the Ministry of Culture, Sports and Tourism. The Ministry provides financial assistance towards the event	Annual Event	Began in 1999





ment in tourism in Lesotho. The Department of Tourism has undertaken a number of projects in the attempt to promote tourism for economic development (Table 2.9).

### ***Reponses: legal frameworks and policies***

A multitude of statutes exist in Lesotho governing natural resource management and the specific environmental components. They range from the basic law – the Lesotho Constitution – to simple regulations. These rules and regulations are scattered and characterized by a considerable degree of overlap and inconsistency. In most instances, the laws and regulations are sectoral in nature and therefore present problems of enforcement. The following list of laws has been promulgated but they lack a considerable degree of enforcement.

#### ***The Historic Monument Relics, Flora and Fauna Act 41 of 1967***

The Act provides for the preservation and protection of natural and historical monuments, relics, antiques, fauna and flora and for related matters. The Act also provides for the establishment of an administrative body responsible for the preservation and protection of cultural artefacts. This is the Commission for preservation of Natural and Historical Monuments, Relics and Antiques or the Protection of Fauna and Flora and sometimes commonly known Protection and Preservation Commission (PPC).

#### ***Museums Act, No. 41 of 1967***

The Act provides for the custody, care and control of tangible cultural materials. The Board of Trustees is to run the national museums on behalf of Government. The three

statutory bodies; The Board of Trustees of the National Museum, the Archives Commission and the Protection and Preservation Commission have not been gazetted and since 1993 they have been dysfunctional. The legislation governing the three organizations needs to be reviewed as there are overlapping responsibilities. Funding to make them operational has not been done. The Protection and Preservation Commission has legal responsibility for national monuments, relics and antiques and has been receiving Government subvention annually.

#### ***Archives Act, No.1967***

The Act provides for the custody, care and control of public Archives and established the administrative body – the Archives Commission. However, the Archives Commission does not receive a Government financial support.

#### ***The Constitution of Lesotho***

The constitution of Lesotho 1993, Section 36, stipulates that Lesotho shall adopt policies designed to protect and embrace the natural and cultural environment of Lesotho for the benefit of present and future generations and shall endeavour to assure all citizens a sound and safe environment adequate for their health and well being.

#### ***National Tourism Policy***

The Government of Lesotho through the Ministry of Tourism, Environment and Culture formulated a National Tourism Policy in 2000, in order to maximise the tourism industry's contribution to the economy while ensuring that the cultural heritage and natural



environment are preserved and protected (2000).

The National Tourism Policy states that Lesotho has a wealth of cultural and historical resources. These are varied and have great national value and international tourism appeal. The protection of these assets for the nation, the children of the future, as well as tourism purposes is absolutely critical and shall be paid immediate attention if they are not to be degraded or destroyed. Their protection as drivers for socio-economic development needs to be explored and developed in the most sustainable manner possible (2000).

The approach to sustainable development of tourism is planned to be based on partnership among the private sector, local communities and the government of Lesotho.

#### *National culture policy framework*

The policy development process is complete and at the time of writing of the book the policy framework was due to be tabled before Cabinet for adoption as an official working document for the Lesotho Government. The document will guide development of sector specific policies within the department of culture.

#### **A bill on traditional medical practice**

The efforts of traditional medical practitioners to organise themselves began in the 1960s and several associations have been established. The formation of the Lesotho Traditional and Medical Practitioners Council (LTMPC) and the council's submission of a bill to Parliament that calls for them to unite and be under one body.

The bill, when enacted will repeal the No.17 Act of 1978 – the Lesotho Universal Medicine Men and Herbalists. Among others, the bill proposed a controlled harvesting and conservation of medical plants and the establishment of a system of quality assurance in traditional medical practice □







# 3

## Land use and management

The Basotho way of life is underpinned by the principle and an understanding that all land and natural resources are strictly communal; i.e. Land belongs to the nation (*mobu ke oa Sechaba*) and it is the inalienable right of every Mosotho to have access to land, water, pasture, woodland and wildlife. This notion, characteristic of the tragedy of the commons, has serious implications in respect of land and land resources use and management. In most instances proper management and sustainable use of resources is a foreign metaphor to most Basotho. Consequently, land and land resources are under a serious threat. Serious interventions have been undertaken by the Government to foster attitudes of better and appropriate land management, but with limited success.

The Government has introduced a series of interventions to try and arrest the misuse of the land resources. These interventions however had mixed results (Chakela, ed. 1999) as a few of them achieved their intended objectives whereas the majority of them failed to achieve their objectives. Land resources management have been characterised by constraints such as fragmented efforts, lack of clear framework for land use planning, absence of security of tenure, declining traditional authority and mixed rule of law between Government institutions and traditional authorities (Mokuku, 2002). These dynamic factors have resulted in bad land use practices, such as encroachment on agricultural land by residential settlements, encroachment on steep slopes and marginal lands by crop farmers, uncontrolled mining and road construction in other environmentally sensitive areas of the country such as wetlands.

This chapter considers factors, which affect land use and its management and in particular, it focuses on land use planning, mining and transport industry. The discussions on each of the subjects are contextualized along the DPSIR model.

### Land use planning

#### Driving forces

Population growth and the rapid rural-urban migration in search of opportunities increase urban and peri-urban population density in Lesotho. Usually these are factors which impose stress on natural resources by increasing demand on land for various uses and it generates fierce competitions among users (Chakela, ed. 1999). Population trends and rates of urbanisation are discussed in detail Chapter 2.0 - Socio-economic and Cultural Environment. However, some aspects of the socio-economic factors as driving forces in land use and management are discussed here to lend further credence to the impact of people and their belongings on the land environment.

Increased livestock production has also affected rangelands tremendously. In 1999, the rangelands of Lesotho supported 540,000 cattle, 87,000 horses, 168,000 donkeys, 860,000 sheep and 626,000 goats (Sechaba, 2000). Although the livestock numbers are regularly reduced by high stock theft, they are still too high to be adequately supported by the rangelands. The quality of the rangelands is also affected by varying cli-



matic conditions such as drought, diminishing rangeland areas and accelerated soil erosion. Poor management of rangelands has also affected the functionality of the wetlands.

Wetlands are composed of catchments which by virtue of their integrated value for flood control, water storage, stream flow regulation, drought relief, soil erosion protection, wildlife sustainability and potential recreational areas for people offer substantial biological and hydrological advantages to catchments that will have subsequent benefit to society. In Lesotho, as in most parts of the world, demographic growth, poverty and economic stress have combined to exert pressure upon the renewable natural resources such as wetlands (Chakela, ed. 1999).

## Pressures

There are two main pressures resulting from land use planning in Lesotho, namely, rate of soil erosion and rate of encroachment of settlements into arable land in Lesotho. The problem of soil erosion has been addressed by embarking on several efforts, which mainly emphasized on terracing, contours, silt-traps, diversions and waterways in the past. The current approach emphasizes biological conservation with strong mobilization of community participation as the best option. The latter is solicited by trying to marry production with conservation and environmental management, with acceptable and affordable techniques (GOL, 2000). However, incised gullies and badlands still remain as eyesore in the lowlands of Lesotho (Plate 3.1).

Plate 3.1 Soil erosion on dynamic wetland system at Jorotane cathment



Soil erosion in Lesotho is very extensive as gullies are found in every ecosystem throughout the country. Many studies on the extent of soil erosion have been undertaken in the country and a detailed discussion of such studies is given Box 3 and Figures 3.1 and 3.2.

## State and impacts: trends

The importance of soil as a resource is derived from the fact that more than 80 % of the population in Lesotho meet part or their entire livelihood from agricultural activities (GOL, 1994; MNR, 2000). The 9 % of the country's arable land has made farmland



scarce and most families are landless. The suitability of most soils for agricultural production has been affected by topography, variable rainfall intensity, animal and human pressure for settlements. These factors have combined to expose the country to severe forms of soil erosion.

#### *Current land use*

Table 3.1 gives a comparison between population densities for the entire country and densities on arable land. Clearly, the overall human population densities are increasing rapidly. The most rapid increase is experienced on arable land, which is being used for human settlements, particularly in the Lowlands. Cropland currently constitutes 24.7% of the total land area (Table 3.2). However, this is expected to decrease if the current trend of human settlements on arable land is not controlled.



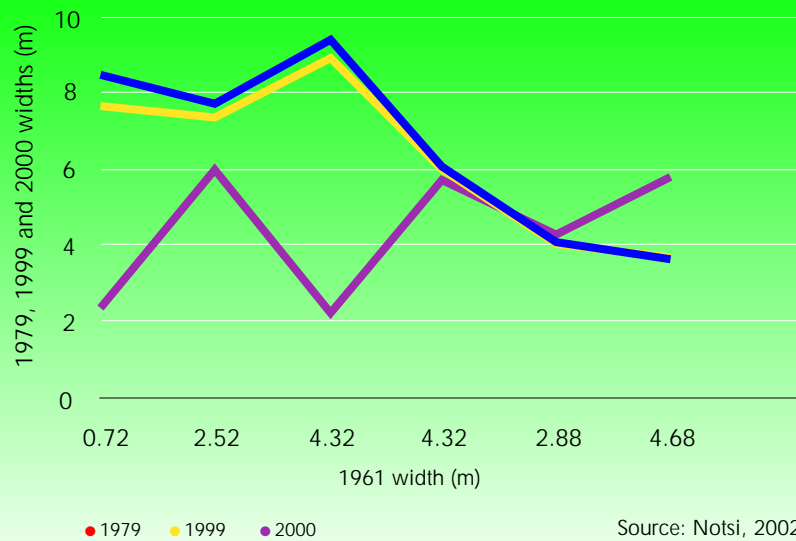
**Box 3.1 Soil erosion studies at St. Michael's**

Recent studies made by students and staff at the National University of Lesotho reveal varying rates of soil erosion, particularly gully formation in spite of conservation measures put in place to address the loss of soil these conservation measures include tree plantations as means of stabilizing the soil and reducing raindrop impact. In this study, gully widths and

gully lengths were interpreted on aerial photographs of 1961, 1979 and 1999 and field measurement were made in 2000. The width and lengths of gullies have increased in spite of biological conservation measures of tree planting trees (Fig. 3.1 and Fig. 3.2).

Although there is variation in widths and lengths of these features from point to point, a clear incremental trend is observable.

**Figure 3.1 Gully widths at Maliele on South facing slope from 1961 to 2000**



**Figure 3.2 Lengths of gullies at Maliele on South facing slope from 1961**

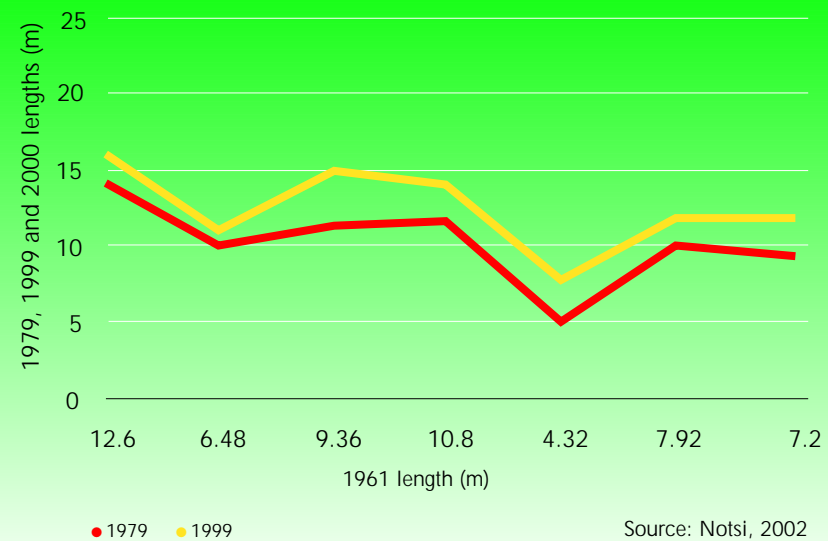




Table 3.1 Population density per Km<sup>2</sup>

Year	Number of people/ Km <sup>2</sup> (Total area)	Number of people/ Km <sup>2</sup> (on arable land)
1976	40	306
1986	53	569
1996	61	588
1998	68	750
1999	69	769
2000	71	785

Source: Lesotho Population Data Sheet, 2000

The soil series of Lesotho as compiled by Carrol, et.al. (1979) and Curley (1986) has been grouped according to their productivity potential during the National Resources Inventory (NRI) in 1988 (Chakela, 1997). This inventory identified 36 soil series and grouped them into five productive groups (Table 3.3).

In order to address the problems and minimize pressures imposed on land by natural and man made activities, the Government of Lesotho with other stakeholders has

Table 3.2 Land cover/use in Lesotho

Land use category	Cover	
	1998 (ha)	% of total
Crop land	745, 002	24.7
Range	1,981,896	64.8
Forest	12,118	0.4
Rock	103,798	3.4
Gullied	59,572	1.9
Villages	98,802	3.2
Roads	12,118	0.4
Water	33,179	1.1
Other	1,581	0.1
<b>Total</b>	<b>3,057,066</b>	<b>100,0</b>

Source: Chakela, 1997



embarked on devising and adopting an integrated approach in land use and resource management. The measures include rehabilitation of degraded lands, development of land resources and production with conservation utilizing affordable techniques based on participatory approaches (Mokuku 2002, Agric Conservation 2000).

Government is also currently in the process of rationalizing institutional arrangements of land related agencies by transferring the Deeds Registry Office from the Ministry of Justice, and Land use Planning Division (LUP) from Ministry of Agriculture and intergrading them with Department of Land, Survey and Physical Planning (LSPP) of the Ministry of Local Government (Mokuku 2002). A visible indication of collaborative effort between LUP and LSPP is the recent joint preparation of plans, which drew a clear demarcation between different land use patterns. The land policies also encourage sound natural resource management. Illegal and uncontrolled settlements are being discouraged as part of the implementation of the strategies.

The functions and responsibilities of LSPP and LUP are similar and thus why a merger was suggested. LSPP is to provide appropriate technical and professional advice to all stakeholders namely, Government, Local Authorities, local communities, the private sector, NGOs and CBOs on sustainable locations of social, economic and environmental activities in urban and rural areas of the country. On the other hand LUP is charged with responsibility to inscribe and raise awareness in all stakeholders, environmentally sustainable management of land based resources for the betterment of rural communities by providing a spatial context for multi-sectoral planning at community, district and national levels.

LSPP has finalised the National Settlement Policy and district physical plans have been

**Table 3.3 Soil resources of Lesotho by productivity group**

Productivity group	Coverage (%)	Representative soil series
Group 1: Most productive soils	1.1	Nkau, Khabo
Group 2: Very productive soils	11.7	Fusi, Machache, Qalo, Sefikeng, Sofonia, Kubu, Leribe, Tumo
Group 3: Moderately productive soils	25.5	Tsenola, Maliele, Matsana, Matsana Warm Phase, Berea, Caledon, Sani, Lekhalong, Matsaba, Thabana
Group 4: Moderately productive soils with careful management	50.2	Popa, Majara, Matela, Phechela, Phechela Cool Phase, Qalaheng, Kolo, Tsiki, Ralebese, Hololo
Group 5: Soils productive via grass crops	11.5	Maseru Dark Variant, Ntsi, Maseru, Sephula

prepared. LUP has also successfully conducted capacity building workshops and developed a manual for sound land use planning at district and local level. Furthermore, the LUP has completed the mapping of land cover changes for the five-year period 1989-1994 (Mokuku 2002).



The Land use division of the Ministry of Agriculture used Land Sat Imagery to classify land cover based on 1: 250 000 South African Land Cover Database (NLC DATA) which covered the whole of South Africa including Lesotho (Mikomtek, CSIR 1999). The images were selected in order to minimize temporal effects and land cover variability between images of March 1989 and April/May 1994. Associated areas for each land cover type were calculated and trends over the indicated period were determined. Between 1989 and 1994 the land cover for Lesotho alpine communities decreased by 13.8 %, Unimproved Grassland decreased by 49.2 %, Forest Plantations increased by 11.9 %, Water bodies increased by 17.9 %, Wetlands decreased by 52.4 %, Degraded unimproved Grassland increased by 27.1 %, Cultivated subsistence dryland decreased by 7 %, Urban/Built up land: residential increased by 177.2 %, Urban/ Built up Land and Industrial/transport land increased by 4.1 %,and Mines and Quarries increased by 72.9 %.

However, the accuracy, information content and generalisation of the final product were determined despite the fact that the image was not ortho-rectified, minimum mapping unit of 25 hectares was used, mapping scale of 1: 250 000 was used and there was field verification. Implications of these results are that the final product presented by this methodology is a generalised representation of land cover types of Lesotho for the period 1984 to 1994 (Mikomtek, CSIR 1999).

## Response

In the past different institutions have enacted several Laws dealing with land resources problems for their own working conditions. The main weaknesses of these laws have been fragmentation and their failure to provide sufficient security of tenure required for

the promotion of sustainable use of land resources. Land Policy Reform Commission, established in 1999, was charged with the responsibility of reviewing land tenure system and all laws governing access to land with the aim of proposing land policy that will conserve and sustainably use land resources. The findings of the Commission were published in 2000 following extensive stakeholder consultations. The commission observed that land management issues should start with establishment of a strong Ministry of Lands and Environment and it recommended that it should comprise of the Departments of Environment, LSPP and LUP – strengthened technically and financially, Deeds registry and decentralised Local Authorities. The Commission further recommended that the Local Government Act must drive the process of land management.

The specific recommendations of the Land Policy Reform Commission are that 1) all land in Lesotho must be vested in Basotho Nation and be held by the State through the National Land council as a representative of the Nation, 2) all land, including agricultural land, that was held under customary tenure system should be held on leasehold tenure in order to enhance high production and economic development, 3) sections of the Laws of Lerotoli dealing with land must be repealed and land must be held in accordance with the proposed new Land Act, 4) leasehold and freehold must control access to land and leased land must include agricultural land as well as residential land and freehold tenure must cover industrial and development sites, 5) access to land or land property should be based on merit and not sex for purposes of optimising on productivity rather than inheritance and gender inequality, 6) there must not be encroachment of one zoned and categorised land on another, 7) Range Management Areas and Grazing Associations must be established throughout the rangelands of Lesotho and be answerable to the Land Boards who would have been empowered to declare reserved pastures and enforce compliance through legal mechanics, 8) wetlands must be



declared special protected areas under state land and must be controlled by Land Boards and 9) there must be intensive public awareness campaigns to the general public about conservation and protection of the wetlands and the environment

Integrated management of land resources is an across cutting issue, which requires co-ordination across sectors. The integrated management should start at the higher levels of planning to ensure that all sectors work towards the common goal of sound management of land resources so as to minimize the impacts caused by poor management strategies. Institutional frameworks, capacity building and harmonization of conflicting policies and legislation should become prerequisites for better land management. The proposed National Land Code within the Draft Land Policy is intended to respond to these demands.

Measures have to be taken to foster integrated management of resources and these are 1) the immediate adoption of Land Policy by Government of Lesotho, 2) revision and enactment of land act which would harmonise existing pieces of legislation addressing management of land resources, 3) ensure that conflict is minimized between Land Act, Local Government Act and Environment Act 2001, 4) capacity building for district planning units and local authorities, 5) ensure that sustainable development is achieved through the sound management of the environment and 6) reclaim lost ecosystems where possible or reverse degradation of natural resources.

### ***Mining, construction, transport and infrastructure***

Environmental effects of mining, construction, transport and infrastructure activities in Lesotho vary with the type of activity, but are generally related to soil erosion, water

pollution, air and noise pollution. Mining, construction, transport and infrastructure have similar economic impacts on the environment. Ever since the last State of Environment report, data collection on the rate of mining of diamonds, sandstone, dolerite and river sand has not been made. There is particular need to put in place data collection mechanisms for these resources as they directly affect socio-economic activities of the country.

### **Driving forces**

Export rates of minerals, poverty, population growth and demand for roads are driving forces for mining, construction, transport and infrastructure. Export rates of minerals that are related to demand is a driver for mining activities. Poverty also drives mining, construction, transport and infrastructure. The importance of these variables has been discussed in detail in Chapter 2.0 - Socio-economic and Cultural Environment. In order to meet the demands of a growing population, environmental resources must be used to improve the well being of people. The details of how population growth, environment and development are linked are dealt with in detail in chapter 2.0.

Although the road network is relatively young in Lesotho, it has various direct and indirect environmental impacts at different phases of its development. The Traffic Department has collected data related to road accidents by district, causes of road accidents, times when accidents are most prevalent and numbers of vehicles involved in road accidents in the country.

The main driving forces to effect environmental change due to mining, construction, transport and infrastructure are rate of mining, poverty, population growth and demand



for roads. Poverty and population growth as factors affecting environmental conditions in Lesotho are discussed in the Socio-economic chapter. This section will however explore the effects of population growth on road and transport industry in Lesotho. High population growth has affected the numbers of vehicles in the country, especially the private passenger vehicles such as combis and buses. This increase imposes stress on the roads infrastructure and the overall condition of roads.

The Ministry of Transport and Communication reported a total number of vehicles in Lesotho to be 60 000 with Maseru District having 25 000 vehicles and 17 000 of them registered in the computerized system. There is need to extend this data collection to other districts of the country.

### Pressures

There are three large-scale diamond mining operations in the country, namely, Kolo, Liqhobong, and let\_eng-La-terai. Additionally, there are individuals who are engaged in unofficial diamond mining at various places around the country. Sandstone is mined by Lesotho Sandstone Company (LESACO) at White City in Maseru. The location of this company in relation to environmental impacts is questionable. Several groups of individuals are sporadically mining sandstone for building purposes without using intensive machinery. Lekokoaneng Sandstone Company (PTY) LTD is involved in mining sandstone for building purposes since 1997. This company has recently submitted a project brief to the National Environment Secretariat (NES). The production of this company has enabled building of several Government buildings such as the Ministry of Works building and Matala Local Court building. The company is presently supplying the central Bank of Lesotho with building material for its recreation centre.

Moradi dolerite quarrying company operates stone crushing plant at Morija. Southern Sky company is in its inception stage to operate similar activity at Ha Ntsi. The latter company has recently submitted its project brief and was subsequently requested by National Environment Secretariat, Environment Impact Assessment Department to prepare an Environmental Management Plan (EMP). And they complied. The increasing demand for crushed stone in road construction and building industry necessitates proper monitoring of the resource base and mining rates. At present quantitative data is insufficient.

Mining of clay is mainly for purposes of face bricks, and the industry is located at Ha Thetsane. The company is in the process of locating new sites for this activity (Plate 3.2). Environmental impacts of this activity needs close monitoring because unsightly scars may be left out when clay is exploited. Loti brick has recently submitted a full scale EIA for mining activities at Ha Teko.

Plate 3.2 Proposed mining site at Ha Motloheloa



River sand is also a resource widely exploited by several groups without close monitoring of quantities supplied and amounts demanded.

### State and impacts: trends

There is need to undertake studies, which will identify locations and spatial distribution of mineral occurrence in Lesotho. Lqhobong mine has submitted project brief and an EIA for large scale mining activity to NES. Let\_eng diamond mine has not started operating. Studies carried out have concentrated on diamond mining. Slurry from diamond mines impacts on water resources and stone crushing activities create tremors, noise and air pollution. There is also aesthetic value degradation by unsightly scars left on unrehabilitated land where quarries for construction of roads and other infrastructure existed. Since the last state of the environment report, scanty quantitative data on quarrying and mining exists.

Kao Mining activities have been suspended and the project has recently been submitted to NES. However, studies were conducted in 1998 to assess the negative effects of the uncontrolled waste material originating from mining operations and discharged into the the river system. Findings of the study have indicated that the pH, Electrical conductivity, phosphate and nitrate concentrations are within the allowable limits (Water Quality OPB, 1999).

However, high average suspended solids of 1565.96 mg/l were flowing from Kao river system into the upper part of Katse Dam (Water Quality OPB, 1999). Average sediment loads of 33342 mg.i have been recorded at a point immediately discharging slurry into the river as compared to 65.0 mg/l at Malibatso river. Assessment of water quality



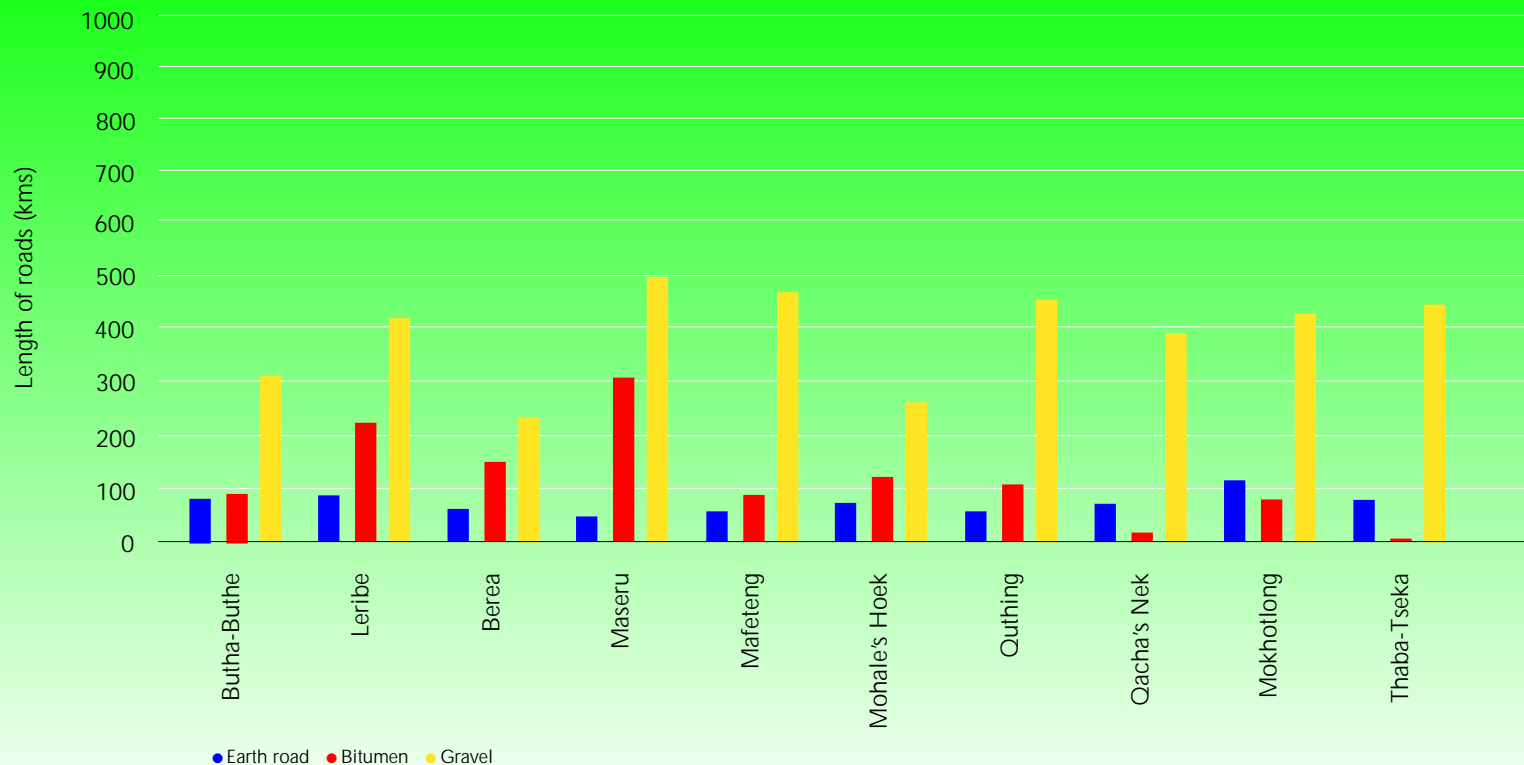
using the rapid biological assessment techniques (SASS4 ) showed very low scores, below the point of slurry discharge, indicating poor water quality.

Impacts of Mining of diamonds and dolerite quarrying are impacting on water resources and well being of communities around these areas. Moradi dolerite quarrying company is affecting local communities with dust and earth tremors, which destroy houses. A petition from local communities has been submitted to NES and follow up trips to the area have been undertaken. Currently, the local communities and the company held meetings in the presence of NES and Mines and geology representatives to look into ways of minimising impacts caused by the company activities.

Road network in Lesotho is insufficient and the problem is further compounded by the generally poor road conditions that require major network rehabilitation. Many more places still remain inaccessible in Lesotho. This affects economic activities in those inaccessible areas. Transport and Communications Statistics of 2000, prepared by Bureau of Statistics highlights the state of roads and transport industry in Lesotho. Labour Construction Unit (LCU) has reported to have constructed 662.7 km length of roads in the North in 2000, 621.7 km in the South and 169 km in the East (BOS, 2001). The roads constructed by Civil Works in each district per type of road are depicted Figure 3.3).



Figure 3.3 Lengths of roads constructed by civil works and lengths of road networks by district per type of road (BOS)<sup>1</sup>



Lesotho still has more gravel roads than tarred roads in every district. These roads require frequent maintenance to restore them to good condition. Intensive rainfall often washes the gravel and gullies and potholes result.

Roads have also been observed to affect spring and wetland ecosystems when they are indiscriminately located. Culverts also discharge water onto the agricultural fields. This results into siltation of dams, reservoirs and ponds. The amounts of sediment transport-





ed reduces the life span of dams and reservoirs leading to high costs of dredging and high costs of chemicals for potable water treatment.

## Response

The ministry of Transport and Communications has an intensive awareness campaign radio programs where people are made aware of road safety measures. These programs need to be intensified and workshops and defensive driving need to be instilled in the minds of drivers operating passenger vehicles.

Sections of Environment Act 2001 affecting land use and management have to be enforced; and policies affecting mining, construction, road and transport industry must be formulated and carried out. Sections of the Environment act 2001 dealing with EIA and precautionary measures have to be enforced. Capacity building to monitor, encourage popular participation and finally enforce compliance of both policies and legislation must be implemented.

### Notes:

<sup>1</sup>Districts are BB Botha Bothe, LR Leribe, BR Berea, MSU, Maseru, MFT Mafeteng, MH Mohale's Hoek, QT Quthing, QN Qacha's Nek, MKT Mokhotlong, TT Thaba Tseka



# 4 Water resources

## Introduction

Water is the most valuable Lesotho's natural resource and a key determinant of economic growth and a resource that must be carefully managed as part of an environmentally sustainable program. Lesotho is an upstream riparian State with South Africa and Namibia in the Senqu/Orange river

basin. The country is drained by four major river systems - the Senqu (Orange) and Mohokare (Caledon) originating from the Mount Aux Sources in the Northeast along the Drakensberg and Makhaleng and Maphutseng River Systems originating from the central Maloti and flow in a South Westerly direction into the Republic of South Africa (RSA). The flow regime, precipitation and runoff of the country are given in table 4.1.

Table 4.1 Precipitation, runoff and stream flow measurements of four river systems draining Lesotho

Catchment	Area (Km <sup>2</sup> )	Precipitation (mm/yr)	Total runoff (mm/yr)	Percentage Precipitation	Runoff deficit % Precipitation	Flow (m <sup>3</sup> /s)
Lesotho	30 648	775	154	20	80	149.9
Senqu (Border)	20 485	749	167	22	78	108.4
Makhaleng	2 911	844	199	24	76	18.4
Maphutseng	362	733	166	23	77	1.9
Mohokare	6 890	824	97	12	88	21.2

Source: Hydro-geological Map of Lesotho, 1994

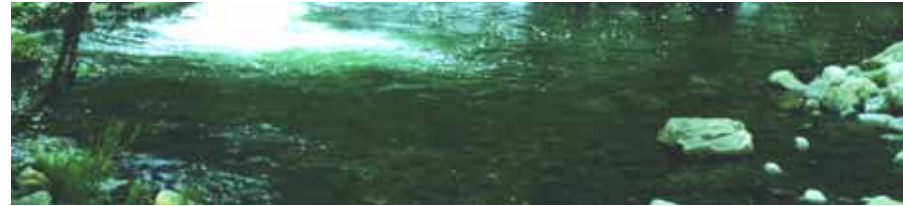


Fifty nine percent of the Orange River Basin lies in South Africa and the remainder in Lesotho, Namibia and Botswana. However, 46 percent of mean annual runoff is generated from Lesotho, upstream, of the basin from just 3 % of the land area. South Africa contributes 50 % of mean annual runoff and Namibia 4 %. The Namibian contribution comes from 27 % of the land area. Although Botswana contributes 11 % of the land area, its contribution in the mean annual flow is negligible.

It is eminent that most of the Orange River Basin runoff of 11,500 million m<sup>3</sup> /yr. (364.7 m<sup>3</sup>/s) comes from the upper Vaal tributary in RSA and from Lesotho in the upper part of the basin known as Senqu. Development activities within the drainage basin have reduced the amount of flow reaching the estuary in Namibia by about half, although this amount varies widely depending on wet and dry conditions (SADC-EU Conference, 1997).

Ground water contribution of these river systems are from base-flow that is sustained from the highland valley wetlands and region where the rivers originate. In 1985, one of the driest years on record for the past 20 years, the sustenance of the base flow of these rivers was reported in the Hydro-geological Map of Lesotho that during May to October of the said year, most of the rivers in the Highlands had sustained base-flow but the rivers and streams in the lowlands were dry.

This difference in runoff between the lowlands and the highlands is attributed to firstly the high runoff/rainfall coefficient in the highlands as compared to the lowlands. Mountain catchments yield approximately 22 % of rainfall as runoff, while the Lowlands, especially Mohokare catchment in Lesotho, yield 12 % of rainfall as runoff. Secondly, the steep slopes, higher rainfall and deteriorated pastures in the highlands



region facilitate direct runoff. Thirdly, the deeply weathered basalt in the highlands provides temporary storage for ground water. Fourthly, the presence of the numerous wetlands that regulate the flow of water in the highlands

The rate of infiltration is important in regulating the flow of water and is affected for the most part by the underlying rock formations. Available data indicates that infiltration into the Basaltic formation is 30 mm/year and 15 mm/year in the lowland sedimentary rocks with an exception of 30 mm/year into Molteno formation. Comparatively, superficial deposits have an infiltration capacity of 2 mm/year. Test studies indicate that infiltration is about 4 % of precipitation and about 25 % of runoff (Bonney, 1975).

Assessment and monitoring of water resources is the responsibility of the Department of Water Affairs (DWA) within the Ministry of Natural Resources. There is a relatively high density of monitoring stations and the stations, which were judged by TAMS (1996) survey to provide accurate and useful records, were 28 climate, 67 rainfall and 29 river flow stations. Underground water monitoring is also done by the DWA. The Department has a database of 5104 located borehole records with variable amounts of associated data. Water quality is monitored on a need basis only. Monitoring is done when groundwater wells are being drilled. Monitoring of water quality is also being done by the LHWP to ensure safe supply for the exported water. Monitoring of surface is also done at three points near Maseru on a regular basis. Water quality monitoring is also done on raw and treated sewage effluent in Maseru and also on *ad hoc* basis on city water used for drinking. There is a limited amount of information on sediment loads at 17 monitoring locations and on sediment accumulation in reservoirs throughout the country.



Overall, total water resources in Lesotho are abundant in relation to the demand even when that is projected forward for 25 years or more. The forecast is that Lesotho will require 5.18 m<sup>3</sup>/s from a total supply of 159.53 m<sup>3</sup>/s from surface and ground water in 2025. Nevertheless, there are severe water availability problems. Lesotho has been observed to be vulnerable to water stress and scarcity that could result due to climate change (Ministry of Natural resources, 2000). If those focused conditions exist, water stress level shall set in by the year 2016 when less than 1700 m<sup>3</sup> per capita per year will be experienced. Water scarcity level of less than 660 m<sup>3</sup> per capita per year will be reached at 2050.

For surface water sources, which are mostly direct river abstractions, variability of flows and lack of regulation facilities will lead to seasonal shortages. Groundwater sources are generally smaller if explored in perched water tables, and a lack of sufficient capacity to drill deeper means that some of the boreholes are often overused leading to local depletion and a shortfall in supply. The problem of water shortages has often been experienced and information from the Ground Water division of the DWA indicated that it happens to those drillings where permission to drill was not granted by DWA.

Furthermore, seasonal distribution and its distance from the consumer affect this relative abundance. For example, Mean annual rainfall ranges from approximately 500 mm in the southern and western lowlands to over 1 200 mm in north-eastern highlands. On average, rainfall of about 780 mm of which 85 % occurs during the rainy season from October to April, falls over the country. In any case, people are not prepared to walk long distances to a spring or a stream to fetch water. They want a year round tap or a pump fairly close to their houses. This convenience and reliability requires multiple boreholes, multipurpose dams or reservoirs and the construction of

accessible reticulation systems. A considerable investment is necessary for purposes of ensuring equity in access to basic water needs.

Traditionally streams and rivers have been used as boundaries between areas of adjacent communities such that the entire catchment is actually divided down the middle by its own river and then managed by communities on both banks in terms of water use. Springs were also major sources of drinking water for communities while streams and rivers were mainly used for the washing and bathing purposes as well as drinking water for animals and wildlife. Overall, Basotho have always regarded water as a valuable, readily available and communal resource. Industrialization, irrigation, hydropower development and increasing population in gazetted urban and peri-urban centres have forced water resources development from streams, springs, well fields and rivers to cater for escalating demands. Investment into water resources development has made water a costly resource that can no more be treated as a free gift of God, and the cultural attitudes towards this resource need to be changed.

Water resources management in Lesotho is generally the responsibility of the Ministry of Natural Resources through its Departments. NGOs dealing with water resources issues, private companies drilling boreholes and parastatals directly dealing with water resources issues have some responsibility with water resources management. The DWA has the responsibility of establishing water sector policies, water resources planning, water quality monitoring and administering the existing Water Resources Act 1978. The DWA also has responsibility in introducing new legislation dealing with issues of water resources management.

Water supply in urban centres is the responsibility of Water and Sewerage Authority



(WASA). WASA was established by GOL order in 1991 as a corporate body. The order gave WASA the responsibility of water supply and sanitation in 16 urban areas, comprising the 10 districts headquarters and others towns such as Mapoteng, Maputsoe, Morija, Peka, Roma and Thot'a-Moli (Mazenod).

The Department of Rural water supply (DRWS) is responsible for water supply in rural areas. DRWS operates throughout the country and its service level is dependent upon the infrastructure system of the area, population density and water yield in the area to be served. The rapid increase in population growth and inadequate operations and maintenance as well as management in some of the water systems reduced the life span of some water supply systems. The future strategy of DRWS is shifting towards consideration of surface water exploration as a source of rural water supply to supplement spring and ground water (Sepamo, 2002). The shift in policy will however have implications of water quality assurance. Another shift is towards responding to demand by communities and water supply by the involvement of private sector in providing sufficient capacity for implementation of new systems and maintenance of systems. The shift in policy is hoped will accelerate coverage of all rural communities by 2020.

Another important water supply entity is the Lesotho Highlands Development Authority (LHDA). LHDA was established by Government order in 1991 as a body corporate with responsibilities to implement, operate and maintain the components of the Lesotho Highlands Water Project (LHWP) that are within Lesotho. The scope of LHDA activities is governed by the LHWP treaty that was signed by the Governments of Lesotho and Republic of South Africa in 1986.

The functions of LHDA, in broad terms, are to transfer water to South Africa, generate



electricity at 'Muela and support to community based projects that are funded through Lesotho Fund for Community Development (LFCD).

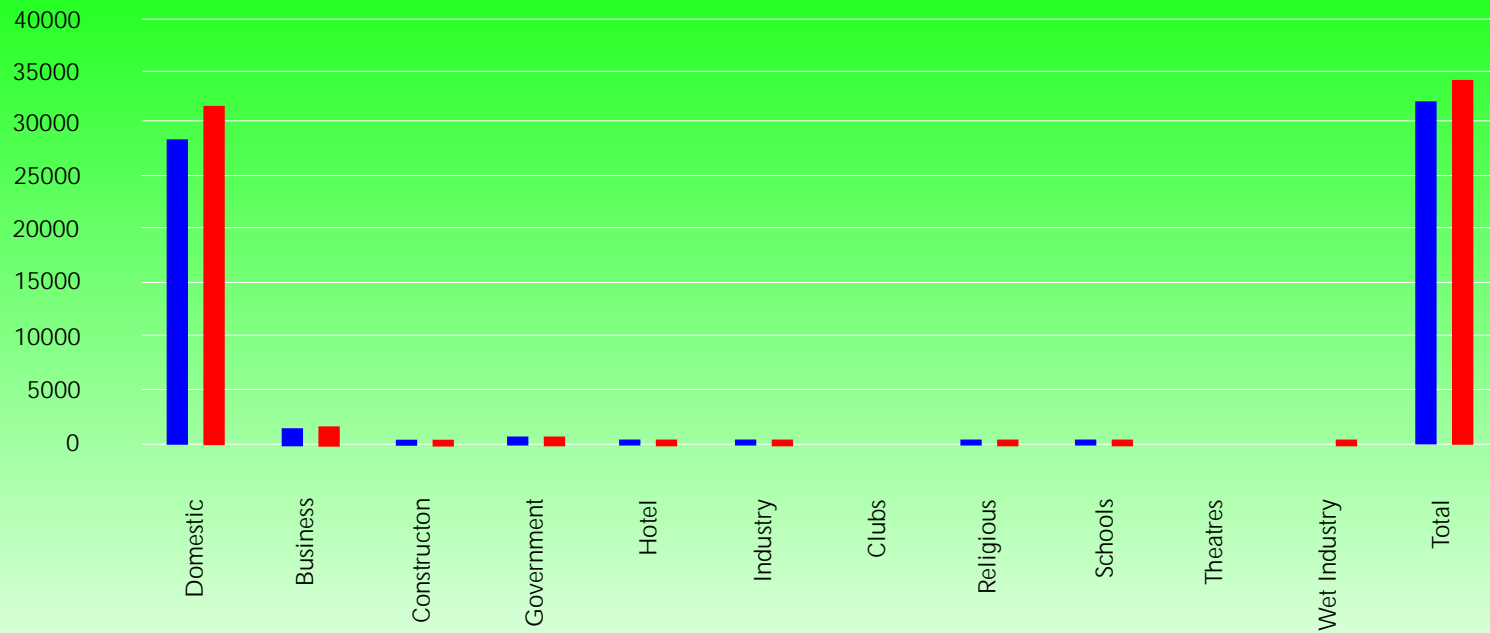
## Driving forces

There are several driving forces affecting Lesotho's water resources. First is its ever-growing population in urban centres. WASA, the sole provider of reticulated water in Lesotho, provided water services to around 176 000 inhabitants or 50% of the population, living within its designated area of responsibility in 1997 (Makhoalibe, 1997) when WASA had approximately 17 000 domestic water supply connections. During 1997 about 420 standpipes providing 18 000 urban households with water were maintained and paid for by the Government.

People migrating from rural areas into towns in search of jobs place a greater pressure on water resources in towns. This influx is shown by steady increase in numbers of customers supplied by WASA between year 2000 and 2002 (Figure 4.1). By the year 2000, it is estimated that 31685 customers were served and this figure rose to 34 492 during the 2000/2001.



Figure 4.1 Number of customers supplied by WASA during 2000/2001 and 2001/2002 water years by category

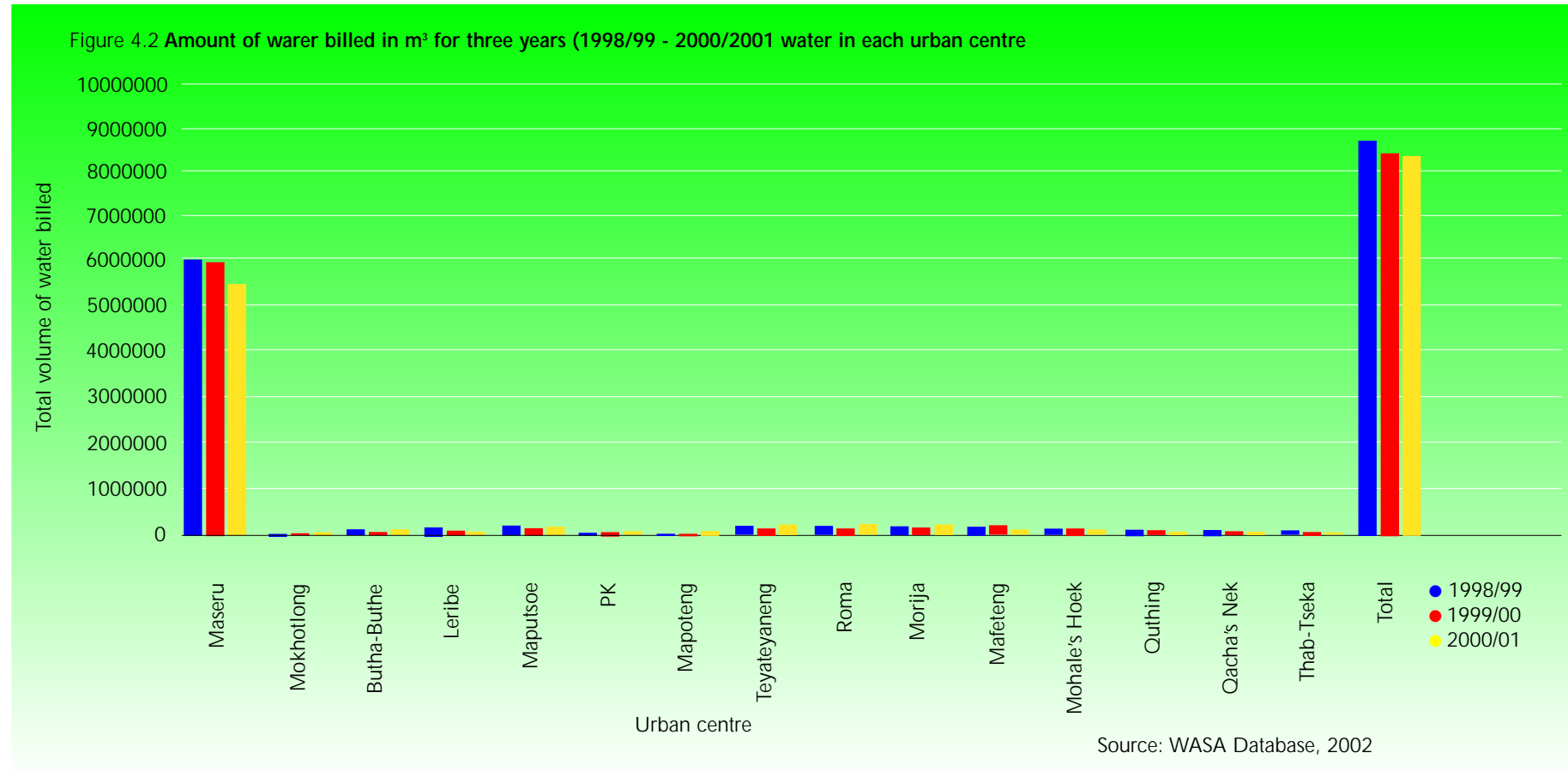


Second, climate and atmospheric conditions also are driving forces for water resources and management as sparsely distributed rainfall and variable climatic conditions impose stress on water resources and its use. Water availability now and in the future

heavily depends on climate, water resources use and management and land management practices.



Water abstraction and consumption rates are important factors affecting water resources capacity and use in Lesotho. The numbers of customers served has affected the amounts of water supplied at urban centre from 1998 to 2001 (Figure 4.2).





The Lesotho Highlands Water Project (LHWP) is developing Water resources in the highland of Lesotho. It has three main functional objectives being the transfer of water to Republic of South Africa (RSA), generation of electricity to Lesotho and Community based development activities in rural areas of Lesotho. LHWP consists of a multi-phased water transfer and hydropower generation scheme that has resulted in construction of Katse Dam on Malibamat\_o and Bokong rivers and Mohale Dam on the Senqunyane River and its tributaries. A series of tunnels links these dams and water is being transferred to the Vaal River system in RSA. The project includes a hydropower station at Muela generating 72 MW of electricity utilizing a head produced at an out-flow of the transfer tunnel. All the basins in Lesotho are international, being shared with South Africa. Increased water use in Lesotho could also have international implications for the other downstream countries of the Orange basin - Botswana and Namibia.

The groundwater resources in Lesotho have been subjected to many studies since 1970. However, resource analysis and assessment at national level have been limited and often only addressed on regional bases. Historically, use of surface water for town supplies and naturally occurring springs for rural village supplies did not necessitate examination of groundwater occurrence and availability.

However, with the rapid growth in water demand for urban, peri-urban and rural areas, the need for reliable water sources has become a priority. Several towns have augmented river abstraction systems with water from boreholes and well fields. The present level of abstraction or use of renewable groundwater resources is a relatively small percentage of what is potentially available - 0.2% to 12 % by district (Chakela, ed. 1999).

## Pressures

Pollution and rates of ground water depletion and the efficiency of water treatment plants to meet demand affect water resources quality and quantity. Poor land management practices and infrastructure development have serious negative impacts on water resources. These practices degrade wetlands capacity to regulate and purify flows. Sediment yield from accelerated soil erosion renders high water treatment costs. The causes of water resources pollution are overgrazing, soil compaction, deforestation and inappropriate land utilisation and cultivation. These factors affect infiltration capacity of in situ soils within catchments. High overland flow processes dominate and therefore increase sediment yield in streams and rivers. A holistic catchment management program in Lesotho under comprehensive catchment based rural development programmes may lead to a sustainable water quality management programme.

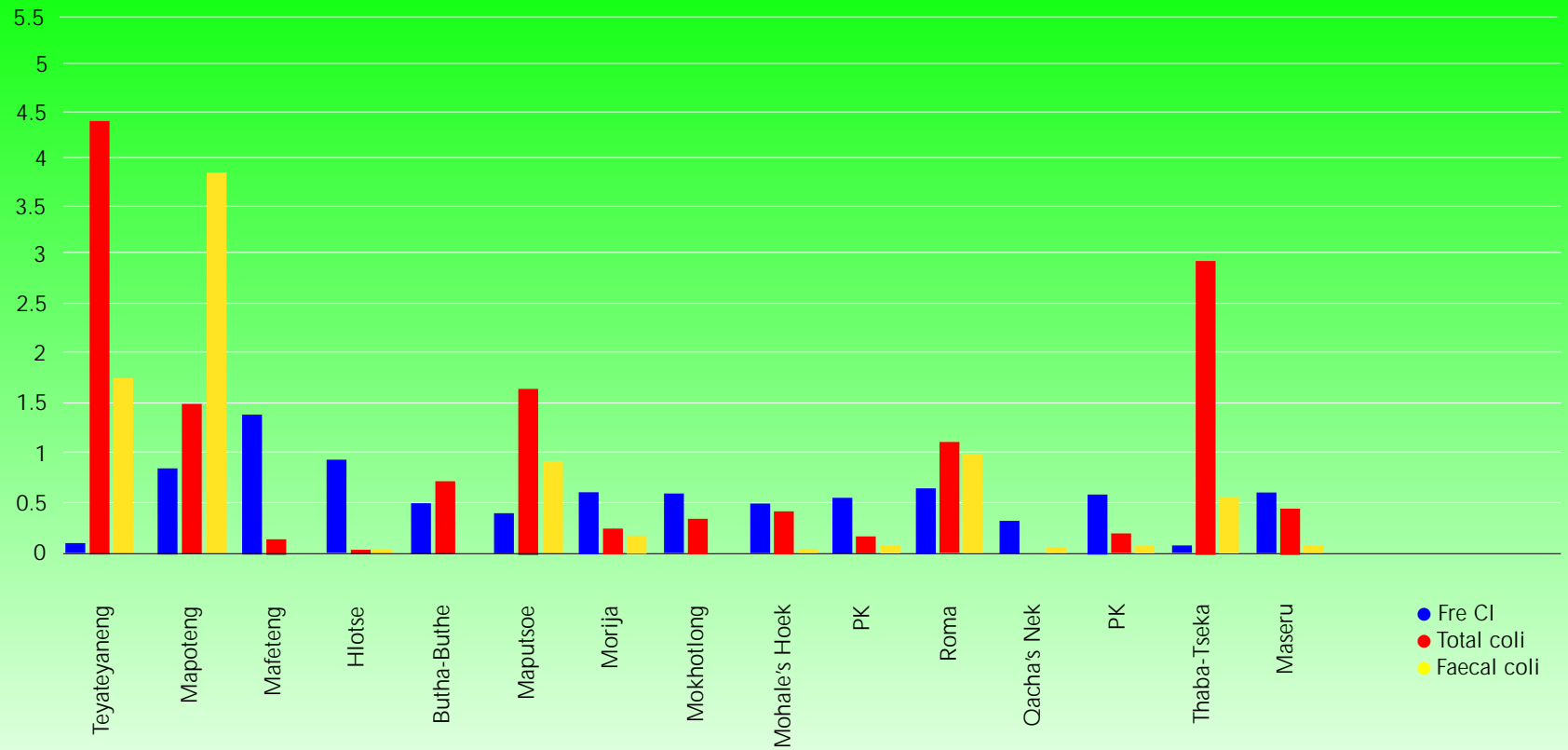
Water pollution may be classified as point source and non-point source in nature. The wastes or pollution, which emanates from definite sources and carried away to a treatment or a waste disposal site, is referred to as point source pollution. Some examples of these are sewerage industries; municipal sewage treatment plant and house hold sewerage systems. Uncontrolled wastewater disposal generate non-point source pollution. Some examples of these are agrochemicals from agricultural land, animal waste, urban storm runoff, pit latrines and unlined septic tanks. These pollutants generally affect both the surface water and ground water quality.

Fig. 4.3 represents average values of free chlorine, Total coliform and faecal coliform sampled at different potable water sources in the urban centers served by WASA over a period of a year. These figures are comparable to the World Health Organization (WHO) stipulated standards, namely 0.2 mg/l of free chlorine, 0.00 total coliform and total faecal coliform. Although there are values higher than WHO standards, they are



not significantly high.

Figure 4.3 Free chlorine and total bacterial counts in potable water around WASA served urban centres



Faecal water contamination clearly depicts absence or lack of sanitary facilities around water sources. The Rapid Biological Assessment (RBA) which uses South Africa Scoring System 4 (SASS4) has been used in the LHWP instream flow requirements (IFR) sites and by Molapo (1998) at Sebaboleng and Maqalika Dams to assess biological integrity of those water sources. This system makes use of selected fauna species to indicate water quality and has assigned scores according to their respective sensitivity to water pollution (CSIR 1997, Molapo 1998).

The SASS4 scores monitored at eight IFR sites (Figure. 4.4) by Skoroszewski and Palmer (1998) downstream of LHWP dams indicate moderate to very good water quality. The sites on Matsoku River at Seshote and on Senqunyane at Marakabei had very good water quality with average scores in excess of 90 (Table 4.2). The IFR sites at Sehonghong, Paray and Sekake had average scores between 60 and 80 indicating good water quality. The IFR sites at Seaka and Lower Senqunyane show less than 60 SASS4 scores indicating moderate to poor water quality. The RBA scores at Mejametalana stream feeding Sebaboleng dam and on the stream from Tsosane solid waste disposal site into Maqalika dam on average had 24 and 42 SASS4 scores, respectively (Molapo, 1998). These studies indicated high pollution in streams in the lowlands as compared to good water quality in the highlands of Lesotho. The RBA scores are a rough indication of water quality because they are also affected by the nature of taxa habitat. For an example, muddy substrates are bad and often yield low SASS4 scores compared to bedrock substrates, which yield high SASS4 scores.

Molapo (1998) conducted a research to assess the effects of land use practices on the water quality of Sebaboleng Dam in Maseru. His results have indicated high faecal coliform counts in excess of 5000 for the Most Probable Number (MPN) and the total col-



iform counts around 22600 around Sebaboleng Dam over a period of three months. Although these values were compiled over a short period of time, they are very high compared to WHO range of 20-2000 for faecally polluted water. Skoroszeewski and Palmer (1999) calculated the ratios of total nitrogen to total phosphorus for the eight IFR sites using chemical characteristics of the water sampled from the areas to assess their impact on eutrophication. Monthly sampling data for the period January to December 1998 was used (Table 4.2).

According to the Department of Water Affairs and Forestry (DWAF) (1996), unimpacted systems have an N/P ratio of greater than 25 and heavily impacted systems having N/P ratio of less than 10. The results from Table 4.2 indicate possibility of algal blooms during low flows on most of these sites in spite of their relatively high water quality. Dissolved Oxygen (DO) concentrations in Table 4.2 were not different from a range between 7.8 to 10 mg/l that was measured by WASA and Molapo in Mejametalana stream feeding Sebaboleng Dam (Molapo, 1998). The Results also show that eutrophication caused by high concentrations of phosphates and nitrates does not seem to deplete DO below an acceptable range of 5 to 7 mg/l.



Table 4.2 **Biological and physio-chemical characteristics of instream flow requirements downstream of LHWP dams**

No.	IFR site	N/P ratio	DO (mg/l)	RBA (average count)	ASPT
1	Seshote	25	9.4	97	7.3
2	Katse	12	9.5	60	6.0
3	Paray	12	9.5	80	7.4
4	Sehonghong	15	9.3	78	7.5
5	Sekake	24	8.9	62	8.2
6	Seaka	12	8.7	41	5.6
7	Marakabei	14	9.2	97	7.7
8	Lower Senqunyane	21	9.3	29	6.9

Adapted from Skoroszewski and Palmer, 1998

for surface water are 1) urban storm water drainage system, 2) overflowing septic tanks and broken sewage reticulation system, 3) the stone wash denim factory in Maseru, emitting a blue effluent that is discharged into the Caledon River without treatment (Plate 4.1), 4) the industries in Maseru and other large towns such as Maputsoe, Mafeteng and Botha-Bothe - canneries, pharmaceutical companies, brewing, ice cream factories, flour mills and clothing manufactures, 5) dipping and spraying free-range livestock against parasites uses insecticides which are toxic to humans at very low concentrations and 6) high sediment yield from the watershed lowers the quality of water and renders costly water treatment



### Surface water pollution sources

Surface water resources are the most abundant in Lesotho. However the resource is liable to point source and non-point source pollutions. Stream flow is liable to non-point source contamination. Overflowing septic tanks and ruptured sewerage systems have become an environmental nuisance in Lesotho and a common sight to see in most places. The possible sources of pollution



Plate 4.12 Polluted Caledon River



#### *Ground water pollution sources*

The possible sources of pollution for underground water in Lesotho are 1) Leaching of substances - pesticides, herbicides, organo-phosphates into the water table, 2) filtering through of latrine water, 3) leaching from landfill sites, 4) uncontrolled urban drainage systems and 5) possible leachates from cemeteries.

These effluents pollute potable water resulting in water borne diseases. The most prevalent incidences are diarrhoea, stomach-ache and vomiting. The frequency of these diseases is prevalent in people getting water from springs. The high frequency is justifiable because most of Lesotho's rural population still gets its water supply from unprotected springs.

On the other hand, the percentage responses towards water related diseases, by type of sanitation facility, are higher than the percentage responses by location and source of water supply. The absence of a toilet within the community becomes disastrous in terms of the levels of faecal contamination into the water resources. An ordinary toilet alleviates the levels of pollution by almost half and a VIP latrine has shown dramatic improvements towards alleviation of water related diseases.



Table 4.3 River gauging stations maintained by DWA at various locations throughout the country

Facility	Diarrhoea	Stomachache	Vomiting	Worms	Skin problems
No toilet	43.5	49	44.4	61.1	44.8
Latrine	24.5	26	23.8	33.3	27.6
VIP latrine	29.3	23.5	28.6	5.6	24.1
Flush toilet	2.7	1.5	3.2	0	3.4

Adapted from Sechaba consultants, 1994, TAMS report 1996.

## State and impacts: trends

The DWA, within the Ministry of Natural Resources, is responsible for establishing water sector policies, water resources planning, water quality monitoring and administering the existing Water Resources Act – 1978. Furthermore, the Department is responsible for introducing new legislation dealing with issues of water resources management. The Department is also responsible for collecting and processing all data dealing with water related issues such as monitoring of hydrological data, water quality monitoring and hydro-geologic surveys. The data collected by hydrometric stations becomes important in water resources management and development. The DWA has five Divisions with respective responsibilities to their designations. The Divisions are Water Resources, Water Pollution Control, Hydrology, Administration and Ground Water.

The Lesotho hydrometric network has 80 gauging stations; of which only 29 are currently operational and provide relatively accurate records, 33 are somewhat operational as they lack established rating curves and 19 are either closed or without recent available records. The DWA

is intending to establish rating curves for the unrated 33 stations and such an undertaking would geographically distribute the gauging network for purposes of providing valuable information needed in surface water resources analysis (Table 4.4). More importantly, of the 33 unrated stations, 15 are in the Mohokare river basin, 2 in the Makhaleng river basin and 16 in Senqu river basin where there is an urgent need to have data for purposes of better management of the water resources in a population that is growing exponentially.



Table 4.4 River gauging stations maintained by DWA at various locations throughout the country

Station No.	Location	River	River basin	DA <sup>2</sup> (KM <sup>2</sup> )	M.A.R. (m <sup>3</sup> /s) <sup>3</sup>
MG-19	Molimo-Nthuse	Makhaleng	Makhaleng	86	1.27
CG-24	Masianokeng	Phuthiatsana South	Mohokare	945	4.12
CG-25	Ha Setene	Hlotse	Mohokare	728	6.73
CG-26	Khukhune	Hololo	Mohokare	212	1.35
CG-29	Sherra	Tebetebeng	Mohokare	172	0.88
CG-31	Ha Makhoa	Tsoinyane	Mohokare	108	1.36
CG-33	Kolonyama	Phuthiatsana North	Mohokare	905	5.13
CG34	Mapoteng	Phuthiatsana North	Mohokare	386	2.81
CG-37	Matsoaing	Mohokare	Mohokare	88	0.67
CG-39	Mohlakaqala	Mohokare	Mohokare	5600	18.9
CG-44	Lower Qeme	Tlametlu	Mohokare	142	1.49
SG-11	Ox-Bow	Tsehlanyane	Senqu	57	0.78
SG-12	Ox-Bow	Thlolohatsi	Senqu	82	1.01
SG-13	Ox-Bow	Matseng	Senqu	83	0.91
SG-14	Mahlasela	Motete	Senqu	67	0.88
SG-18	Semonkong	Maletsunyane	Senqu	231	2.39
SG-32	Ha Nkau	Senqunyane	Senqu	3 480	24.4

<sup>2</sup> DA means drainage ares    <sup>3</sup> M.A.R means main annual runoff

Source: De Baulny, 1980 and Water Resources Management: Policy and Strategies, 1996.





DWA has been keeping records of gauging stations since 1950's and has published three hydrological yearbooks up to 1980. For more recent data, which has not been published, computer files are created and maintained by DWA. A second source of monthly runoff for some gauging stations in the Senqu river basin, consists of work performed by the Lesotho Highlands Development Authority (LHDA). LHDA independently processes raw monthly runoff data from 12 gauging stations in the Senqu River basin for purposes of planning water transfer schemes and hydro-electric development (Table 4.5). Within these stations, time series analysis has been carried out to take care of the missing data. The Patch Program developed by Prof. G.G.S. Pegman (1985) has been used to fill-in missing data of rainfall and stream flow. The other model developed by Dr. W.V Pitman has been modified and its latest version (1992) has been used in the Water Resources Management, especially in its policy and strategy document, to extend existing runoff records by using correspondingly longer rainfall series.

**Table 4.5 River gauging stations processed by LHDA in the Senqu basin**

Station No.	Location	River	DA <sup>2</sup> (KM <sup>2</sup> )	M.A.R. (m <sup>3</sup> /s) <sup>3</sup>
SG-03	Seaka	Senqu	19 875	105.6
SG-04	White Hill	Senqu	11 000	69.2
SG-05	Koma-Koma	Senqu	7 950	49.5
SG-06	Mokhotlong	Senqu	1 660	8.39
SG-07	Tsoelike Bridge	Tsoelike	797	4.74
SG-08	Paray	Malibamatso	3 240	26.8
SG-17	Ha Marakabei	Senqunyane	1 087	11.4
SG-32	Ha Nkau	Senqunyane	3 480	24.4
SG-36	Tlokoeng	Khubelu	852	4.88
SG-41	Bokong	Bokong	403	3.43
SG-42	Ha Seshote	Matsoku	652	3.23
SG-45	Ha Lejone	Malibamatso	1 157	14.7

Source: DWA database, Water Resources Management: Policy and Strategies, 1996.



The raw data are generally collected and processed independently by DWA and LHDA. Data processing includes digitising, interpreting and converting to discharges as measures of water flow rates. DWA is responsible for maintaining all stations except the 12 stations operated by LHDA and are located within the Lesotho Highlands Water Project operational area.

Construction of large dams in Lesotho has had many and varying problems amongst which the problems of health and in particular communicable diseases such as STD and HIV/AIDS areas around construction sites. The details on health hazards have been addressed in more detail in Chapter 2. Some diseases associated with impounded water may be realised in the future. The construction of dams has also led to displacement of people and their resources. The displacement occurred because of infrastructure activities emanating from road construction, telecommunication equipment installations, installations of power lines, construction of labour camps and inundation of settlements and communal resources.

Studies conducted by LHDA on effects of IFR down stream of LHWP sites that there is an emergence of modified riverine ecosystem which is indicated by invasion of alien vegetation of species trees and grasses (good for fuel wood and other grass related products), but there will also be a decrease in sand which is used in the construction industry. There will also be loss of fish and the quality of water may induce aquatic blackflies that may affect livestock grazing in the areas downstream of LHWP dams (contract 648 summary of main findings, 2000).

### **Institutions**

Water resources sector is responsible for managing, monitoring, supplying demanded water resources in urban and rural areas and cross boundary water supply. The main institutions and

<b>Agency</b>	<b>Main activities and responsibilities</b>
<i>Government Departments</i> Department of Water Affairs (DWA)	Overall planning, management, monitoring of water resources and policy and legislative framework
Department of Rural Water Supply (DRWS)	Provision of water supply and sanitation in rural and some peri-urban areas
<i>Parastatals</i> Water and Sewerage Authority (WASA)	Water supply and sanitation in gazetted urban areas
Lesotho Highland Development Authority (LHDA)	Water transfers to South Africa from the LHWP and Hydro-electric Power generation for Lesotho.
<i>Regional organisation</i> Southern African Development Community (SADC) Water Sector Coordination Unit	Regional water issues and co-ordination

their respective responsibilities, involved in the water sector in the country are listed below.

All these organisations listed above are under the Ministry of Natural Resources. Also involved with the Water sector are a small number of national consultancies, contractors and NGOs.

To widen the ownership of the water related issues, in May 1999 the Government established a Water Resources Development Task Force Team that includes representative from the organisations listed above -except SADC Water



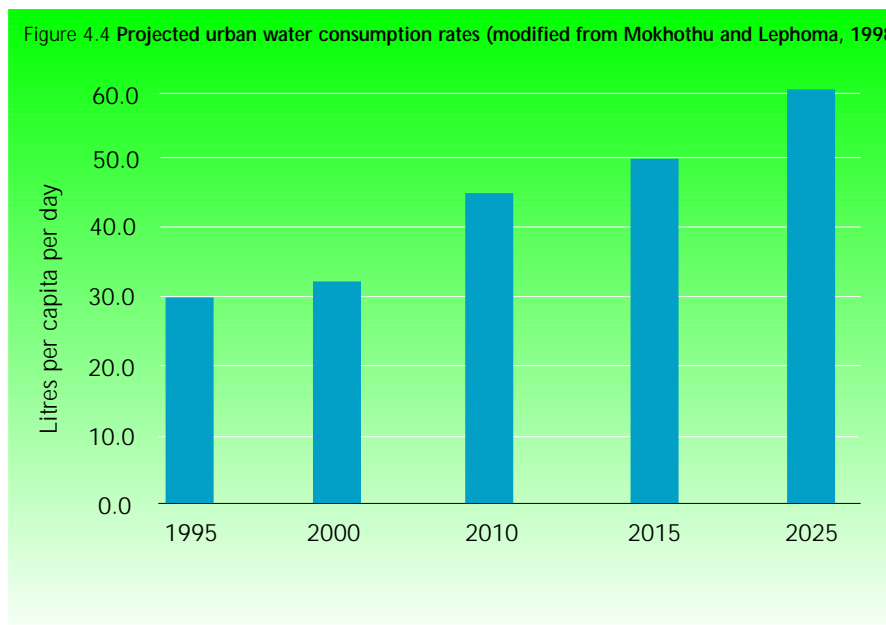
Sector Coordination Unit - the Ministry of Agriculture and the National Environment Secretariat. A Lesotho Water Partnership, along the lines of the Global Water Partnership, is soon to be launched. Because of the fragmentation and lack of co-ordination in the sector, it has been proposed to establish a Directorate of Water that is intended to provide the sector with strong and cohesive organisation. Consideration and implementation of this idea is being undertaken by the affected authorities.

At the international level, the relevant institutions are the Lesotho Highlands Water Commission (LHWC), which is the joint body of Lesotho and South Africa for controlling the Lesotho Highlands Water Project, and the Orange/Senqu River Commission, which has recently being created in order to enhance co-operation in water resources across the entire basin under the SADC protocols.

### *Urban water supply*

In urban areas, as the number of private connections increase, the total consumption will increase according to the present per capita value for private systems. The remaining public connections will follow the same trend as in rural areas from a present value of 11.78 l/c/d to 30 l/c/d in the year 2025. The urban domestic water consumption for the year 2025 is projected at 61 l/c/d as compared to 30 l/c/d used in 1995 (Figure 4.4). System losses based upon WASA figures were added to the total consumption. Water and Sewerage Authority (WASA) had reduced its unaccounted for water from 40% to about 27% in 1997/98. In 1998/99 the unaccounted for water was further reduced to 22%. There was a major problem of identifying accurately the amount of water lost in the past because of unreliable production meters. Water losses are mainly due to 1) Water that leaks into the ground from pipe bursts, leaks at pipe joints and overflow

from service reservoirs, 2) water that is being consumed but not billed as a result poor meter reading, faulty meters, illegal connections, and fire hydrants and 3) some water is also used at the water treatment plants for bath washing and dilution purposes.



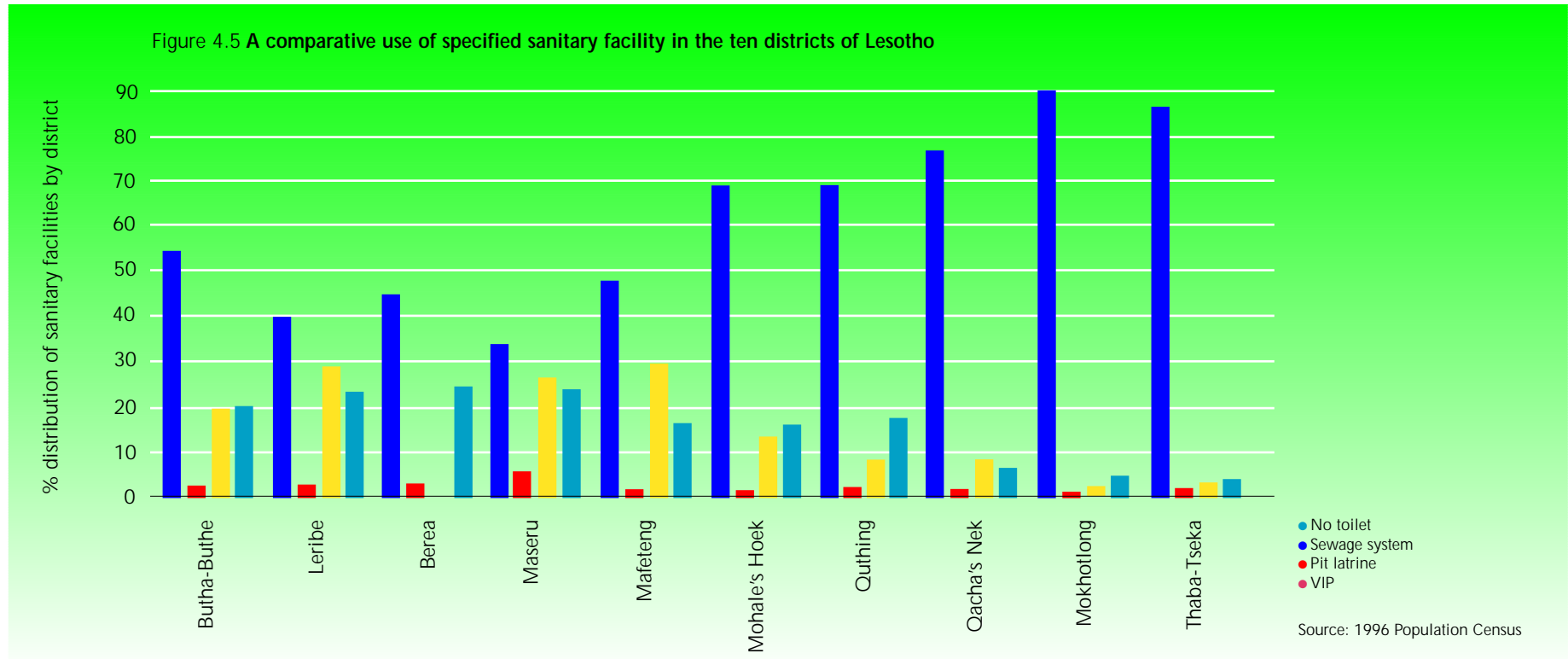
Sewerage is treated at Ha Ratjomose treatment plant by removing solids and dissolved impurities. The solids form a sludge that is dried and used as soil conditioner. The treated water is returned to Mokokare after passing through several oxidation ponds. Areas not connected to the main Ratjomose transfer system are served with tankers. In other urban areas outside Maseru oxidation ponds are used to purify sewage water. The effluent is returned to streams and rivers after passing through several oxidation ponds where an increase of phosphates, nitrates and chlorides is anticipated over time.



## Sanitation

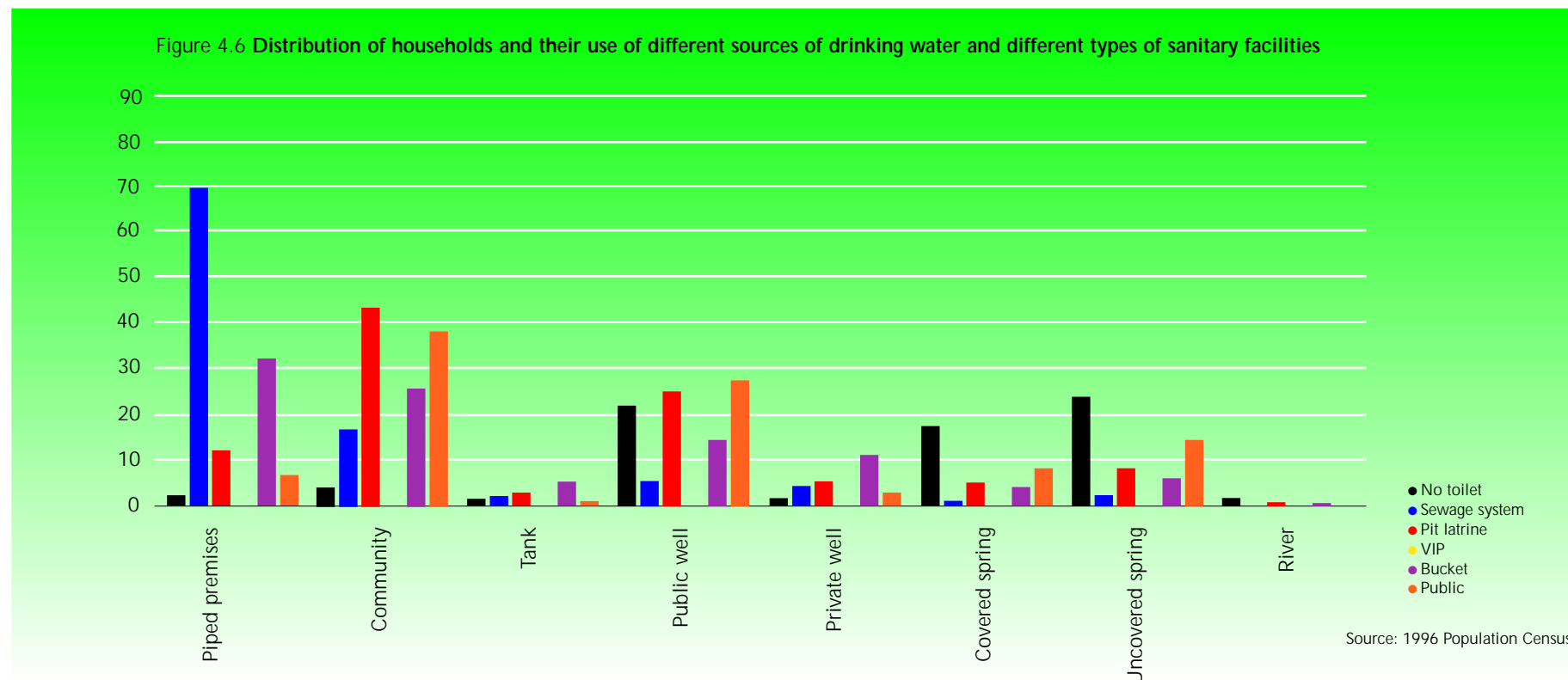
Sanitary facilities in any setting are good indicators of good health as lack of or insufficient sanitary facilities may contribute in the spread of communicable diseases (BOS, 1996). The Government abolished the use of “buckets” to collect sewage in the late 1980s and introduced the modern VIP latrine toilets. However, the use of pit latrine was so widespread that they still preferred facilities for waste disposal and because they are

relatively cheaper to install as compared to VIP latrines. In any event, the numbers of people using the pit and VIP latrines is still low compared to the numbers of people without toilets. The 1996 population census analytical report showed that of 370 972 households sampled 22.5% used Pit latrines and 16.8% used VIP toilets. Demographically, the percentage of households without a toilet facilities were high in the Districts of Quthing, Qacha’s Nek, Mokhotlong and Thaba Tseka (Figure 4.5).



Sanitation also covers aspects of availability of safe drinking water. Water drawn from a public well, private well, uncovered spring and the river is considered unsafe for drinking as these environments are prone to water borne diseases. Health indicators were assessed by comparing the method of sanitary facility together with the methods of drawing drinking water from environmentally safe sources such as piped water within own premises, piped water within a community and covered spring. Figure 4.6 indicates that 33% of the households with no toilet facilities drew drinking water from

community piped water sources and 17.9% drew water from covered springs. Forty three percent of households sampled still drew their drinking water from unprotected springs and public wells. Of the total households using pit latrines, 42.7% drew drinking water from piped community water sources. Although these figures are relatively low, they are however encouraging as they show an increasing number of households using Government recommended sanitation facilities - VIP toilets and drawing drinking water from piped water sources.



## Rural water supply

The main institution responsible for rural water supply and sanitation is the Department of Rural Water Supply (DRWS) within the Ministry of Natural Resources.

The Department supplies water and sanitation facilities to the rural as well as the peri-urban areas of the country because WASA is restricted in its jurisdiction.

In 1996 an estimated 58% of the rural population had been supplied with water through the DRWS's public water supply schemes, although there were substantial variations in size and functionality of the systems across the country. The LHDA and some NGOs have also been active in village water supply schemes.

Recent statistics indicate that the DRWS has installed some 9,300 standpipes, 3,900 boreholes and over 1,500 collection points. However, 20 to 30% of collection points have been assessed to be out of order.

The overall coverage of rural sanitation of a variety of types is around 50%. There is a trend towards higher levels of service as over 70% of water points are based on reticulated systems and there is increasing demand for private connections. In the last 4 years DRWS has not constructed a single hand pump-based project.

DRWS is responsible for the widespread distribution of piped community water and public well in rural and other peri-urban areas of Lesotho. In 1997/98, DRWS had 60 percentage coverage of the populations served by it in all ten districts as compared to the 55 percentage in 1995.

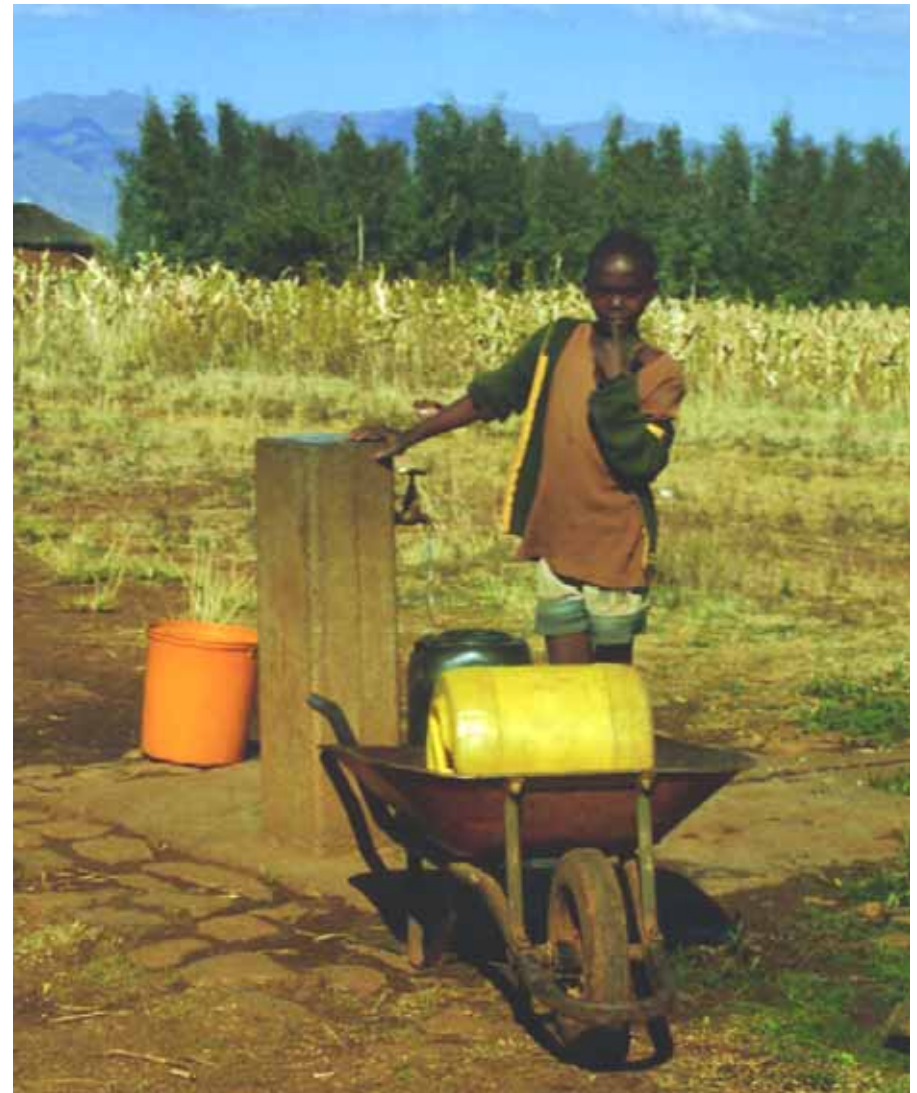
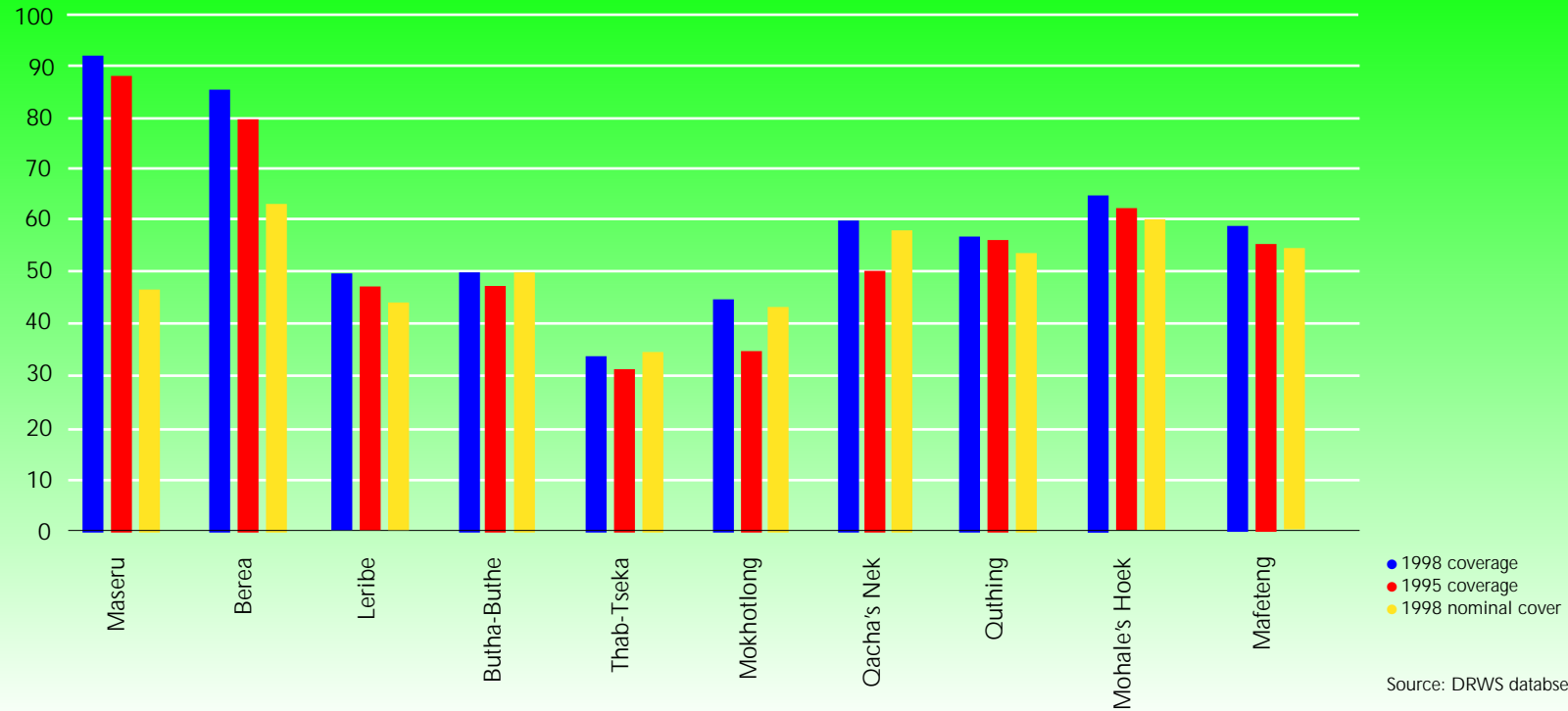


Figure 4.7 Percentage of distribution of people covered and nominally covered by DRWS from 1995 to 1997/98



The percentage distribution of people serviced with water and sanitation has increased since 1995. Geographically, greater percentages of people served with water and sanitation facilities are in the Districts of Maseru, Berea, Mohale's Hoek, Mafeteng and Quthing (Figure 4.7). The District of Thaba Tseka had the minimum coverage and nominal coverage, which represents people with piped water much below the national per

capita demand and convenience of 25 l/c/d and 150 m radius, respectively.

### Ground water resources

The groundwater resources in Lesotho have been subjected to many studies since the





1970s. However, resource analysis and assessment at national level have been limited and often only addressed on regional bases. Historically, use of surface water for town supplies and naturally occurring springs for rural village supplies did not necessitate examination of groundwater occurrence and availability. However, with the rapid growth in water demand for urban, peri-urban and rural areas the need for reliable water sources has become a priority. Several Towns have augmented river abstraction systems with water from borehole and well fields.

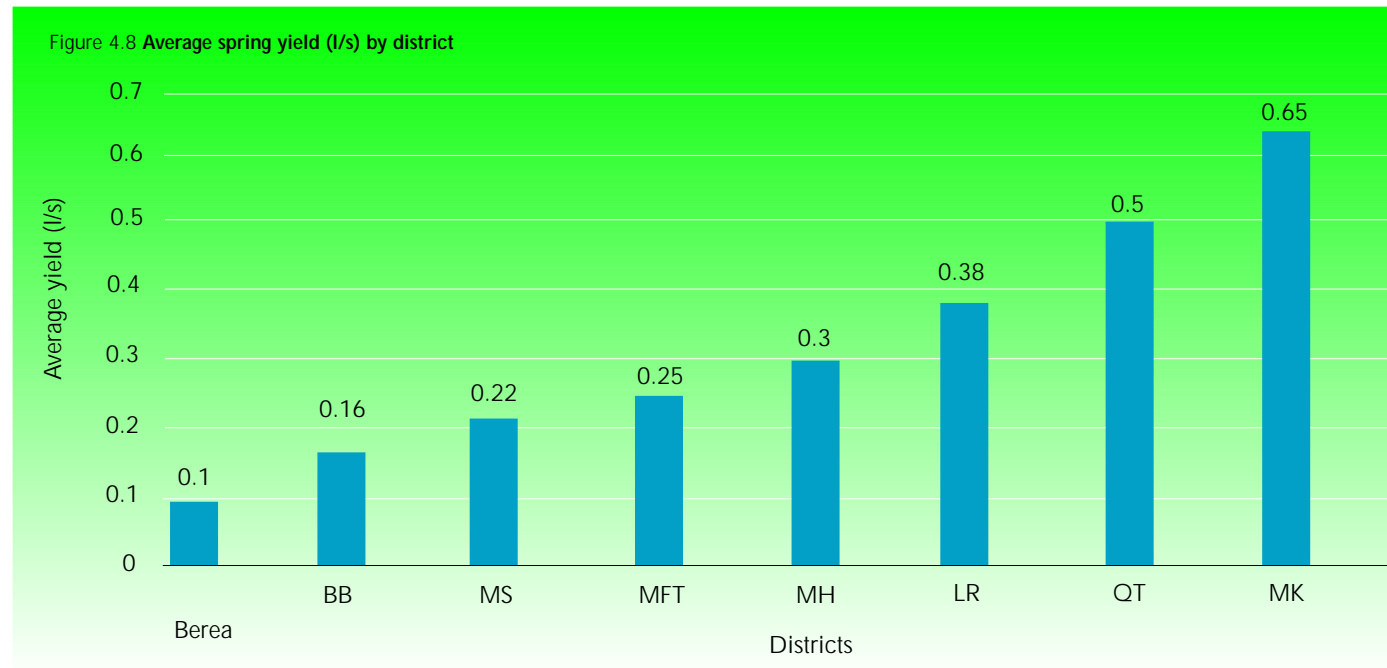
## Responses

The response to the water status in the country had been undertaken at the policy level. In May 1999, the Government adopted a new Water Resources Management Policy that sets out the framework for a sector-wide reform. The reforms anticipated in the policy were 1) the need for the economic pricing of water resources, 2) recognizing the benefits of introducing private sector participation in water related issue, 3) the neces-

sity of institutional reform and 4) the requirement for a strong regulatory framework. The policy also recognized the seriousness of the water situation in the lowlands and as its strategy to alleviate the water supply problems in the region revealed the willingness to implement the Lesotho Lowlands Water Supply Scheme.

DRWS in 1997 produced a strategy for the future supply and sanitation water in rural areas. The strategy indicated that rural water supply will be based on demand-driven expansion, full recurrent cost recovery, private

sector delivery of services, increased community participation, and a shift from construction towards maintenance. Water Resources Act 1978 needs to be revised and harmonized with Environment Act 2001 so as to remove inconsistencies, conflicts and



Average spring yield in litres per second (l/s) has been monitored between 1994 and 1999 from different springs within each district. Available data indicates variable yields between 0.10 l/s in Berea district and 0.65 l/s in Mohale's Hoek district (Figure 4.8).



contradictions and to ensure that they all take into account all environmental concerns.

## Tariff structure

Studies of poverty in Lesotho by TAMS (1996) indicated that the vast majority of customers can afford to pay for water services. Not only are people able to pay for water but they are much willing when the resource is convenient and reliable.

In the same study, it was indicated that WASA paid between M3.60 to M4.00 to supply a cubic meter of water. WASA has been increasing tariffs from then to cover production costs. The following tariff structure is applied as of 1st September 2001 for domestic customers: ● Old Standing charge of M2.00 for all customers has been increased to M2.40; ● Old rate of M1.56 (in the consumption range of zero to five kiloliters) has been increased to M1.56 per 1000 liters; ● Old rate of M2.34 (in the consumption range of six to ten kiloliters) has been increased to M2.61 per 1000 liters; ● Old rate of M3.12 (in the consumption range of eleven to twenty three kiloliters) has been increased to M4.37 per 1000 liters; ● Old rate of M5.00 for water consumption above twenty three kiloliters has been increased to M6.50 per 1000 liters

Non-domestic customers were charged M3.78 and the sewerage was charged M3.00 for 85 % of the water consumed. This existing tariff caters for less privileged customers and the cost increases with amounts of water consumed.

## International aspects

As discussed above, all the basins in Lesotho are international, being shared with South

Africa. There are significant water demands from the shared basins in the neighboring areas of South Africa, especially for urban and irrigation use. Major transfers of water from Lesotho to South Africa take place under the LHWP (discussed above). Increased water use in Lesotho could also have international implications for the other downstream countries of the Orange basin (Botswana and Namibia).

Specific international treaties and agreements relevant to water resources in Lesotho are: ● Lesotho Highlands Water Project Treaty between the Governments of Lesotho and South Africa (1987) which defines and controls the LHWP and includes complex agreements on how the costs and benefits of the project are to be shared; ● Protocol on Shared Watercourse Systems in the Southern African Development Community (SADC) Region (1995); and ● Revised Protocol on Shared Watercourses in the Southern African Development Community (2000).

The first of the two protocols is in force, but the revised version has yet to be ratified by the required number of Governments. The protocols set out objectives for the sustainable, equitable and reasonable utilization of shared river basins in the SADC region, promoting regional integration, poverty alleviation and environmentally sound development and management. They specify provisions for the utilization of shared watercourses, which are in accordance with generally, agreed international agreements, and they set out specific provision for notification, consultation and negotiations in respect of planned measures in shared river basins □



# 5

## *Climate change and the atmosphere*

### Climate change

The latitudinal position of Lesotho in the global high-pressure belt of 30° S determines her climate and temperature regimes (Sekoli, 1997). Lesotho's climate is continental and temperate with four distinct seasons of summer, autumn, winter and spring. Lesotho receives 85% of its annual rainfall from October to April and it averages 700mm a year. Spatial distribution of rainfall is such that the highlands region receive the highest precipitation with an annual average of 1200mm a year whereas the Senqu River Valley region receives the lowest precipitation with an annual average precipitation of 500mm. In winter snowfall occurs annually in the mountain areas and once in three years in the lowlands. The country's temperatures are low in winter and high in summer.

The global concern about climate change has increased since the 1980's due to scientific evidence linking anthropogenic gas emissions with global climate change. Over the last century, atmospheric concentrations of Greenhouse Gases (GHGs) such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) have increased by 31%, 25% and 17%, respectively mainly as a result of human activities. As a consequent, therefore, global temperatures have increased by 0.3 to 0.6 °C (Ministry of Natural Resources, 2000). The rise in temperatures has also led to a rise in sea-level. It is expected that by 2100 the average global temperatures will have risen by 1 to 3.5 °C and the mean sea level by 15 to 95 cm. Other effects of increasing temperatures

include shift in the global rainfall, change in composition and distribution of living organisms and disruption of agricultural production. These global changes in climate will definitely affect the climatic conditions in Lesotho. Therefore response initiatives are to be put in place so that the socio-economic as well as well as the bio-climatic conditions of the country will not be upset significantly.

Climatologically, in recent years, the Lesotho has experienced droughts associated with El Nino conditions. In 1991/92 and 1993/94, a very severe drought occurred with disastrous consequences for the country. The country suffered poor crop harvests and loss of livestock in great numbers (Ministry of Natural Resources, 2000). The El Nino effect was not only limited to drought but also had other disasters. Because of the El Nino effect, Lesotho suffered from heavy snowfalls, strong winds and floods on a periodic basis.

Lesotho as a geographic sphere is vulnerable to climate change (Ministry of Natural Resources, 2000). Its geographical location, which is on the tapering Southern African subcontinent, exposes it to significant influences of both Indian and Atlantic ocean climatic fluctuations. The weather patterns that result from this location combine to modify the usual conditions that are created by the annual movement of the Inter Tropical Convergence Zone (ITCZ) which in turn determine whether the weather is dry or wet. The behaviour of ITCZ varies from year to year, therefore the climate of the country especially rainfall and temperature is highly variable all the time.



Analysis made by the Lesotho Meteorological Service (LMS) of the Ministry of Natural Resources on the country's climate in 2000 indicates that climatic variability places critical constraints on crop production. The major factors are water availability especially rainfall and evaporative demands – evaporation and evapotranspiration), soil and terrain regime and climate regime. The variability in climate dictates cultivable area and duration of growing season and thus limiting production and productivity potential in the country. In overall terms, Lesotho is a low potential crop production ecosystem. Since the majority of Basotho people depend on agriculture, their socio-economic conditions are highly affected by climate.

Other sectors that are also affected by climate change include the water sector, forestry, rangelands, biodiversity, health and the Basotho culture in general. Detailed discussions of these factors are in subsection 5.6.1.

## Ozone layer depletion

The ozone layer protects the earth from harmful effects of the sun's ultraviolet (UV) radiation. The UV radiation from the sun is short wave and can be harmful to living organisms if received in large quantities. The Ozone is depleted by substances collectively known as the Ozone Depleting Substances (ODSs). These substances include, propellants in aerosols, solvents in chemical industry especially the Group 7 metals collectively known as the Chlorofluorocarbons, refrigeration and air-conditioning. Excessive exposure to UV can damage eyes, lower immune systems and cause skin cancer. Some land plants and aquatic organisms are sensitive to UV radiation and excessive exposure can lead to reduced productivity. The use of ODSs has led to the formation of a "hole" in the ozone layer over the Antarctic.

The UN responded to the depletion of ozone layer by adopting the Vienna Convention for the Protection of the Ozone Layer in 1995. The convention sets a basis for the reduction of ozone layer depletion by reducing emissions of the ODSs. The Montreal Protocol to the Vienna Convention was adopted in 1997 and sets out a timetable for countries to reduce the consumption of ODSs. Lesotho ratified the Montreal Protocol on substances that deplete the ozone layer in 1994.

## Driving forces

### *Population growth - people and livestock*

The population of Lesotho is currently estimated at 2.4 million with 84% living in rural area. The population growth rate is approximately 2.6% per annum and the average population density is 69 persons/km<sup>2</sup> countrywide and rises to 745 persons/km<sup>2</sup> on arable land. Increasing human population and livestock, increased cultivation of marginal lands, over-exploitation of rangelands and fuel wood and uncontrolled land-use practices result in severe land degradation. Population growth mainly affects climate through increased demand for fossil fuels, which release GHGs. Increasing population also impacts on the ozone layer due to an associated increase in the demand for ODSs.

## Pressures

### Demand for fuel

In Lesotho more than 90% of the country's total energy consumption is utilised in the domestic sector (GOL. 2001). This energy is used for cooking, heating water and

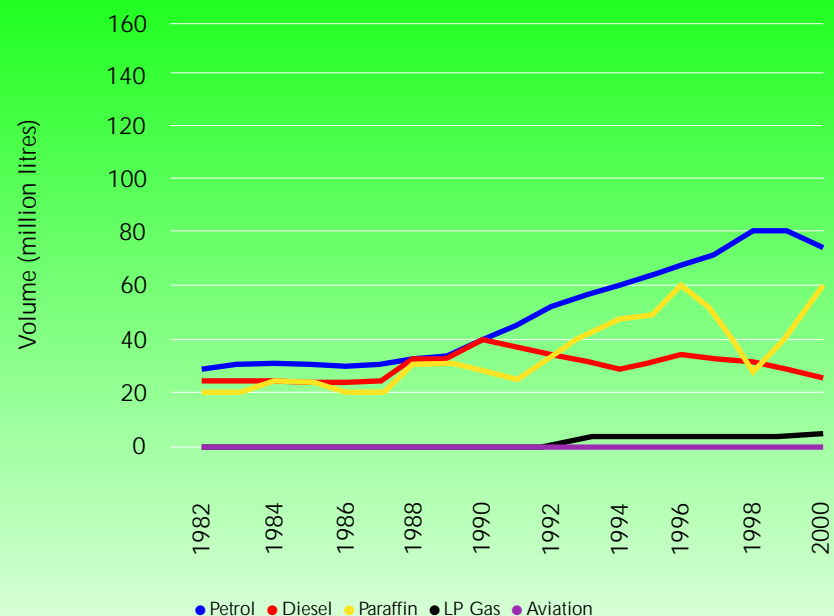


space, lighting and for powering entertainment appliances - radios and televisions. Sources of energy used include electricity, paraffin, biomass fuel - wood, animal dung, crop residues and shrubs, candles, Low Pressure Gas (LPG), coal and solar energy. These sources and their extend of use differ among urban and rural households depending on availability of source and its cost relative to the income of households in the area.

According to GOL (2001), the energy use patterns in urban and rural households are dependent on the following. First, over 80% of all households in Lesotho use wood and paraffin as main source of energy for space heating. Electricity, LPGas and coal are used to a lesser extent. Second, over 80% of all households use biomass fuels and paraffin as their main source of energy for cooking. Only 8.4% of the households, mainly in urban areas use LPGas while electricity use for cooking is very minute due to its cost and low connection rate. Third, about 95% of all households in the country use candles and paraffin as the main source of energy for lighting however in urban areas electricity is used mainly for lighting.

Also a small number of households in the country use solar energy for lighting and for powering entertainment appliances. Due to increasing population and human activities, both social and economic, there has been an increase in use of sources of fuel including those that contribute to climate change. Figure 5.1 shows the use of fuel over the years beginning 1982 to 2000. The use of biomass fuel is shown in Table 3.1. There is an increasing demand of biomass fuel since 1991 to 2001 perhaps as indications of the growth in the country's population and for that matter at the low end of the poverty spectrum.

Figure 5.1 Lesotho Petroleum Products Consumption



Transport is another sector that demands energy. In Lesotho, modes of transport include public buses and taxis, private vehicles and trucks. Air transport is between Lesotho and South Africa, while within the country, it is used by flying doctors service and the military. There is also a short railway, about 2km that is used by trains for transportation of goods into the country from South Africa.



Table 5.1 Comparative estimated biomass consumption in Lesotho in 1999 and 2000

Type of biomass	Energy consumption (PJ) (GTZ and Lahmeyer International 1991)	Energy consumption (PJ) (Government of Lesotho 2001)
Fuel wood	6,882	8,190
Shrubs	7,168	8,170
Dung	4,557	5,600
Crop residues	1,283	1,270
<b>Total</b>	<b>19,890</b>	<b>23,200</b>

### Use of ozone depleting substances (ODS)

The use of Ozone Depleting Substances is not widespread in Lesotho as in other countries worldwide. Lesotho consumed 5.4 tonnes ODS/year in 1997 but the amounts have decreased to about 2.0 tonnes/year in 2001 (Mphethi pers comm 2002). Table 5.2 depicts these trends in the decline in the ODS. Most country's ODSs emanate from refrigeration services as most of the appliances are still using CFCs as refrigerants. The country is implementing the requirements of the Montreal protocol and the decline could be attributed to ODS phase-out activities that include recovery of CFCs during servicing of refrigerators, training of refrigeration technicians, legislation on ODSs and public awareness activities. The country intends to eliminate the use of ODSs by the year 2008.

Table 5.1 Production of ODS in Lesotho

Year	Amount of ODS (Tonnes/year)
1997	5.4
1998	3.4
1999	2.8
2000	2.4
2001	2



## Industry, commerce, government buildings and other institutions

The industrial sector of Lesotho comprises approximately 200 registered medium to large-scale industries and 1 200 small-scale industries (GOL, 2001). These range from manufacturing, mining (quarrying), construction, carpentry and steelworks, brick-making, sewing and knitting. Electricity is the major source of energy in the production line, for lighting, motive power and space heating. Other forms used are coal, diesel and oil and their extent of use depends on the type of industry.

The commercial sector constitutes wholesalers, retailers, hotels, restaurants and other business services. There are about 110 large commercial entities and they use electricity as the major source of energy for lighting, cooling and heating. LPGas is used mainly for cooking while coal is used both for cooking and space heating.

Government buildings and other institutions consume large amounts of electricity for space heating, cooling, office appliances and equipment as well as lighting. Also coal and LPGas are used for space heating in winter. Solar energy is used in some health centres in remote areas for lighting, refrigeration, communication and water heating.

## Green house gases

The country has conducted GHGs emissions inventories as the vulnerability assessment study in 1997. The study revealed that Lesotho has a net emission of approximately 2,109.89 Gigagrams (Gg) of GHGs. The study indicated that in 1994 Lesotho was releasing about 5,149.09 Gg while absorbing 3,039.20 Gg of CO<sub>2</sub> (Ministry of Natural Resources, 2000).

## Inventory of green house gases emissions

In 1998, the National Climate Change Study Committee (NCCST) made an inventory of anthropogenic emissions by source and removals by sinks. Their results (taken from Ministry of Natural Resources, 2000) are in Tables 5.3 and 5.4. tables 3.3, 3.4, 3.5, 3.6 and 3.7.





Table 5.3 Emissions from energy sector (Gg)

	Green house gas source	CO <sub>2</sub> e	CH <sub>4</sub>	N <sub>2</sub> O	NO <sub>x</sub>	VO	NMVOC
	<b>Total energy</b>	<b>635.99</b>	<b>7.63</b>	<b>0.10</b>	<b>4.92</b>	<b>137.08</b>	<b>17.57</b>
1	<b>Fuel consumption activities</b>	<b>635.99</b>	<b>7.63</b>	<b>0.00</b>	<b>4.92</b>	<b>137.08</b>	<b>17.57</b>
2	<b>Manufacturing industries and construction</b>	<b>27.87</b>	<b>0.00</b>	<b>0.00</b>	<b>0.09</b>	<b>0.03</b>	<b>0.00</b>
3	<b>Transport:</b>	<b>220.69</b>	<b>0.05</b>	<b>0.00</b>	<b>2.10</b>	<b>17.70</b>	<b>3.33</b>
	Civil aviation	0.25	0.00	0.00	0.00	0.00	0.00
	Road transport	220.44	0.05	0.00	17.70	17.70	3.33
4	<b>Other sectors:</b>	<b>382.55</b>	<b>7.58</b>	<b>0.10</b>	<b>119.25</b>	<b>119.25</b>	<b>14.22</b>
	Commercial/institutional	2.15	0.00	0.00	0.05	0.05	0.00
	Residential	357.42	7.58	0.10	119.20	119.20	14.22
	Agricultural/forestry,fishing	22.99	0.00	0.00	0.00	0.00	0.00
5	<b>Other sources</b>	<b>4.87</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.1</b>	<b>0.01</b>

### State and impacts: trends

The 1997 State of Environment Report compared long-term meteorological data from the highlands with data from the lowlands using Maseru and Leribe to represent lowlands and Oxbow to represent highlands. To add value and dimension to the previous report on meteorological data presented in the previous report, Mejametalana data is

used to represent the Lowlands whilst retaining Oxbow to still represent the highlands. The main reason for the use of long-term data as opposed to short-term data is that climate change cannot be detected sufficiently within a short space of time. Temperature, rainfall, droughts and winds are discussed below to substantiate environmental changes in Lesotho over the years.



Table 5.4 Total GHG emissions in Lesotho (Gg)

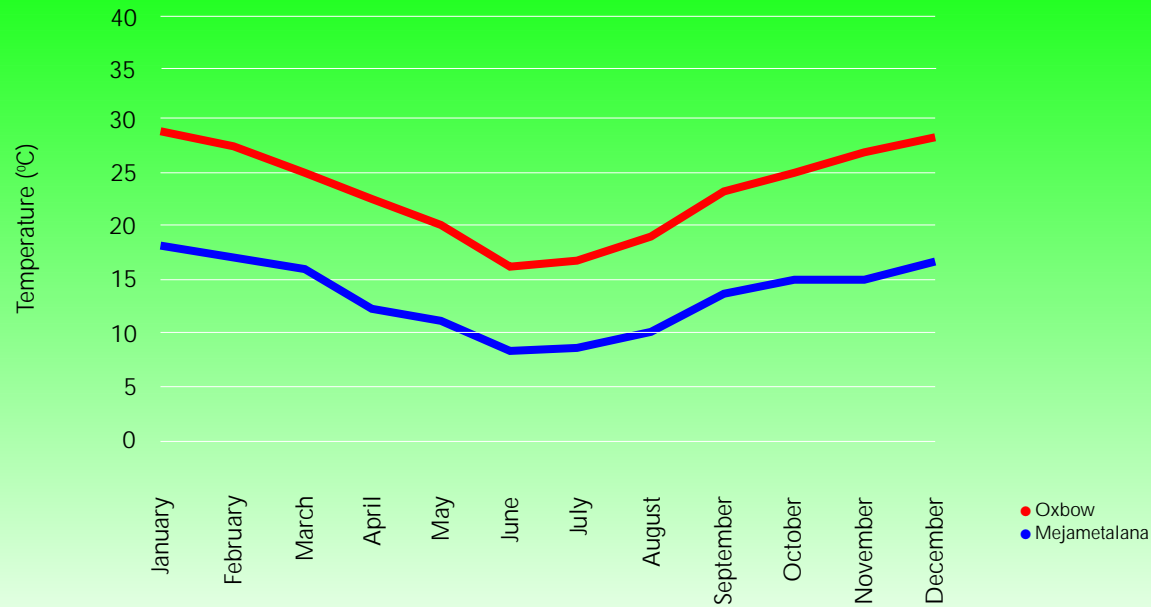
	Green house and sink categories	CO <sub>2</sub> e	CO <sub>2</sub> s	CH <sub>4</sub>	N <sub>2</sub> O	NO <sub>x</sub>	CO	NM VOC
	Total national emissions and removals	4,935.76	-3,039.20	46.29	0.69	5.05	143.81	17.57
1	Energy: Reference approach Sectoral approach	637.01						
2	Agriculture	0.00	0.00	37.31	0.50	0.50	0.13	0.00
3	Land use change and forestry	4,299.77	-3,039.20	0.00	0.00	0.00	0.00	0.00
4	Waste	0.00	0.00	1.27	0.09	0.09	0.00	0.00

## Temperature

The coldest month in Lesotho is July whilst the warmest month is December (Figure 5.2 and this coincides with the winter and summer seasons, respectively. A similar report in pattern of long term mean minimum and maximum temperatures for the lowlands and highlands was presented the previous State of the Environment in Lesotho 1997.



Figure 5.2 Long-term mean maximum temperatures in Oxbow and Mejametalana

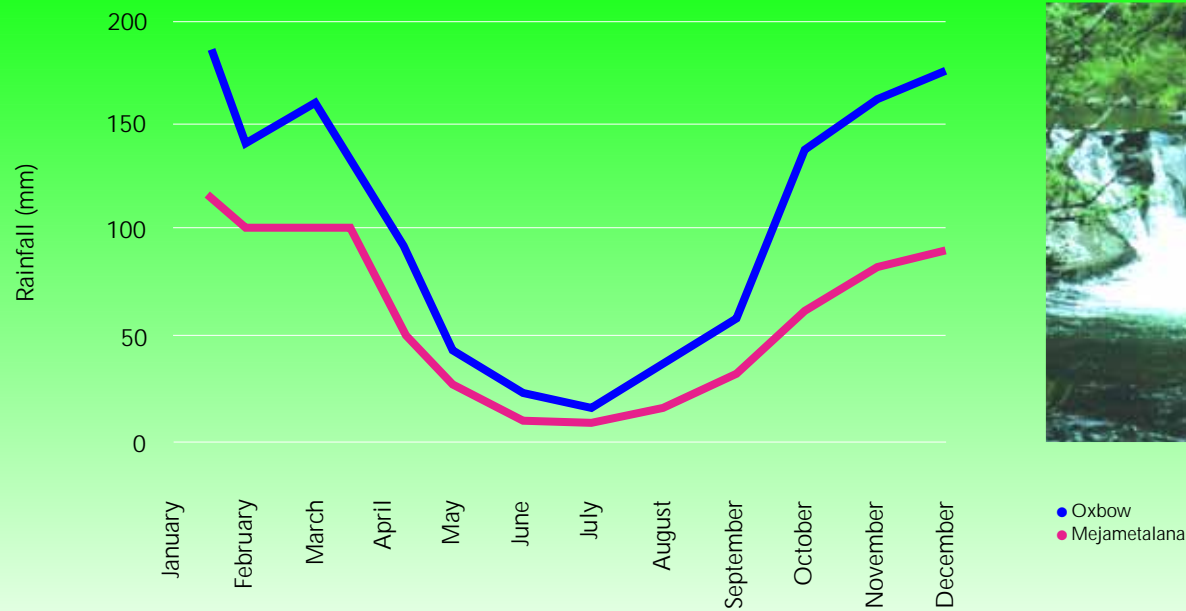


## Rainfall

Similarly, the long-term rainfall pattern follows that of the temperatures for the country with most of the precipitation in the warm summer months and relatively dry during the winter months (Figure 5.3). Geographically the highlands receive significantly more rainfall than the lowlands with mean precipitation of 1200mm whilst the lowlands receive 700mm.



Figure 5.3 Long-term mean monthly rainfall for Oxbow and Mejametalana



## Droughts

Drought is a recurring problem in Lesotho and respect of Lesotho it can be defined as a shortfall in precipitation that would not allow performance of normal economic activities especially agriculture. There are different definitions of drought such as agricultural drought, meteorological drought and hydrological drought and Lesotho experiences

mostly agricultural drought The available data of agricultural drought shows that the frequency of droughts is increasing with time in Lesotho (Table 5.5). During a ten-year period, 1986 to 1996 drought has hit the country seven times out of ten and agricultural performance was bad in those years. Even as recently as 2002, drought was so serious that it necessitated the Government to declare the state of famine in the country.



Table 5.5 Droughts occurrence from 1975 to 1996

Year	Condition of the year	year	Condition of the year
1975	Wet	1986	Drought
1976	Wet	1987	Drought
1977	Wet	1988	Wet
1978	Wet	1989	Wet
1979	Drought	1990	Wet
1980	Drought	1991	Drought
1981	Wet	1992	Drought
1982	Drought	1993	Drought
1983	Drought	1994	Drought
1984	Wet	1995	Drought
1985	Drought	1996	Wet

## Winds

Empirical data on natural disasters including storms and whirlwinds is scarce in Lesotho, however, in 1999 the Disaster Management Unit gathered sufficient information on the impact of whirlwinds on buildings in the ten districts of Lesotho and assessed their impacts to the environment and the socio-economics well being of the nation (Table 5.6). The assessment was on the number of houses blown by the wind. Of the ten districts, the mountain districts, and especially Thaba-Tseka suffered the greatest damage whilst the lowlands and in particular Botha-Bothe suffered the least damage.



Table 5.6 Impacts of whirlwinds in 1999 and 2001

District	Type of building		
	Houses blown	Schools blown	Churches blown
Maseru	256	3	4
Berea	162	-	1
Leribe	128	4	1
Butha-Buthe	75	2	-
Mokhotlong	308	2	3
Qacha's Nek	100	4	2
Thaba-Tseka	455	8	3
Mafeteng	10	-	1
Mohale's Hoek	104	4	1
Quthing	17	5	-

## Climate change scenarios

Lesotho's contribution to GHGs is minor however because insufficient vegetation cover, the country is can not compensate for the emissions of GHG's from fossil fuel combustion and therefore it is a net emitter of GHGs. Sekoli (1999) reported that Lesotho is among the countries of the world that are extremely vulnerable to climate change and of particular concern is on agriculture, water resources and health sectors.

The Lesotho Meteorological Services (LMS) has studied and simulated climate change for the years 2025, 2050 and 2075 using five Global Circulation Models (GCM) and one transient model and meteorological data collected from 12 stations from 1961 to 1990. The models assumed a mid-range estimate of future GHG emissions and a modest policy intervention of the reduction of these emissions. Under these assumptions, it is projected that CO<sub>2</sub> concentration in the atmosphere increased from 340 ppmv in 1961 to 1990 to 530 ppmv in 2075. The second assumption was that the global average temperature will increase by 1.5 °C.

Based on the stated assumptions, the models indicated that first for the *temperature scenarios*, temperatures will increase for most of the months up to year 2075. The highest temperature increase will be experienced for the month of June and the least temperature will be experienced in the month of May. Second, the for the *precipitation scenarios*, precipitation will be reduced most months except April where there will be an increase of precipitation. Third, for the *seasonal climate scenarios*, the temperatures will in all the seasons. By year 2075 summer and autumn temperatures shall increase by 2.0 °C, winter by 1.5 °C and spring by 2.7 °C. Fourth, *seasonal precipitation scenarios* indicate a decrease in summer and spring precipitation until 2075, a severe



decrease in winter precipitation and a minor decrease in autumn precipitation but will be significant by the year 2075.

These scenarios imply that Lesotho is likely to have a warmer climate in summer and spring with lower rainfall, while winter will have higher precipitation and autumn gradually increasing precipitation. This will result in seasonal rains of summer coming late in autumn and winters will have heavier snowfall and strong devastating winds.

### **Vulnerable sectors**

*Agricultural Sector.* In 1995/96 the Ministry of Natural Resources (2001) reported that the area planted in Lesotho was 63% maize, 28% sorghum, 12% wheat, 5% beans and 3% peas.

The GCM simulations predicted that climate change will have positive impact on maize production during normal and wet years whilst the impact on sorghum and dry beans is uncertain (MNR, 2000). The production of all crops is likely to improve in dry years provided the country adopts programmes and policies that adapt it to new agro-climatic conditions.

*Water Sector.* It is predicted that the surface and sub-surface run-off will be reduced due to predicted lower precipitation. Assuming the current population growth rate, climate and fresh water availability of 5.4 km<sup>3</sup> per year, the country will have water scarcity of less than 1,700m<sup>3</sup> per capita per year by the year 2019 and less than 1,000m<sup>3</sup> by the year 2062. This will impact negatively on livestock and households and it will bring about biodiversity disaster and closure of water based activities. Also a



conflict might occur between Lesotho and South Africa by the year 2075, as the latter will increasingly depend on the former for water supply.

*Forestry Sector.* It is predicted that projected climate change will impact positively on afforestation, as there is a potential for an increase of sub-tropical dry forest and temperate moist forest cover. This will happen provided that the current constraints of afforestation are relaxed and relevant development programmes are successfully implemented.

*Rangelands Sector.* Due to delayed precipitation under climate change, the country is likely to lose its nutritious climax grass and gain a lot of hardy less nutritious varieties. This will have serious consequences on livestock productivity and will lead to lower farmers income and increased meat import to meet the country's demand.

*Soils and Desertification.* GCM scenarios project showed increased rate and magnitude of soil erosion in the country. High temperatures, poor grass cover, lower rainfall, frequent droughts, rainstorms, strong winds and the melting of heavier snow are likely to increase soil loss far above current levels further weakening the capacity of the soils to support the country's economic and biological well-being (Ministry of Natural Resources, 2001).





*Biodiversity.* The warmer climate in the future will result in improved species diversity through migration and/or adaptation of imported species. However, a decrease in rainfall will encourage increase of those species tolerant of dry climate, resulting in improvement of herbal, floral and reptile species found in dry forests. On the other hand, indications are that global warming might result in rapid changes that will not allow gradual genetic make-up adaptation to drier conditions, therefore many species including endemic plants will become extinct.

*Health Sector.* Due to predicted warmer climate, the country could be invaded by tropical diseases for which it is ill-prepared as it is currently free of them. The projected dry summers and springs might result in increase of respiratory tract infections like tuberculosis and the waterborne diseases like typhoid. Severe winter will exacerbate acute respiratory infection, especially in the poverty-stricken rural areas.

*Basotho culture.* The climate change is likely to have positive impacts on the culture of Basotho people. Improvements in biodiversity will lead to increase in use of plants for medicinal and cultural purposes. Also improvements in biomass will lead to reduced use of dung and paraffin fuel.

## Response

In response to the problem of climate change, the United Nations (UN) established the Intergovernmental Negotiating Committee for Framework Convention of Climate Change (INC/FCCC) in 1990 and the committee in 1992 drafted the convention - the United Nations Framework Convention on Climate Change (UNFCCC). The convention was adopted during the same at the Rio World Summit. Lesotho ratified the con-

vention in 1995 and initiated the project - *Enabling Activities for the Implementation of UNFCCC*. The main objectives of the project were to assist Lesotho in meeting its obligations under the convention and to help in formulating and implementing the National Action Programme on Climate Change.

The responses to climate change in Lesotho have been motivated by a number of international and regional initiatives amongst which are the international conventions and protocols that Lesotho has entered into and the regional SADC climate change initiative. Other national initiatives in response to climate change are discussed in section 5.8.

### *Conventions and protocols*

In response to climate change and ozone layer depletion, the nations of the world drafted and adopted four conventions and protocols, namely 1) The 1992 UN Framework Convention on Climate Change which Lesotho ratified in 1995, 2) the 1985 Vienna Convention for the Protection of the Ozone Layer which Lesotho ratified in 1994, 3) the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer which Lesotho ratified in 1994 and 4) the Kyoto Protocol to the Convention on Climate Change, 2000.

Under the DPSIR framework adopted for the presentation of this report, some indicators may fall under one or more categories depending on the level of analysis. The international agreements listed above are responses at international level, but they also serve as important driving forces at the national level as Governments are obliged to meet the requirement of all international agreements they have ratified.



Department of Meteorology in the Ministry of Natural Resources, in collaboration with the NES, co-ordinates the implementation of these international agreements. In 1995 the Department of Meteorology received GEF financing to enable implementation of the conventions requirements. The support was under the Enabling Activities Project for the Implementation of UNFCCC to develop a National Programme of Action for Climate Change. The Project had six components, namely 1) public awareness campaigns on climate change, 2) compilation of greenhouse gas emissions, 3) assessment of vulnerability to climate change, 4) assessment of mitigation policies and measures, 5) assessment of adaptive policies and measures and 6) formulation of a national implementation strategy.

Each Convention has own requirements to be met by member states. For an example, to ensure compliance with its requirements, the Montreal Protocol mandates member states to draft necessary national legislation that would improve systems of collection, monitoring and control of ODSs.

Therefore, Lesotho has sought to abide by and live by the spirit of these agreements. A number of interventions ranging from national action plan on Climate change to drought management strategy have been formulated. Furthermore, Lesotho has a programme developed in 1994 to phase-out ODS. Public awareness campaigns have been conducted since 1995 involving ten refrigeration agencies that are ODS importing consumers. Additionally and to reinforce the country's efforts, the UNDP assisted in the implementation of a national programme for recovery and recycling of ODSs. The UNDP assisted project provided refrigerant recovery equipment to the maintenance Departments of major consumers of CFCs and to the refrigeration and air-conditioning service shops. The UNDP also provided equipment required for recycling the

recovered CFCs with the aim of establishing a nation-wide recovery, collection and recycling system.

A training seminar for technicians who undertook repairs, maintenance and installations of refrigerators and air-conditioners was also conducted. The training focused mainly on improved operations, service and maintenance of refrigerators. In addition, Customs Officers at the Lesotho entry points received training on control of illegal importation of CFCs. Identification kits will soon be provided to facilitate detection of CFCs.

Lesotho's responses to Climate Change were at the regional level. Lesotho participated in the Zero Emissions Research Initiative (ZERI) and the SADC Climate Technology Initiative.

### ***Zero emission research initiative (ZERI)***

ZERI was launched in July 1994 at the United Nations University (UNU) in Tokyo. The initiative aims at addressing environmental concerns associated with industries, increasing levels of pollution and environmental degradation while at the same time addressing issues of poverty, malnutrition and low productivity amongst the rural communities, particularly in Africa.

The advantage of ZERI is that it uses raw materials and makes use of existing resources rather than adding expensive inputs - to eliminate environmental pollution, increase productivity and create new jobs. It also encourages an industry to use its own waste as a raw material, or another industry to use them, to achieve total throughput- with



industries reorganising in 'clusters' so that waste or by-products without value in one activity can be converted into value- adding inputs for others. The initiative builds on zero defects, zero inventory and zero complaints.

Lesotho submitted a project proposal under ZERI on Mushroom Farming in 2000 and the proposal was approved by UNDP Lesotho. Three individuals from the National University of Lesotho (NUL), Agricultural Research Station and National Youth Corps have received some training on mushroom farming in Lilongwe, Malawi. The project is at an advanced stage, and propagation experiments are being conducted at the Faculty of Agriculture - NUL

### SADC climate technology initiative

Climate Technology Initiative (CTI) involves assessment of appropriate cleaner energy technologies with high potential in the sub-region. The initiative aims at promoting the diffusion of these technologies in order to reduce greenhouse gas emissions. CTI was launched by 23 developed countries and the European Community at the first conference of UNFCCC held in Berlin in 1995.

The SADC Environment and Land Management Sector (SADC-ELMS) and the Southern Centre are implementing the initiative with technical assistance of the United States National Renewable Energy Laboratory.

The initiative has undertaken a baseline study of existing cleaner technologies in the region and has identified barriers, which prevent the diffusion of such technologies with the aim of developing strategies of overcoming such barriers. Additionally, stake-

holders have identified possible technologies that could be enhanced in different countries with possible assistance of various financial institutions in the region. Lesotho was found to have very high potential of utilising solar energy for fruit and vegetable drying.

Whereas Lesotho has succeeded in developing the National Programme of Action for Climate Change with GEF financial support, the absence of a National Climate Policy and the associated National Adaptation Plan of Action makes it difficult to implement the Convention effectively. Furthermore, public awareness campaigns about climate change and associated remedial measures have been limited to a small number of stakeholders and as a result many stakeholders are still ignorant about climate change.

### Planned responses

The Government in collaboration with interested and affected parties have resolved to undertake measures to enhance the implementation of the UN Framework Convention on Climate Change, the Vienna convention for the protection of the ozone layer and the Montreal protocol on substances that deplete the ozone layer. In particular, they have resolved to 1) formulate the National Policy and the associated National Adaptation Plan of Action for climate change, 2) intensify and broaden awareness campaigns to the broader public through effective public awareness approaches, 3) promote the diffusion of cleaner technologies and 4) encourage local, regional and international financial institutions and donor agencies to provide financial support for the diffusion of cleaner technologies as their contribution towards the implementation of the above-mentioned agreements □





# 6

## *Aquatic and terrestrial ecosystems*

The total number of species recorded for Lesotho is 4,694 and compares well with the neighbouring Free State Province of South Africa, whose land area is four times the land area of Lesotho, with 3,487 different species.

Sixty percent of the Maloti/Drakensberg biodiversity hot-spot area, with 30% endemism, falls within Lesotho. Therefore, Lesotho together with South Africa has a responsibility for the preservation of the endemic species within the Maloti/Drakensberg biodiversity hotpot. In addition Lesotho has a sole responsibility for its true endemics - the small number of species that are found within the political boundaries of Lesotho and nowhere else.

The mountains of Lesotho are a fragile ecosystem and are globally important as a centre of endemism, sources of freshwater with unique wetland systems, preferred areas for recreation and as places of cultural significance. They contain diverse biota with a high concentration of endemic species and several rare and endangered species including the famous Spiral Aloe (*Aloe polyphylla*, *kharatsa*) and Maloti Minnow (*Pseudoberbus quathlambae*) both of which are threatened to extinction.

Threats to aquatic and terrestrial ecosystems are real as invasion by alien species of plants and animals and land and vegetation degradation are widespread Lesotho. Alien organisms can replace large numbers, even whole populations, of native animals and plants as alien plants use greater quantities of scarce water resources. The prob-

lems of land and resource degradation is further compounded by rapid population growth as people utilize unsustainably the natural resources to sustain their livelihoods.

### **Driving forces**

The driving forces for change in terrestrial and aquatic ecosystems are many and varied but the most important in Lesotho are 1) population growth, 2) population mobility, 3) natural disturbances and 4) poverty.

### **Population growth**

The agricultural revolution in the 1960s and modern medicine have allowed human populations to skyrocket in recent times (Stiling, 1992) as people now lead better lives and live longer. Population growth increases the demand for land transformation for settlements, agriculture, recreation, as well as demand for resources such as food, fuel, building materials, paper and board, minerals and water. Urbanisation, industrialisation, infrastructure development and pollution are consequences of an expanding population as consumption of resources is directly related to socio-economic developments as well as population growth. Per-capita consumption of manufactured products increases with economic and social development.

The population of Lesotho is currently estimated at 2.4 million, with 84% living in the





rural areas. The population growth rate is approximately 2.6% per annum. The average population density is presently 69 persons per km<sup>2</sup> countrywide and rising to 745 persons per km<sup>2</sup> on arable land in the lowlands and foothills. The increase in population density coupled with livestock population pressure on arable land has serious consequences on the country's food security. Severe land degradation, particularly in the lowland districts is widespread. Furthermore encroachment by humans into environmentally sensitive areas is likely to increase, due to industrial and agricultural activities. This pattern of growth is however expected to change due to decreased life expectancy as a result of HIV/AIDS pandemic.

### *Population mobility*

The increase in mobility due to modern transportation methods, easy access to previously inaccessible areas especially within LHDA's project area, weakening border control, international trade as well as international movement has resulted in the introduction of many alien species. Alien species may progressively displace indigenous species from ecosystems if they are better adapted to the site conditions than the indigenous species. This picture (Plate 6.1) illustrates how the countryside has been transformed by the road network through LHDA so much so that areas which were not easily accessible are now traversed with ease from mountains to the lowlands.

Plate 6.1 Malibatso bridge



## Natural disturbances

Natural disturbances, including climatic conditions (drought, frost, hail, snow), lightning-induced fires, predators, pests, and diseases occur from time to time. Although man has little or no control over these natural events, risk management to minimise their economic, social and environmental effects is important.

Climatic threats to ecosystems arise from both steady long-term changes and serious short-term climatic abnormalities (GOL, 2000). Particular plant species of the Afroalpine Grassland Zone first established themselves in the locality and progressively evolved under different climatic conditions (including oscillating warmer and colder climates) to become in time, constituents of the present flora of the zone.

The Afroalpine Grassland ecosystem of Lesotho may disappear and its biodiversity replaced by warmer, lower altitude flora as a result of global warming (GOL, 2000). With respect to cultivated plants and domesticated animals, global warming resulting in drier and hotter conditions than are existent today may further increase the threat facing diversity of the agricultural ecosystem. The variety of crop plants and animal breeds in the country may be restricted. It is possible that the numbers of livestock which could be sustained in a drier environment in the Lowlands and Foothills would be less, but a warmer climate would probably allow more animals to be kept in the cattle-post areas year round. If uncontrolled, however, this could have a devastating effect on the mountain ecosystem.

Lightning-induced veld fires occur in Lesotho, and protected areas with long grass are particularly vulnerable. Due to overgrazing of the rangelands and over-harvesting of

fuel wood, most parts of the country today do not have the accumulated fuel base conducive to major fires. Thus lightning-induced fires are today less common than in the past, and those that do occur are less likely to spread over large areas.

On occasions, Lesotho experiences severe drought so much so that plant and animal lives are threatened. During drought periods, which occur in cycles of a few years many plant and animal species die. The most sensitive ecosystems and non-succulent annual plant species show the effects first. The species composition of Lesotho rangelands may be affected more by drought than any other natural phenomenon. Staples and Hudson (1938) reported that a substantial change in grass species composition occurred following the 1932/33 drought. The increase in *Chrysocoma (sehalahala)* dominated pastures increased substantially following that drought. Significant declines in crop production have been experienced during 2001/2002 due to drought and the subsequent excessive rainfall killed most cereal crops.

In undisturbed environments, a natural balance tends to be reached between predators and their prey. The balance may shift temporarily in favour of the prey if better than average rains or an unusually mild winter occurs, allowing an increase in the numbers of prey. In the disturbed conditions existing throughout most of Lesotho, the threats to biodiversity from predators may become critical.

All wild species and all long-introduced domesticated species will have developed a natural resistance to local pests and diseases. However, the threat is still potentially serious for small host populations, or if a pest or disease is new to any particular plant or animal in the country. New pests and diseases may also arise by natural mutations in an existing pest or disease to which the plant or animal has developed some toler-





ance, or may spread to Lesotho from other countries.

## Poverty

Lesotho is presently facing a problem of acute and widespread poverty. Statistics show that in 1993 fifty percent of the population in the country was living below the poverty line and this was up from 2% recorded in 1986. Of the 50% population living below the poverty line, 26% was ultra poor in 1993 down from 39% in 1986/87. Increasing human population, declining agricultural production and severe land degradation in many parts of the country further exacerbate the problem of poverty. In addition, the retrenchment of Basotho workers from the South African mining industry is worsening the unemployment situation in the country and adding to the woes of poverty.

Vegetation cover constitutes about 70 percent of Lesotho's total land surface with grassland, which is primarily used for livestock grazing, comprising 61% including the invasive *Chrysocoma* sp. (12%), shrublands (8%), and mires (0.1%) and less than 1% under forest cover (Chakela, ed. 2000). Other land categories are shallow rockland (5%), residential areas (2%) and cultivated areas including woodlots (25%) (Chakela, ed. 2000)

The majority of households in Lesotho, particularly in the rural areas is dependent on biomass as the main energy source and this has placed tremendous pressure on indigenous trees and shrubs. The survival rate of the trees is therefore very limited due to socio-economic and climatic constraints. The energy sources include Government woodlots, natural woodland, shrubs, crop residues and community plantations. Cow dung is also important source of energy in the rural areas. There has been an increase in the use of biomass from 19.89 PJ in 1991 to 23.2 in 2001 (Table 3.1). Local com-

munities continue to over-exploit indigenous forests regardless of the existence of alternative sources of energy such a hydropower, solar and wind energy.

Plate 6.2 Wood gathering



## Pressures

### Exploration of natural resources

As discussed earlier, forests are continually being exploited as a result of economic disparities. The forestry division has often planted exotic tree species which were potentially inhibitory or harmful to other trees or other nearby plants or microorganisms (allelopathic) in areas with rich biodiversity. This has led to a decline in biodiversity in affected areas. Woodlots of exotic species should therefore be established in degraded area with low biological diversity. The ecology and behaviour of an exotic tree species should be studied before any large-scale introductions are made.

Other constraints include climatic constraints, competing land uses, weak land tenure system and poor land allocation practices, risks of woodlot destruction through fire and livestock, and limited choice of suitable tree species. Exploitation of natural woodlands and forests to meet energy and construction needs has led to the depletion of resources and degradation of these systems. The effects of deforestation on ecosystems has a negative impact on diversity of mammals, birds and insects by removing cover and nesting material. Other impacts include bush encroachment and an increase in invader plants. Bush encroachment reduces grass cover that leads to a decrease in carrying capacity for grazing and browsing animals. The impacts of deforestation are compounded by subsistence agriculture, especially in the communal areas where the density of human and livestock populations are high.

Domestic and international demand for resources such as certain types of plants, water,

and animals cause changes to terrestrial and aquatic ecosystems. In some cases some of these resources are over utilised, i.e. exploitation. Diamond mining is presently the main mineral mining activity in Lesotho. There exist other secondary mines like Moradi Dolerite Quarrying Company at Morija. There are several small-scale quarrying operations located above the Convention centre in Maseru, at Teyateyaneng and at St. Michaels. The country's two major clay-mining operations are Loti Brick and Unibrick, the latter having closed its operations leaving behind un-reclaimed open pits. River sand, which is a product of erosion, is being used for construction at both subsistence and commercial levels. The ecological effects of this industry include the acceleration of soil erosion by ruts formed by tractors/trucks collecting the material, and the collapse of river beds (See also chapter 3: Land Use).

Wild plants and animals are widely used for food, medicinal and other purposes, although in the case of animals, the depletion of the once abundant wild game has seriously restricted their use as a food source. In the Baseline Biology Survey carried out at Mohale catchment (Mokuku & Linder, 1996), 207 plants are said to be used for medicinal purposes. The list includes many other plants used for other non-food purposes. Recently there has been an alarming rise in the rate of harvesting of medicinal plants as more and more cross – border dealers enter Lesotho and leave with a significant amount of plant material. One estimate is that as much as 5 million plants are lifted each year (Letsie, 1993) out of Lesotho ecosystems. Amongst medicinal plants most commonly harvested for sale in Lesotho's urban areas or for sale to South Africa are *Alepidea amatymbica* (*Lesoko*) and *Dicoma anomala* (*Hloenya*). The roots of these plants are used to make medicine, and thus harvesting them involves destroying the plant.



Plate 6.3 **Moseha** (*M. macawonii*)



*A. amatymbica* only grows in the Maloti, where it is often found close to *Merxmuellera macowonii* (*Moseha*), a grass which is cut, and dried for export, although in this case the rootstock is not harmed and the plant can regenerate (Plate 6.3). Exploitation of the natural resource base is also a serious problem. Wild animals that could be hunted for meat or for skin are now rare, although a number are regularly caught for medicinal purposes, including the Striped Polecat (*Nakeli*) and Rock Dassies

### ***Conversion from natural to man-made systems***

The conversion of natural ecosystems for intensive agricultural production or for grazing livestock, is one of the major pressures on plant diversity. The quality and quantity of rangeland resources have however declined over the years due to factors such as poor range management, encroachment of human settlements and arable agriculture into the rangelands. Poor range management and poor farming practices have resulted in severe soil loss. Soil erosion is estimated at 40 million tonnes of top soil per year (GoL, 1994). Lesotho's Lowlands have largely been destroyed as an ecosystem by intensive agriculture. Both crop production and excessive use of pastures have also impacted on the Afromontane Grassland Zone for which the lowlands are a part. At the highest level, the Afroalpine Grassland Zone has also been subjected to grazing pressure and the wetlands - bogs and sponges within its limits have particularly come under threat of severe damage. The wetlands are the sources of all major rivers in Lesotho but they very existence is highly threatened due to trampling by livestock and in particular by cattle. Most of the wetlands have lost or are losing much of their ability to retain water. Wetlands are unique ecosystems with corresponding unique flora. The loss of the wetlands has a corresponding loss of their biodiversity (Guilarmod, 1969).



Pressures on natural habitats and biological diversity arise because cultivation and afforestation often involve replacement of natural or near – natural habitats rather than of already transformed habitats. In the process, the surface area of natural habitat has been reduced and fragmented, and impacted by pollution, alteration of hydrological cycles, and by management actions which are aimed at increasing production.

### *Increased productivity of man-made systems*

In spite of the declining agricultural productivity, approximately 85% of the population of Lesotho is still dependent partly or fully on agriculture for its livelihood. Continuous mono-cropping, over-use of chemical fertilizers, inappropriate tillage methods all contribute to the decline in agricultural production. In Lesotho, the spread of agriculture has contributed to the fragmentation of natural habitats, particularly of grasslands, wetlands and forest areas. This occurs mainly through extending farming systems into former frontier zones accompanied by clearing of natural vegetation.

Production pressures have also encouraged prolific monoculture which reduces biodiversity, and depletes soil nutrients faster than planting a variety of crops. This, combined with the high economic costs associated with crop failure, encourage increased use of agrochemicals. Conversion to monocultural farming systems also greatly adds to erosion of the diversity of naturally occurring organisms and habitats far from the original site.

The erosion of genetic diversity is in part due to monocultural farming systems replacing traditional polycultural systems that incorporated both intraspecific and interspecific diversity. In Lesotho, the introduction of hybrids has displaced more than 30 tradi-

tional maize, sorghum, wheat, and bean varieties that had been the principal source of food for generations.

Pressure to increase productivity of agricultural systems to meet domestic and international demands has encouraged widespread use of fertilisers, and other agrochemicals. Application of fertilisers is important to achieve optimum yields. However, it is equally important not to over-fertilise. Over-fertilisation also increases the concentration of nitrates in underground and surface waters and of phosphates in surface waters. The concentration of the inorganic compounds causes pollution and eutrophication.

According to agricultural census carried out in 1999/2000 in Lesotho, it was found that 11 types of inorganic fertilizers had been applied to 121,817 fields throughout the country. The two most commonly used compound fertilizers are 3:2:1 (25) and 2:3:2 (22) and have proportionally been applied to 43% and 28% of the fields, respectively. Deviations to these national statistics have been recorded. In Botha-Bothe farmers used lime and urea to fertilize and improve their crop yields. In Leribe various types of inorganic fertilizers were used and applied to 40,300 fields. Mokhotlong did not use any inorganic fertilizers. Furthermore, in some places organic fertilizers were used more than inorganic fertilizers. Farmers in rural areas preferred kraal manure where they applied it to 127,217 fields throughout the country. The results showed that wood ash was the second largest preferred type of organic fertilizer. The survey showed that 137,717 fields were fertilized with organic fertilizers of which 38% were from Leribe district and 25% from Botha-Bothe. Similarly, Mokhotlong district did not use any organic fertilizers.

Pesticides are also used in many parts of the country. Lesotho Agricultural Census



1999/2000 reported that among the pesticides used, Thiodan was the most commonly used pesticide (Table 6.1). Berea district had the highest number of fields - 9,100 where Thiodan was used. This pesticide was applied in small fields of areas between ranging from 0.01 ha and 0.49 ha. The Census revealed that pesticides are rarely used in fields of larger acreages due to the high cost of pesticides. Pesticides such as Metasystox and Dithane M45 were not popularly used.

In some parts of the country, demand for food and increased productivity has led to some farmers using marginal lands, cultivate unsuitable soils and in unfavourable climatic conditions and areas. These pressures, especially when combined with poor cultivation techniques such as ploughing down the slope, removal of plant material after harvesting, and not managing irrigated soils correctly, leads to increased runoff and soil erosion.

Table 6.1 Number of fields by district and type of pesticides used

District	Malathion	Metasystox	Ripcort	Karate	Dithane M45	Cutworm bait	Phostoxin tablets	Thiodan	Others	Total Fields
Butha-Buthe	0	0	0	400	0	0	300	5267	0	5967
Leribe	200	400	700	2400	200	300	3200	6200	700	13900
berea	200	0	100	1200	0	0	3200	9100	1400	15600
Maseru	600	0	0	0	0	200	0	1400	400	2600
Mafeteng	0	0	0	0	0	0	0	200	0	200
Mohale's Hoek	0	0	0	0	0	0	0	0	0	0
Quthing	0	0	0	0	100	0	0	100	100	300
Qacha's Nek	0	0	0	0	0	0	0	0	0	0
Mokhotlong	0	0	0	0	0	0	0	0	0	0
Thaba-Tseka	0	0	0	0	0	0	100	100	0	200
<b>Total (Rural)</b>	<b>1000</b>	<b>400</b>	<b>800</b>	<b>1600</b>	<b>300</b>	<b>500</b>	<b>3600</b>	<b>22367</b>	<b>2600</b>	<b>24864</b>





## Alien invasive organisms

Invasion of exotic trees and shrubs pose a severe threat to plant and animal diversity. The invasion has many ecological impacts which include alteration of soil nutrient cycling, reduction of runoff and subsequent stream flow, increased river bank erosion, altered fire intensity and reduction of light to the forest floor near to the ground.

Plant species such as *Acacia saligna* and *Hakea sericea*, have dominated areas to the extent that natural vegetation has been almost lost. Others, such as pine and eucalyptus trees, present a threat to ecosystems functioning, because they use greater amounts of water than the natural vegetation, and therefore reduce the amount of runoff that reaches the streams and rivers. Bird species such as Crested barbet and Redbreasted Sapsrowhawk are birds which have spread to Lesotho, exploiting the increased number of trees.

Exotic trees such as Grey Poplar, (*Populus canescens, popoliri*) and Silver Wattle (*Acacia dealbata, boloukatlele*) are examples of introduced plant species which have spread widely in the country and are replacing some indigenous species in suitable habitats (Talukdar, 1981). These however have some value as a source of fast regenerating firewood.

Water plant invaders also pose serious threats to native flora. Parrot's Feather (*Mariophyllum aquaticum*), a common aquarium plant, which is a native of South America has invaded a dam at the National University of Lesotho (Talukdar, 1993, 1995). In recent years, there has been new species of birds from outside the continent, such as the European Starling and Indian Myna, both of which have spread to Lesotho

Plate 6.4 Silver wattle (*Acacia dealbata*) declared an invader species



after becoming established in South Africa (Ambrose, 1988). The Crested Barbet and Redbreasted Sapsrowhawk are birds common to the region and have spread to Lesotho,



exploiting the increased number of woodlot trees. Of greater economic importance is the snout beetle, *Gonipterus scutellus*, which invades trees and defoliates leaves of several species of Eucalyptus, and is a threat to woodlot (forest) plantations (GOL, 2000).

### Climate change

Climate change alters the physical environment in ways that directly affect living organisms. Through Global Environment Facility (GEF) and the United Nations Environment Programme (UNEP), an assessment of Lesotho's vulnerability to climate change is being carried out. The mountain ecosystems may be negatively affected by climate change. The altitudinal distribution of vegetation is projected to shift to a higher elevation. Some species with climatic ranges limited to mountain tops may become extinct because of disappearance of habitat reduced migration potential.

Projections indicate that, under the climate change scenarios, Lesotho is to change into a tropical dry forest. Another feature that could result from climate change is an increase in biomass production. The implications are that forests and indigenous species may have faster growth rates. Climate change may therefore have a generally positive impact on Lesotho's forestry resources. Afroalpine Grassland ecosystem of Lesotho may disappear and its biodiversity replaced by warmer, lower altitude flora. With respect to cultivated plants and domesticated plants and domesticated animals, global warming resulting in drier and hotter conditions than are existent today may further increase the threat facing the diversity of the agricultural ecosystem.

It is again anticipated that under climate change, rainfall will be more erratic, droughts will be more intensive, and rain heavier. Agricultural enterprise will be more risky and

food security less assured. Climate change would further encourage land degradation, and there would be increased soil loss resulting in the expansion of abandoned land.

Table 6.2 Rehabilitation contribution by National Environment Youth Corps

District	Rehabilitated area (Ha)	No. of Conservation dams
Butha-Buthe	322	0
Leribe	425	2
berea	600	4
Maseru	525	5
Mafeteng	400	4
Mohale's Hoek	500	3
Qacha's Nek	505	0
Mokhotlong	200	0
Thaba-Tseka	620	0
<b>Total (Rural)</b>	<b>4617</b>	<b>20</b>

Source: NEYC, 2001





## State and impact: trends

### Forestry

Less than 1% of the Lesotho's total land area is under forestry (Chakela, 2000) yet most rural people still rely on biomass for fuel and thus placing tremendous pressure on indigenous trees and shrubs. The pivotal role played by trees in environmental protection includes soil stabilisation, soil erosion prevention, the control of water run-off in catchment areas, and the provision of shelter from wind and the sun's heat. The loss of vegetative cover has caused increased and more violent flooding, accelerated siltation of dams, and propelled phenomenal soil erosion rates thereby contributing to desertification.

Woodlot plantations have been undertaken for just that purpose and least for protection and improvement of the environment. Afforestation to reduce land degradation and protecting the soil must therefore not conflict with wood production. The poplars and willows planted throughout the country supply poles and fuelwood as well as assisting in the abatement of soil erosion. Many tree-planting initiatives in Lesotho were undertaken for production of fuel wood and not for catchment protection and as a consequent he impact of such a setting is manifested in the environmental change where a catchment ecosystem is showing signs of malfunction. In Leshoboro Plateau in the Berea District, a plantation of eucalyptus has caused drying up of seasonal springs. Some springs below the plateau have started to dry up earlier in the year than usual, while some have disappeared altogether. Eucalypts are also known to produce chemicals that inhibit the germination and growth of other plants below their canopy. In any event, tree plantations have shown to regulate the water flow more efficiently, pre-

venting the extreme runoffs that are characteristic of deforested catchments in areas of high rainfall.

A major environmental aspect of tree plantations is its integration with farming in agroforestry setups. However, the practice of agroforestry has been explored to a limited extent in Lesotho. The main challenge is to identify tree species that are compatible with other food crops, considering that moisture availability is almost invariably regarded as the critical limiting factor for crop growth.

Presently, a number of Social Forestry Projects and Programmes are implemented by the Forestry Division of the Ministry of Agriculture, the LHDA and several local and international NGOs including CARE -Lesotho, World Vision, Lesotho Red Cross, Plenty - Lesotho, Durham Link and Teyateyaneng Youth. Many of these projects have nurseries for fruit, fuel and fodder trees and community woodlots.

Plate 6.5 Cheche (*Leucosidea sericea*) forest in the Tsehlanyane valley



The Social Forestry Programme was initiated by the Forestry Division following the adoption of the Social Forestry Policy in 1995. The policy takes into account environmental protection and biodiversity conservation and also recognizes the importance of community participation for sustainable management of forest resources in Lesotho. The National Forestry Action Plan was later formulated in 1997

In 1998 the Forestry Act No. 11 of 1978 was repealed and replaced by the Forestry Act (1998). The Forestry Act (1998) empowers communities to manage their forest resources in a sustainable manner. The legislation also provides for protection of indigenous trees and shrubs.

The Forestry Division is charged with the responsibility of developing and implementing Social Forestry activities in the country. The programme is supported by GTZ and operates in the Districts of Maseru and Mafeteng. The programme supports farmers in tree planting through training, providing tools, credits and loans and supplying seedlings. The project also supports selected farmers in the establishment of micro-nurseries, providing a subsidy covering 75% of the costs of the inputs. This subsidy is meant to help launch an economically self-supporting enterprise. The programme has helped communities, individuals and NGOs to develop nurseries for seedling production and distribution. The Social Forestry Programme has also supported the preparation of the National Botanical Garden Master Plan which was completed early 1999.

The period of support to the Forestry Division by GTZ was scheduled for thirteen years beginning 1993 and ending 2005 but that was reduced to ten years beginning in 1993 and ending in 2002. Within the ten year period, the GTZ support has managed to 1) train over 1,310 forestry personnel, 2) develop concepts and guidelines for promoting

social forestry and these are presented in videos, posters, calendars and technical leaflets, developed forestry advisory service to 368 VDC members, awareness raising in 143 schools and introduction of social forestry to over 30,700 individuals, 3) increase production of fruit tree by importing 36,500 plants, establishing a tree resource centre and 25 families owning and operating fruit tree nurseries, 4) establish 25 private forest and fruit trees nurseries, 5) upgrade Social Forestry Extension Services through training activities and 6) construct and rehabilitate forestry infrastructure.

**Plate 6.6 Forest nursery of the Forestry Division**



Besides the Forestry Division, other Government Ministries and Departments are also involved in forestry activities. These are the Department of Field Services (DFS) in the Ministry of Agriculture and the Environmental Management for Poverty Reduction (EMPR) project within the Ministry of Tourism, Environment and Culture (MTEC). The number of trees planted by youth under the EMPR project from 1997 to 1999 are presented in Table 6.3. Comparatively, the Woodlot project planted 12,000 ha of State Forests from 1973 to 1985 and 2,000 ha of community forests in 6 years from 1987 to 1993.

The perspective of Lesotho forest situation is better analysed in respect of other vegetation types in existence in the country. Lesotho is considered to be a grassland country without any closed-canopy forest, and it is even considered to have very few indigenous trees (May, 2000). A study by National Rangeland Inventory (NRI) found that indigenous forests were occupying at least 34,252 hectares of Lesotho. Using cluster-

**Table 6.3 Trees planted by National Environment Youth Corps - NEYC, 2001**

Year	Out-planted trees
1997	14,486
1998	47,810
1999	25,418

ing and correlation, 12 broad land cover types have been identified in Lesotho (Table 6.4) and trees are very limited.

**Table 6.4 Vegetation types in Lesotho**

Type	Vegetation type	Area (ha)
1	<i>Hyparrhenia</i> grasslands	350 190
2	<i>Eragrostis/Aristida</i> grasslands	147 555
3	<i>Themeda</i> grasslands	474 797
4	<i>Festuca</i> grasslands	358 316
5	<i>Chrysocomal/Artemesia</i> low shrublands	359 316
6	<i>Leucosidea</i> tree/shrublands	131 201
7	<i>Rhus</i> tree/shrublands	110 771
8	<i>Merxmullera</i> grasslands	106 356
9	Shallow rocklands	158 202
10	Residential areas	69 431
11	Cultivated fields	765 512
12	Boglands	2 224
<b>Total area (ha)</b>		<b>3 034 235</b>

Source: May 2000



It is worth noting that the national average crown covers, i.e. the part of the plant directly above and below the ground) of *Lucosidea sericea* and of the various *Rhus* species amounted to 10.88% and 11.32%, respectively, of the total land area, while the total crown cover of all woody plants in these categories was 21.24% and 12.90%, respectively – revealing the overall openness of woody growth in much of Lesotho.

Much of the country's existing woody biomass stock originates from trees planted by the Lesotho Woodlot Project between 1973 and 1987. The majority of Lesotho's woodlots are located in the lowlands and foothills. By district, over half of the area planted and survived is in Leribe which accounts for 30% and Maseru which accounts for 26%. Eucalyptus generally predominates in the north, pines in the drier south and cypress at higher elevations.

### Grazing areas vs carrying capacity

The major types of livestock kept in Lesotho are cattle, sheep, goats, horses and donkeys. The mountains rangeland supports more than half of the total sheep population, approximately half of the horses and more than one-third of goats (Table 6.5). In Lesotho, there are no significant populations of ungulates, which are important since they utilize the rangelands quite extensively. Their exact numbers are unknown. Other small wildlife, such as rodents (hares, rabbits, moles) are significant users of rangelands.

In addition to human activities, the condition of rangelands in Lesotho is made worse by regular droughts and the problem of sheet and gully erosion which are partly triggered by heavy rainfall following a severe drought. A particular case in point is the 1932 to 1933 drought (Sechaba 1995). Plate 6.7 shows the extent of soil erosion in Lesotho. Transhumance has its disadvantages to rangelands in that the upper mountain zone is grazed between spring and late summer every year and as such seed develop-

Table 6.5 Percentage distribution of livestock in the four agro-ecological zones

Zone	Cattle	Sheep	Goats	Horses	Donkeys
Lowlands	33	18	23	18	38
Foothills	25	12	20	20	21
Mountains	32	56	38	49	27
Senqu valley	10	14	18	13	14

Source: Bureau of Statistics, Statistical Report No. 3: 1995





ment is prohibited, carbohydrate storage needed for regrowth is retarded, hence decline in rangeland quality. Furthermore many livestock owners exploit the mountain grazing areas and the system of transhumance by keeping their stock in the mountain grazing area throughout the year. Since the chieftainship administration has been eroded over the years, there is haphazard movement of the herd in search of better grazing – which is non-existent due to overstocking. Transhumance is also inequitable, since it favours lowland stock owners to graze mountain rangelands in summer and bring their animals to their village areas to graze crop residues in winter whereas the mountain area people are spellbound to their respective area. The system aggravates the con-

tamination of the pasture with internal parasites, as herders are not given sufficient supervision by stockowners to dose the animals regularly.

It is important to note that any assessment of carrying capacity of a given mountain rangeland does not usually give an accurate figure of acceptable stocking rate per unit area due to errors associated with methodologies employed in the survey and spatial heterogeneity of the mountain ecosystem. The information presented on carrying capacities in Lesotho is therefore intended to provide an overall picture of available range resources in the country.

Plate 6.7 Gully erosion



Plate 6.8 Livestock grazing in the upper mountain ranges of Lesotho



The first national rangeland survey in Lesotho was carried out in 1938 by the colonial administration. The result of the survey revealed heavy stocking rates and called for destocking of the mountain grassland in order to control range degradation (Staple & Hudson 1938). The second national rangeland inventory was conducted in 1972/73 growing season to specifically determine carrying capacities of rangelands in the nine districts of Lesotho excepting Thaba Tseka which was then not a separate district (Chakela 2000). The study showed a considerable variation in carrying capacities and stocking rates between districts. Leribe had the highest overstocking at +71,000 excess livestock units, while Mokhotlong had a higher carrying capacity of -24 000 other than stocking rate excess livestock units. The overall national stocking rate was estimated to be 39 percent.

The latest and more detailed survey was undertaken by the Range Management Division of the Ministry of Agriculture between 1983 and 1986. The survey estimated the national stocking rate to be 75 percent which was a 34 percent increase over a period of ten years. The increase in livestock numbers and the growing human population both contribute to increase in pressure on the limited range resources. Plate 6.8 shows the herded cattle in the Lesotho upper mountains. The impact of stock theft which is rampant in the mountain areas, although not desirable is bound to reverse the situation.

The 1986 survey indicated that 25% of the rangelands were considered to be in poor condition and the greater percentage was considered to be in a fair condition. The rangeland quality was however regarded as deteriorating, as evidenced by apparent topsoil erosion and the abundance of undesirable vegetation species on the rangelands in general.

## Conservation areas

In addition to the seven formal conservation areas discussed in section 2.2.4.7, Lesotho has a system of setting other forms of conservation for the protection of the natural resource. These are the formal botanical gardens, the managed resource areas, the forest reserves and the restricted access areas.

### Other conservation areas

A small botanical garden has been established at Katse, although it does not yet have formal protection. There are also proposals to establish a botanical garden in Maseru in the area formerly occupied by the racecourse.

Managed Resource Areas: certain areas under the control of chiefs and headmen have been traditionally set aside as *maboella* or reserved grazing areas. Very often, a particular area is forbidden to be used for the pasturing of animals so that stands of thatching grass (*mohlomo*; *hyparrhenia hirta*) can be allowed to grow. After the grass has been harvested, the area can be declared open to grazing again.

Range Management Areas (RMAs): areas specifically designated in the mountain rangelands in which rights to graze one's livestock have been restricted by the chief to a specific group of owners who have formed themselves in a Grazing Association (GA).

Forest Reserves and Plantation Areas: Forest reserves and Government-owned plantations are areas on non-arable land which have been specifically set aside for the establishment and sustainable management of exotic tree plantation. They derive from the



Lesotho Woodlot Project, which was set up in 1973. The total planted area was eventually more than 7 000 ha (Maile, 1999) mainly of pines and eucalypts in the Lowlands and Foothills of Lesotho, as well as in a few areas in the Maloti.

Restricted Access Areas (RAAs): Military Bases and Training Areas, the fenced area of the Letseng-la-Terae Mine, and the Moshoeshoe 1 International Airport are examples of RAAs. They have a capacity for biodiversity conservation because restricted access to the public and to domestic animals reduces the pressure on the flora and fauna they contain.

Agricultural Research Station shares a common site of about 230 ha on the outskirts of central Maseru with the Lesotho Agricultural College. This site may also be considered as a Managed Resource Area.

## Biodiversity

### *Genetic Diversity*

Cultivated plants and domestic animals bred for particular selected traits are genetically less variable than their wild counterparts. An example is the Basotho potato (*Litapole tsa Sesotho*), introduced into Lesotho over 160 years ago, before potatoes began to be cultivated for the market and progressively standardised. Genetic diversity in livestock kept by Basotho is also low because the government encourages the rearing of only economically important breeds.

Lesotho has a variety of plants and animals, even if they are not as obvious as those in

other African States that have well-established parks and game reserves (NES, 2000). Recent compilations show that Lesotho has 2961 documented plant species and at least 132 species of Thallophytes: algae and fungi. The total number of endemic plant species is estimated at 27 and one subspecies. Similarly, Lesotho has a limited variety of faunal species. There are 63 mammal species recorded in the country. However, historical records indicate an additional 19 species formerly present in Lesotho and are now locally extinct. Unfortunately, two of them are globally extinct. Table 6.6 shows the total number of species recorded for Lesotho. The vertebrate fauna includes 318 bird species, 40 reptile species, 19 amphibian species and 14 fish species. For its size, Lesotho exhibits a great diversity of birds and furthermore there are 22 bird species for which there are only historical records - "Historical Species" refer to species for which there has been no record in the past 50 years and most were commonly present in the past and these can be regarded as extinct in Lesotho, although most still exist in neighbouring countries (NES, 2000). Records also show three historical reptile species. The fish species include eight indigenous species of which one, the Maloti minnow (*Pseudobarbus quathlambae*), is endemic to Lesotho. Unfortunately this Lesotho endemic fish species is highly threatened by water project developments. Lesotho invertebrates are likely to be more numerous than all other animal and plant species put together, but they have been inadequately documented, and at present there are 1279 species recorded and of which 134 species are endemic.

Lesotho is an egalitarian society where access to land is unrestricted. As a consequence, therefore, natural resources and in particular biodiversity are under constant threat. Threats to Lesotho's biodiversity resources are many and varied but all are human induced. Habitat degradation, fragmentation, the impact of introduced species, and the altered regimes (reservoirs and weirs) are all human induced threats to biodi-





versity in Lesotho. Amongst all these threats, habitat destruction is considered to be the most damaging and in particular threats relating to overgrazing and extensive land clearing have resulted in the loss and fragmentation of habitat across the country. Overexploitation of plants used for medicinal purposes is an additional serious threat to biodiversity because of the destructive nature of harvesting of medicinal plants as roots form the larger portion of medicines used. However, Lesotho has played a pivotal role in preserving a genetic strain of wild potatoes (Basotho potatoes, *Solanum tuberosum*). These wild Basotho potatoes are found virtually in all districts of the country and grow amongst wild shrubs or between rocks along river courses.

The effects of large dams have also played a role in threatening Lesotho's biodiversity. The effects of large dams on Lesotho's biodiversity was studied when considerations for the instream flow requirements of LHWP dams were undertaken. The study predicted that there would be dense algal growths throughout the system, which can be toxic to fish. Additionally, the study predicted that the encroachment of exotic plants at the expense of native plants and the species that depend on them would be severe. Further the study showed that there would be moderate to critically severe increases of blackfly and other pest populations that would prey on livestock. Other effects of the dam on the natural resources were reductions in most fish populations, with some species like the Maloti minnow and trout reaching the point of extinction, declines in waterfowl and an explosion in rodent populations, which could affect crops along the riverbanks. Indicative effects were that these changes to the ecosystem will have major social impacts as many fish and wild vegetable species will be reduced by over 50 % (www.irn.org, 29/11/02).

Threats to Lesotho's biodiversity resources are not only limited to those in the wild but

are also real to the domestic or agricultural biodiversity. In agriculture, genetic diversity is very limited as national efforts have over the past years concentrated on a small number of high yielding varieties or breeds.

Table 6.6 Biological diversity in Lesotho

Group	No. of current species	No. of historical species	Total
Mammals	63	19	82
Birds	318	22	340
Reptiles	40	3	43
Amphibians	19	-	19
Fish	14	-	14
Invertebrates	1 279	-	1 279
Plants & Thallophytes	3 092	-	3 092

Source: National Environment Secretariat (2000)

## Flora

The flora of Lesotho, even though it has been profoundly modified by human activities, contains a diverse range of plants, of which the vascular plants ranging from the prim-



itive *Psilotum* to a wide range of flowering plants, of which a significant but unknown number is Lesotho endemics (Table 6.7). There are 3093 plant species comprising the thallophytes, bryophytes, pteridophytes, gymnosperms and agiosperms. It is estimated

that there are at least 44 endemic species, including lower plants, as well as some endemic subspecies. The best known floral endemic is the spiral aloe (*Aloe polyphylla*) (Plate 6.10).

Table 6.7 Number of known Lesotho plant taxa

	category	No. of families	No. of genera	No. of species	No. of subspecies	No. of varieties
1	Thallophytes (Algae and fungi)	>32	74	132	-	-
2	Bryophytes (Liverworts and hornworts)	>10	39	60	1	1
3	Mosses	>28	102	219	2	6
4	Pteridophytes (Ferns and fern allies)	20	32	85	1	15
5	Gymnosperms	6	16	62	1	8
6	Angiosperms (Monocotyledons)	24	187	776	43	72
7	Dicotyledons	106	466	1759	129	158
<b>Totals</b>		<b>&gt;226</b>	<b>916</b>	<b>3093</b>	<b>177</b>	<b>260</b>

Source: National Environment Secretariat (2000)



Plate 6.9 **Spiral aloe** (*Aloe polyphylla*)



The diversity of vegetation types is commonly used to express ecosystem diversity, since vegetation influences the occurrence and distribution of animals. The grassland biome is subdivided into three grassland types as has been described in the recent work of Acocks in the **Vegetation of South Africa, Lesotho and Swaziland** which was edited by Low and Rebelo (1996). Probably the most useful work of Low and Rebelo are the three vegetation types, Highveld Grassland mainly representing the moist cold high-

veld grassland extending to some 1800 m.a.s.l, the Afro montane Grassland representing the Afro Mountain Grassland extending from 1800 to 2500 m.a.s.l and the Afroalpine Grassland representing the Afroalpine Grassland above 2500 m.a.s.l.

Of great significance amongst these grassland biomes is the Afroalpine grassland that contains the greatest diversity of plant and animals. Descriptively, the sub-alpine scrub occurring within the sub-alpine belt has a variety of indigenous forest in a number of deep valleys, where it has survived firewood gatherers. The forests occur as narrow strips along river banks in remote areas. Thickets of indigenous trees can exist in favourable areas up to 2,500 m.a.s.l. Some areas are typically dominated by *Rhus* (*Kolitsaneltsinabele*) (Plate 6.9) while others are dominated by *Leucosidea sericea* (cheche), *Buddleia salviifolia* (*Ielothoane*) and *B. loricata* (*Ielora*). Tall patches of herb meadows in wetter areas and drier grassland on the ridges also dominate this grassland zone. The *Buddleia* – *Leucosidea* scrub was sometimes continuous with shorter *Passerina*, *Cliffortia*, *Phillipia* and *Inulanthera* scrub species mainly on northern slopes, which are drier. This vegetation type has apparently been converted into temperate grassland by fire (Jacot – Guillarmod, 1971; Weiland, 1982).

Plate 6.10: Spiral aloe (*Aloe polyphylla*)

The alpine belt, which occurs above the sub-alpine scrub at 2, 800 m.a.s.l., contained numerous spring bogs, wet herb and sedge meadows. *Merxmüllera* (*moseha*), *Festuca* (*Ietsir*), *Pentaschistis* (*hlokoana*) and various heaths of *Erica* and *Helichrysum* dominated the grassland. Heavy grazing of livestock, construction activities and mining have adversely affected the spring bogs. The grassland of Lesotho appears to be deteriorating at an alarming rate due to unsustainable range management practices. At present, approximately 359,680 ha of rangeland have been invaded by Karoo shrub,



*Chrysocoma ciliata* (*sehalahala*). This degraded area represents about 16% of the entire rangeland.

The best known and largest endemic is the spiral aloe (*A. polyphylla*, Kharatsa) which grows at heights of 2500 to 2800 m.a.s.l. Its market value is well known and it has vanished in the past 30 years from virtually all sites in the Front Range of the Maloti and also from sites within a few kilometres of roads. The plant however still occur in remote parts of eastern Lesotho where there are still thousands of plants.

Plate 6.10 Mosinabele (*Rhus lancea*)



## Fauna

Although hunting and intensive agriculture have had disastrous impact on the larger wild mammal species, Lesotho, for its size and more importantly population distribution, still has an impressive biodiversity with 63 remaining mammal species, 318 birds, 40 reptiles, 19 amphibians, 14 fish and 1279 recorded invertebrates, more than 100 of which are endemics. The state and impacts of the Lesotho fauna -mammals, birds, reptiles, amphibians, fish and invertebrates is discussed below.

## Mammals

Present knowledge of Lesotho's mammals is largely derived from Lynch (1994). His mammalian survey was based on 13 field trips made during the years 1988 to 1992. He recorded 52 mammal species and for each of them he provided a distribution map. Eleven additional mammal species, other than those recorded as historical mammals, were subsequently added to Lynch's list by Ambrose (1999c). Three of these, the house mouse, the house rat and the feral domestic cat, may have been omitted by Lynch because of their close association with man. Other mammalian species in Ambrose List are the Brown Hyena (*phiri*), the Silver Jackal or Cape Fox (*mopheme*), the Antbear or Aardvark (*thakali*), the Cape Ground Squirrel, the South African Hedgehog (*tlhong*), the Klipspringer (*sekome*), the Small Spotted Cat (qoabinyane) and the Natal Multimammate Mouse (*lephoho*).

The overall Lesotho record has mammalian representatives of 11 orders and 26 families. They could however be 27 families if the Springhare is, as suspected, also present in Lesotho. The Lesotho mammalian biodiversity complex compares well within



Table 6.8 Mammals which are found in Lesotho's checklist

Extinct mammals	Vulnerable species	Rare species	Intermediate species
Quagga (H)	African wild cat (R)	SA hedgehog (R)	Sciater's golden mole (U)
Blue antelope (H)	Honey badger (H)	Aardwolf (H)	Lesueur's hairy or wing-gland bat (R)
	Antbear (S)	Brown hyena (S)	Wintotn's (=De Winton's) long-eared bat (S)
	Orbi (R)	Leopard (R)	
	White-tailed mouse (U)	Caracal (S)	
		Hippopotamus (H)	
		Blue duiker (H)	
		Red duiker (H)	

A=Abundant, C=Common, U=Uncommon, R=Rare, Single=Single record, H=Historical.

Source: National Environment Secretariat (2000)

Southern Africa as a whole as the region has a total of 15 orders, 2 of them are marine animals (Skinner and Smithers, 1990).

The state of the Lesotho mammals may best be assessed in the regions Red Data Listing (Table 6.8). The Red Data Book is a convenient mechanism by which public and scientists are alerted to the status of threatened species of animals. The South African mammal Red Data Book assesses mammals which are threatened in South Africa and it includes mammals found in Lesotho.

### Birds

Overall, Lesotho has 340 recorded bird species represented by 21 orders and 61 families. Historically, there were 23 orders and 65 families of birds in Lesotho. Records show that up to 16 bird species that occurred in Lesotho prior to 1940 could be extinct (Osborne, 1992). This could be due to many factors but the most important is habitat destruction. The Lesotho bird complex is a complement of the Southern African bird complex where there is a total of 26 orders and 91 families (Maclean, 1993). However, 143 out of the 340 bird species recorded for Lesotho, 42% of the total have been recorded less than 10 times, and amongst these are 22 species which are purely historical, i.e. there have been no records during the past 50 years. Fifty-six other species have not been recorded during the past 15 years. The best known red data bird is the bearded vulture (Plate 6.11).

Although a number of records from the distant and more recent past are of vagrants which never became established in Lesotho, a significant number of species have vanished because of habitat loss. Amongst these are grassland species such as the Ostrich





Plate 6.11 Bearded vulture



and various species of Crane and Bustard. Changes in agricultural practice and animal husbandry, as well as the extinction of most antelope species have led to the loss of other species such as the Redbilled Oxpecker. On the other hand, increasing numbers of trees in towns and woodlots have provided opportunities for new species, as the Redbreasted Sparrowhawk (which hunts from tree cover) and species of Barbet, notably the Blackcollared and Crested Barbets (which nest in holes in trees and have recently become established in Lesotho). Some other species such as the European Starling and Indian Myna are newest additions Lesotho territory as part of their migrations through-

out the subcontinent. Six areas in the Maloti have been designated Important Bird Areas (Barnes, 1998) because of their importance as nesting or foraging areas for local and migratory birds.

Table 6.9 Red Data Book Checklist of bird species occurring in Lesotho

Vulnerable species	Rare or near-threatened species	Of special concern	Intermediate species
Bald Ibis (C)	Bearded Vulture (R)	Wattled Crane (R)	Black Stock (U)
Cape Vulture (U)	Black Harrier (U)		South African Longclawed Lark (= Rudd's Lark) (S)
Lesser kestrel (C)	Drakensburg Siskin (C)		
Yellowbreasted Pipit (U)	Ground Woodpecker (C)		
	Mountain Pipit (C)		
	Orangebreasted Rockjumper (C)		

A=Abundant, C=Common, U=Uncommon, R=Rare, Single=Single record, H=Historical.

Source: National Environment Secretariat (2000)



Infrastructure developments can also provide unforeseen opportunities for birds as in some cases wild fauna advantageously exploit them. The Cape Weaver normally depends on trees for building its intricate hanging nests but in the early 1980's, these birds were seen building their nests on electricity wires on the line crossing the Maloti from Maseru to Thaba Tseka. It was thus able to establish itself in new areas where it had previously been unable to breed because of lack of trees.

The bald Ibis or Southern Bald Ibis (*mokhotlo*) was once regarded as 'vulnerable' species is endemic to Lesotho, South Africa and Swaziland and has made a remarkable comeback. The status of many birds is however precarious in Lesotho and the adjacent territory in South Africa. The Cape Vulture is an increasingly threatened species and today there are no breeding colonies remaining in the Free State. Table 6.9 shows the red data checklist of birds found in Lesotho.

There are six officially designated Important Bird Areas (IBA) in Lesotho (Barnes 1998). The IBAs have been chosen on the basis of ecosystems enabling the habitation of the Cape Vulture *Gyps coprotheres*. Owing to the homogeneity of much of the Lesotho's highlands landscape, the Cape Vulture breeding colonies have been used as a skeleton for IBA selection, so that 64% of Lesotho's breeding Cape Vultures fall within an IBA. The six IBAs- Liqobong in Northern Lesotho, Upper Senqu River in the North-Eastern Lesotho, Mafika Lisiu in North-Western Lesotho, the Sehonghong and Matebeng and Sehlabathebe National Park both in Eastern Lesotho and the Upper Quthing Valley in Southern Lesotho cover 216 805 ha or 7.15% of Lesotho's land area.

## Reptiles

There has not been any reptile survey in Lesotho comparable to those undertaken for mammals and birds. However, systematic reptile survey have only taken place in the Lesotho Highlands Water project Phase 1A and Phase 1B areas, as well as downstream from the Maseru dam site along the Senqunyane and Senqu Rivers. The summary table 6.10 shows a large number of species for which there has so far been no authenticated record.

**Table 6.10 Checklist of Lesotho's reptiles**

Reptiles species status (1999)	Number of species
Abundant (A)	3
Common (C)	11
Uncommon (U)	1
Rare (R)	16
Single record (S)	9
Historical (H)	3
<b>Total</b>	<b>43</b>
No authenticated record (N)	19

## Amphibians

There is no published survey of Lesotho amphibians but a Southern African Frog Atlas project to gather information on the state of the amphibians and to develop a checklist is being undertaken. There is a possibility that once the Atlas has been produced, the





checklist for Lesotho will exceed 19 as new species may be recorded particularly in the lowlands where previous surveys were not as extensive. A couple restricted species - the aquatic river frog and the Lesotho River frog may be noted. In any event, recorded amphibians for Lesotho are presented in Table 6.11. Lesotho has no newts or salamanders and all its amphibians belong to the single order Anura, which consists of frogs and toads. Overall, Lesotho has 19 known anuran species and for its size compares favourably with approximately 98 species in South Africa and some 1600 species worldwide.

**Table 6.11 Checklist of Lesotho's amphibians**

Reptiles species status (1999)	Number of species
Abundant (A)	6
Common (C)	2
Uncommon (U)	4
Rare (R)	5
Single record (S)	2
Historical (H)	-
<b>Total</b>	<b>19</b>
No authenticated record (N)	9

## Fish

Although worldwide the number of fish species outnumber any other vertebrate

species, Lesotho has a limited number of fish species. The country's terrain coupled with poor land management systems and practices have all but driven fish stocks out. Additionally, the Orange-Vaal river system is relatively low in species diversity as it effectively has just 13 indigenous species, of which 8 species have been recorded in Lesotho. The best known Lesotho endemic fish species is shown in Plate 6.12.

Apart from the eight indigenous fish species, two species have been introduced; the common Carp, found in both dams and rivers, and also is farmed commercially in fish ponds on a small scale and three sunfish and bass fish species which were introduced into Lowlands dams as part of the nutrition improvement programme. The checklist of Lesotho fish species status is presented in Table 6.12.

**Table 6.12 Checklist of Lesotho fish**

Reptiles species status (1999)	Number of species
Abundant (A)	1
Common (C)	8
Uncommon (U)	5
Rare (R)	-
Single record (S)	-
Historical (H)	-
<b>Total</b>	<b>14</b>



Plate 6.12 **Maloti minnow** (*Pseudobarbus quathlambae*)



Red Data Book species occurring in the Lesotho are the endangered species, Maloti Minnow (U) and rare/intermediate species, Rock Catfish/Rock Barbel (Plate 6.13)

Amongst the two red data book species, the Maloti Minnow is Lesotho's only known true endemic vertebrate species. The fish was first discovered in the headwaters of the Mkhomazana in Kwazulu-Natal (NES, 2000), but was subsequently feared extinct. It was rediscovered at Sehlabathebe in Lesotho in November 1970. The Maloti Minnow has subsequently been found to occur in the headwaters of a number of Lesotho Rivers. Apparently, the survival of the Maloti Minnow is dependent upon the preservation of

the structural integrity of our river systems. On the Senqunyane River, the Semonkoaneng waterfall, 3.5 km downstream from the Mohale Dam, prevents other fish species from migrating upstream. The Maloti Minnow is consequently the only species found in the upper Senqunyane and its tributaries. The creation of the Mohale Reservoir and the possibility of trout being introduced through the tunnel connecting Mohale and Katse reservoirs are threats to the continued existence of the Maloti Minnow.

The Rock Catfish (*Austroglanis sclateri*), although rare downstream in the Orange, has been found to be fairly common in Lesotho. It is considered to be the best indicator species for instream flow requirements (IFR) need when designing future water projects even in the Lesotho Highlands Water Project.

Plate 6.13 **Rock fish** (*Austroglanis sclateri*)



## Invertebrates

Lesotho has 1279 recorded invertebrate species composed of 835 genera, 242 families and 45 orders. The South African Red Data Book lists butterfly Species and Lesotho records are included. The list include the **Rare species**; *Torynesis pringlei*, *Lepidochrysops loewensteini*, *Lepidochrysops oosthuizeni* and *Metisella syrinx*. The Pringle's Widow, *Torynesis pringlei*, was discovered in 1977 at Ha Rafolatsane, is a Lesotho endemic and has since also been found in Sehonghong valley in Mokhotlong District.

## Response

Poor management of rangelands in Lesotho has led to degradation of land resources including the wetlands and has posed a serious threat to both aquatic and terrestrial systems and components. The responses to these threats are many and varied but the most important are action taken the Government and major stakeholders in the management of the land resources. The first response of Government was to put measures to better manage the rangelands. The Government of Lesotho, in 1978 began implementing the concept of Grazing Associations (GAs) in consultation with livestock owners in selected parts of country. The erection and establishment of the Grazing Associations have been financed by donor agencies – first the Canadian International Development Agency (CIDA) and second the United States Agency for International Development (USAID). The concept of the GAs is premised on the notion that if management of rangelands were placed in the hands of livestock owners themselves, effective management and conservation of the rangelands would be enhanced since livestock owners have a vested interest. The first grazing association was established in

Thaba Tseka as part of Thaba Tseka Integrated Rural Development Project in 1978. Membership to the Association was drawn from wool and mohair farmers only. That first attempt of Government to involve the users of the rangelands in their management failed because non-members were dissatisfied with the concept of exclusive user rights to association members. This led to vandalism of fencing and other materials so much so that the association ultimately disbanded.

In the early 1980's the USAID in collaboration with the Government of Lesotho established another grazing association in Sehlabathebe using the experience gained in Thaba Tseka. Membership to this new association was open to all livestock owners in the area. The association also co-opted Chiefs in its executive committee as a way of involving local leadership in the management of rangelands. This approach seems to have worked somewhat are presently there are six operational RMAs in Lesotho. The RMA approach to rangeland management aims at empowering, training and advising communities for the control and management of rangelands. To date the associations have attracted more than 50 percent of livestock owners.

The Government of Lesotho has also embarked on a number of projects to halt the deterioration of the biodiversity particularly in terrestrial and aquatic systems with the boundaries of Lesotho. There are a number of biodiversity projects both completed and in progress that the Government undertook to conserve biodiversity. Also the Government has entered into a number of international agreements that would enable it to better engage itself with the efforts of conserving biodiversity.

## ***Completed and operational biodiversity projects/programmes***



The main role players in the implementation of the convention of biodiversity in Lesotho are the National Environment Secretariat (NES) and the Lesotho Highlands Development Authority (LHDA). Both agencies are implementing a number of biodiversity projects in the country. Short descriptions of completed, operational and proposed biodiversity related projects in Lesotho are presented below.

**The Drakensberg- Maloti Mountains Conservation Programme** started in 1998 and was completed in 2000 with the support of the European Union. The programme has assisted mountain communities, private interest groups and local authorities to better understand their geo-political and social dimensions of their project area. In addition, the programme has undertaken vegetation surveys and range condition assessment with full involvement of stakeholders.

**The Maloti-Drakensberg Transfrontier Conservation and Development Programme** is a World Bank/ Japanese Government financed Global Environment Facility programme which supported the Governments of Lesotho and the Republic of South Africa to draw up a project document for financing to enable biodiversity conservation and tourism developments in the project area. The programme started in 1999 and is now in the implementation phase. The project is intended to enable Trans-Frontier Conservation and Development and sustainable use of mountain resources. The project is co-coordinated by the Ministry of Tourism, Environment and Culture in Lesotho and the Ministry of Environmental Affairs and Tourism in the Republic of South Africa.

**Conserving Mountain Biodiversity in Southern Lesotho** is financed by Global Environment Facility and implemented by United Nations Development Programme (GEF-UNDP) and is intended to assist Lesotho in the conservation and sustainable use

of its biological resources in the Southern Districts of the Country. The project is coordinated by the National Environment Secretariat (NES). The project is addressing biodiversity conservation and sustainable use of rangelands, woodland, wetlands and species of specific importance.

**The Lesotho Highlands Water Project (LHWP)** is one of the largest construction projects currently under way in the world that is exporting surplus water to the Republic of South Africa (RSA). The construction of dams and tunnels has impacted negatively on the peoples and biological diversity of the affected areas. To ameliorate these effects, the Lesotho Highlands Authority, a project implementing agency, has undertaken a number of measures amongst which are preparation of a Comprehensive Environmental Action Plan in order to ensure that mitigation measures to minimize the negative impacts on biodiversity are identified and implemented. Emanating from the environmental Action Plans, LHDA firstly established two protected areas in two ecologically unique areas of Bokong and Ts'ehlanyane, secondly, ex-situ conservation measures are undertaken by establishing a high altitude botanical garden at Katse and thirdly undertaking monitoring of biological resources regularly within the project areas. Additionally, the LHDA is currently implementing a number of conservation programmes. First, propagation of Medicinal Plants in community gardens for community use and commercialisation. The project also includes propagation of an endangered species of aloe that is confined to the highlands of Lesotho – Spiral Aloe (*Aloe polyphylla*). Second, conservation and ex-situ breeding of Maloti Minnow (*Pseudobarbus quatlhambae*), an endangered fish species found only in the high altitude streams of Lesotho.

***SADC regional biodiversity projects***



There are currently two regional botanical diversity projects, operating in Lesotho, namely, the Southern African Botanical Network (SABONET) and Service for Environmental Conservation of Biodiversity and for Sustainable Development (SECOSUD). The SABONET addresses issues of capacity building in taxonomy, ensures proper record keeping of all specimens (floristic data) that are available in the country's three herbaria through computerization using PRECIS program and also improves on the herbaria collection. One of the most significant achievements of SABONET is the recent publication of a Plant Red Data List for Southern Africa. The funding for the project is administered through the NETCAB Programme (Regional Networking and Capacity Building Initiatives for southern Africa) and the Conservation Union's Regional Office for Southern Africa (IUCN-ROSA). It is co-funded through the Global Environment Facility (GEF) and United Nations Development Programme (UNDP). SECOSUD seeks to enable the country to further refine strategies for conservation of biodiversity through mapping of economically important plants available in Lesotho. It also attempts to create a network for collections and distribution of information on plant resources within the SADC region that can provide information services in support of decisions in the planning of biodiversity conservation. The SECOSUD Project is financed by the Government of Italy.

The third regional project where Lesotho is taking part is the GEF funded Southern African Biodiversity Support Programme coordinated by the SADC Focal Point in Malawi. The project is intended to 1) improve the availability and accessibility of biodiversity information and its application in conservation planning and management, 2) achieve cross-sectoral national and regional cooperation in biodiversity conservation and sustainable use activities, 3) develop national and regional institutional capacity for coordination and implementation of biodiversity conservation and sustainable

use activities, 3) integrate effective practices of sustainable natural resource use into national and regional conservation and other sectoral planning and programmes and 4) develop financing mechanisms to ensure the sustainability of the regional support framework

### *Wetland conservation projects*

The mountains of Lesotho support numerous unique wetlands, which contain high diversity of endemic species. Most wetlands in Lesotho are commonly found in river-heads at high altitude and serve as origins of most of the major rivers in the country. Wetlands are variable in size, ranging from several square meters to several square kilometers and cover approximately 1.36% of the total land area. The functions of the wetland systems are to purify and regulate water flow into streams by storing and releasing water at slow rates. They also prevent flooding during the rainy season. In addition, the systems play an important role in ground water recharge, organic matter production and reduction of sediments.

Two main factors that are responsible for degradation of wetlands are unsustainable land use practices and climate change. The extent of the damage is variable, with some wetlands being trampled by livestock and beginning to lose their function and some having gullies running through them and totally destroyed. Many wetlands, particularly mires are found within rangelands that provide grazing for domestic livestock. Overgrazing and trampling by livestock have damaged many of these wetlands. The most unfortunate of these destruction incidences is where there has been diamond mining in the kimberlite pipes and road construction activities. The 'Moteng to Mokhotlong road is a prime example where road construction has seriously damaged



some wetland systems. Additionally, the climate has gradually become drier over the past 4,000 years (Chakela, ed. 2000) and as a result hydrologic regimes of the wetlands have been altered. The invasion of ice rats has also contributed to the degradation of wetland peripheries. The ice rats have caused considerable soil displacement by burrowing and thus promoting wetland aeration and oxidation. In such instances therefore, soil erosion and accelerated rate of disappearance of peat is prevalent (Morris and Grab, 1997). Cultivation around the edges of the wetlands has caused the reduction in size of the wetlands as well as their drying up as farmers gradually encroach into the wetland proper.

To assist Lesotho to come into terms with the loss of these ecosystems and to draw up plans for the conservation of wetlands, there are two initiatives; the Wetlands Regional Initiatives and the Completed Wetland Initiative.

### *Wetlands Regional Initiatives*

The wetland Conservation Programme for Southern Africa was initiated by the ten Southern African Development Community (SADC) member states and was funded by the Royal Norwegian Ministry of Development Cooperation (NORAD), through the World Conservation Union (IUCN). An assessment of the situation of wetlands in the sub-region was undertaken from 1990 and was completed in 1996. The survey provided information on the status of wetlands in respect to their types, condition and threats facing them. In addition, the report presented a generic regional programme of action for conservation and sustainable use of wetlands. The second phase of the project is focussed on regional training to capacitate resource manager in the sub-region with skills for conservation and sustainable use of wetlands.

### *Completed Wetland Initiatives*

The Lesotho Highlands Development Authority (LHDA) has undertaken several wetland studies in both Phase 1A and 1B of the Lesotho Highlands Water Project (LHWP). The first study focused on a single degraded wetland at Bokong headwaters in the Phase 1A (Schwabe, 1992). The main factor responsible for the degradation of the Bokong wetland was the road construction activities of the Lesotho Highlands Water Project. The study provided a general quantitative description of the physical and botanical status of the wetland and its condition to perform its function. Further the study provided an assessment of the present rehabilitation work to adequately restore the functions of the wetland and it provided suggestions to further restore the wetland and to provide advice on the monitoring of the system. Some rehabilitation activities have since been implemented, with limited success, in an attempt to restore the wetland.

The second study was more extensive and was undertaken in Phase 1A by Marneweck and Grundling (1999). The study was on 28 mires that occur in the upper catchment areas of the Malibamat\_o, Motete, Matsoku and Khubelu Rivers. The study aimed at providing a baseline assessment of the size and diversity of wetlands in order to get a better understanding of their current status. Further, the study identified current and potential threats to the long-term conservation of the systems and highlighted key issues and concerns that may affect their long-term conservation. The study identified anthropogenic impacts that are responsible for degradation of wetlands and they include cultivation, roads, grazing and trampling.

A similar study involving the identification and assessment of wetlands was also under-





taken in Phase 1B area of the LHWP as part of the Baseline Biology and Reserve Development Study. For each wetland the physical and biological attributes were recorded. In addition, the extent of degradation was also assessed for each wetland. The LHDA is extending the project by including annual monitoring of the condition of the wetlands for an initial period of five years.

The Maloti-Drakensberg Transfrontier Conservation and Development Project activities involved *inter alia* the assessment of the current status of resources in the area, including wetlands and identification of major threats. The digital Landsat Thematic Mapper Center satellite imagery was used to derive the latest land-cover database of the study area. The project has produced initial map showing the spatial distributions of rivers and wetlands.

The Department of Water Affairs (DWA) of the Ministry of Natural Resources in association with other Government Ministries and Departments is currently rehabilitating the wetlands in the headwaters of Motete, Mothae, Kotisephola and Sani in the Mokhotlong District. The main rehabilitation activities of the project involve construction of gabions and revegetation of degraded wetlands. If successfully implemented, the project would contribute to maintenance of the required water quality and quantity of water in streams for various purposes including irrigation and hydropower in Lesotho and the neighbouring countries of South Africa, Botswana and Namibia.

### ***Proposed biodiversity projects***

NES, with the assistance of the GTZ, has developed a comprehensive Master Plan for a proposed National Botanical Garden and Green Belt to be located within the City of

Maseru. The garden will be used for recreation, education, research, propagation and protection of endangered species and creation of special habitats. NES is presently looking for external funding to implement the project.

### ***Biodiversity treaties, convention and protocols***

To successfully conserve its biological resources and in particular, Lesotho has entered into a number of treaties, conventions and protocols. The list below has been entered into the Government Treaty List.

- 1) Convention on the Protection of Flora and Fauna, signed in London on November 1933, with reservation in respect to Article 10.
- 2) Convention on the International Trade in Endangered Species of Wild Fauna and Flora, signed in Washington DC on 3 March 1973.
- 3) Convention on Biological Diversity, signed in Rio de Janeiro on 11 June 1992; ratified on 10 January 1995.
- 4) Cartagena Protocol on Biosafety, acceded on 31 July 2001.
- 5) Lusaka Agreement on Cooperative Enforcement Operation directed at the Illegal Trade in Wild Fauna and Flora, 1996.

### ***Biodiversity country study and national biodiversity strategy***

In 1996 the Global Environment Facility (GEF) provided assistance for the preparation of Biodiversity Country Report and a National Strategy and Action Plan as part of GEF Enabling Activities. The two documents were published in 2000. The exercise was carried out with full participation of relevant stakeholders. Key issues that were raised by



stakeholders in various consultative workshops have been incorporated in the Biodiversity Strategy, and these include and they include 1) promoting Protected Area mechanisms especially at community level, 2) supporting maintenance of productive biodiversity rich rangelands outside the Protected Areas and 3) developing an enabling environment through policies and incentives as well as empowering people and local communities to conserve and sustainably use biodiversity.

### **Biosafety**

The National Biodiversity Strategy for the conservation and sustainable use of biological diversity recognizes the need to safeguard against harmful biological agents. Therefore, *Action 19* of the strategy emphasises the need to manage biotechnology on an environmentally sound basis. Although the country lacks the capacity to implement programmes geared towards biotechnology and biosafety, the national strategy requires the adoption of the following measures; 1) establishment of a National Focal point and competent authority for management of biotechnology, 2) formulation of biosafety guidelines and regulations, 3) improvement of capacity to manage and reduce risks associated with biotechnology, 4) improvement of coordination of national and regional policies on biosafety, 5) strengthening of research, education, awareness and training on biosafety, setting up a national tracking system for movement of Living Modified Organisms (LMOs), 6) controlling trans-boundary movement of LMOs, 7) setting up information and alert systems to detect illegal traffic of LMOs, 8) improvement of national capacity to monitor the effects of LMOs, 9) continuation and participation in the international negotiations for the development of a Biosafety Protocol.

Lesotho's efforts in the control and management of GMOs and LMOs are not only limited to the domestic front but are also international focussed. Lesotho was the sixth

country to ratify the Cartagena protocol on Biosafety in July 2001 and is among the one hundred eligible countries to benefit from the current UNEP/GEF National Biosafety Frameworks Project. Lesotho has sought this assistance and has been granted a project to assist in the development of national biosafety regulatory framework and enhancement of public awareness on biosafety issues nationwide. NES has also submitted a comprehensive proposal on Public Awareness on Biosafety and Biotechnology to GTZ for funding.

### **Range management and agriculture**

Poor management of rangelands in Lesotho has led to serious degradation of rangeland resources including the wetlands. In an attempt to control the problem, the Government in 1978 in consultation with livestock owners in various parts of the country started introducing the concept of Grazing Associations (GAs) as a better way of managing and sustainably utilizing the rangeland resources. To implement the concept, the Government sought assistance from donor agencies such as the Canadian International Development Agency (CIDA) and United States Agency for International Development (USAID). Given the communal nature of the Lesotho's rangelands, it was presumed that if management of the rangelands was placed in the hands of livestock owners themselves, maybe effective management and conservation will increase thereby affording the country with improved rangelands since livestock owners will have vested interest. Presently, there are seven operational RMAs in Lesotho at various stages of their functionality. The RMA approach to rangeland management aims at empowering, training and advising communities for the control and management of rangeland resources. To date the associations have attracted more than 50 percent of livestock owners.



Needless to say that all have but failed. The reasons for their failure are many but the most important are the social problems of the land use rights. The first grazing association was established in Thaba Tseka as part of Thaba Tseka Integrated Rural Development Project in 1978. Membership to the Association was drawn from wool and mohair farmers only. The separation of livestock owners into association membership and/or non-membership caused problems as access and use rights were now limited to members only. Therefore, the association collapsed because of the intransigency of non-members who were dissatisfied with the concept of exclusive user rights to association members. This led to vandalism of equipment and other resources and ultimately the association collapsed.

In the early 1980's the Government of Lesotho in collaboration with the USAID established another grazing association in Sehlabathebe using the experience gained in Thaba Tseka. Membership to this new association was open to all livestock owners in the area. Further, the USAID approach recognized the role played by chiefs in land management and therefore co-opted them into members of executive committee of the association as a way of involving local leadership in the management of rangelands.

Further interventions from Government of Lesotho have been attempted. The first attempt at enhancing agricultural productivity while controlling land degradation was for the agricultural sector to initiate the Agricultural Sector Investment Programme (ASIP) in 1996 with the support of the European Union (EU). The programme had six sub-sectoral strategies, namely 1) Agricultural Policy and Strategy Development, 2) Privatisation and Market Liberalisation, 3) Land Reform and Natural Resource Management, 4) Agricultural Diversification, 5) Reorientation of Agricultural Support Services and 6) Strengthening of Capacity Building Programmes. Overall, the ASIP was

meant to be implemented over a period of 10 to 15 years. The ASIP programme had identified priority areas within the different sub-sectoral strategies but the implementation of these was deferred to a latter date due to lack of capacity and absence of the required policy framework.

The first of the six programmes to be implemented was the Agricultural Policy and Capacity Building Project (APCBP). It started in 1998 and was coined to be a foundation for the implementation of ASIP through the improved institutional and policy arrangements, financing and delivery of public and private services in the country. The APCBP was meant to operate for three years beginning in 1998 but has since been extended to end of 2003. The APCBP has four components; Sectoral strategy and management, Agricultural support services, Land management and administration and Change process management. The Sectoral strategy and management consists of three sub components; Policy analysis, Planning and Budgeting and Monitoring and Evaluation. Agricultural support services component aims at the rationalisation, decentralisation and effective delivery of agricultural support services and consists of three sub components; Extension, Research, Marketing Facilitation and Technical Services. Land management and administration component aims at strengthening the Department of Lands, Survey and Physical Planning and it is being administered by the Ministry of Local Government. Change process management consists of four sub-components; Institutional Restructuring, Human Resource Management, Financial Management and Privatisation and Divestiture.

Furthermore, in its attempts to better manage the land resources while optimising productivity, the Ministry of Agriculture has also drafted an Irrigation Policy for utilisation of the country's water resources for agricultural purposes. The policy will assist in



enhancing crop production and will reduce the effects of the effects of periodic droughts.

### **Policy and legislation**

Lesotho has demonstrated its political commitment to addressing global environmental problems by becoming a Party to various environmental Conventions and Treaties. It has however not translated this political commitment into concrete actions due to diverse implementation constraints. The main barriers include *inter alia* poverty and lack of financial resources, limited human and institutional capacities and lack of public awareness and political will. Although there are limitations in respect of the aforementioned, Lesotho has drafted a number of legislative instruments to assist in management of the land and land resources. The Country has a multiplicity of laws, which relate directly or indirectly to the preservation of ecosystems. These laws have mostly evolved separately in response to a variety of different perceived needs. Consequently therefore, there are both overlaps and inconsistencies, as well as serious gaps. For example the flora in Sehlabathebe National Park is not legally protected, and many Red Data Book species are afforded no protection under Lesotho Law, while other less threatened species are at least theoretically legally protected.

Lesotho laws meant to protect and preserve the natural heritage date back to the Colonial era. Customary Law (Cape of Good Hope Government, 1873), is an early account of reserved grazing areas (maboella) and customs relating to the conservation of reeds, grass, *loli* (*Hypoxis* spp.) and forests. The Laws of Lerotholi are a partial codification of these and other customary laws. Out of the body of statutory laws relevant to the environment as a whole, only those statutes that deal with flora and flora (includ-

ing both wildlife and livestock) are listed (NES, 2000). These are

- 1) Bees (Protection) (Act 9 of 1869),
- 2) Stock Diseases (Proc. 10 of 1896, as amended by Procs 57 of 1922, 16 of 1923, 80 of 1935, 36 of 1938),
- 3) Ostrich Exportation (Proc. 40 of 1907),
- 4) Game Preservation (Proc. 23 of 1907),
- 5) Wild Birds (Proc. 43 of 1914),
- 6) Pedigree Livestock (Proc. 9 of 1921),
- 7) Locust Destruction (Proc. 3 of 1925),
- 8) Protection of Relics, Fauna and Flora (Proc. 40 of 1938),
- 9) Sale of Game (Proc. 5 of 1939),
- 10) Game Preservation (Proc. 33 of 1951),
- 11) Protection of Fresh Water Fish (Proc. 45 of 1951),
- 12) Weeds (Proc. 47 of 1951),
- 13) Museums (Act 29 of 1967),
- 14) Weeds eradication (Act 18 of 1969),
- 15) Local Administration (Act 13 of 1969),
- 16) Land Husbandry (Act 22 of 1969),
- 17) Liremo Control (Order 23 of 1970),
- 18) Proclamation of a wild Life Sanctuary (GN 34 of 1970),
- 19) National Parks (Act 11 of 1975), Forestry Act (Act 11 of 1978),
- 20) Water Resources (Act 22 of 1978),
- 21) Land Act No. 17 of 1979),
- 22) Land Regulations (LN 15 of 1980),
- 23) Range Management and Grazing Control Regulations (LN 39 of 1980),
- 24) Lesotho Highlands Development Authority (Order 23 of 1986),



- 25) Managed Resources Areas Order (Order 18 of 1993) and
- 26) Local Government Act 1996 (Act 6 of 1997)

Some of these laws are still in force or are theoretically in force. The Environment Act (2001) supersedes all other existing environment related legal instruments including

different pieces of biodiversity legislation. It ensures that appropriate environmental management tools are applied for different development activities that may adversely affect the environment. These include activities such as conservation of environment and natural resources, preservation of biological diversity and such activities, which often have adverse effects on the biophysical environment







# 7 *Environmental governance*

**A**s mentioned in preceding chapters, Lesotho is a party to a number of environmental Conventions and Protocols and to implement its obligations under these instruments, appropriate policy and legal framework as well as effective institutional arrangements with adequate capacity are required at national and local levels. This would help create an enabling environment for the implementation of local Agenda 21.

Lesotho prepared a comprehensive National Environment Action Plan (NEAP), which attempted to incorporate environmental issues into the country's economic development and to coordinate the country's environmental challenges. The NEAP, however, did not become effective due to absence of an appropriate institutional mechanism to co-ordinate environmental programmes and activities. Following the UNCED in 1992, Lesotho pledged to refine both national and global environmental concerns and to establish an institutional mechanism responsible for implementation of NEAP. In 1994, Lesotho formulated the National Action Plan to Implement Agenda 21 under the overall guidance of the National Environment Secretariat (NES), which was then within the Prime Minister's Office.

The National Action Plan sought to build upon the existing NEAP by involving and linking all sectors of the society. NES and Ministry of Development Planning were tasked with the responsibility of coordinating the implementation of NAP and were instrumental in formulating the National Environment Policy (NEP). The NEP, which harmonised

NEAP and NAP was finalised and approved by the Cabinet in 1996 and further reviewed in 1998. The NEP does not usurp the powers of sectoral ministries, but instead reinforced and focused them on areas of high environmental concerns in Lesotho. As a result, during 1995 to 1996, Environmental Units (EUs) were established within the Planning Divisions of each line Ministry to ensure that the role of NES as a coordinating body is effected and to ensure that environmental considerations are incorporated at every level of decision-making in all line Ministries. The decision to establish EUs was based on a recommendation contained in the NEAP.

The EUs are responsible for, among others, 1) identifying potential problems posed by Government Ministry and Departments sponsored projects, 2) ensuring that budgetary allocations adequately cover remedial actions, 3) preparing plans and supervising EIA for Ministry's projects, 4) liaising with NES for approval of all aspects of environmental impact statements (EIS), 5) advising communities on particular aspects of environmental concern, 6) monitoring post EIA audits of projects and 7) participating in resource accounting and the preparation of annual state of the environment reports.

To meet the requirements of the NEAP, NAP and the Constitution of the Country for sound environmental governance, Lesotho drafted an umbrella environmental law in 1995. The law was however enacted in 2001 Parliament of Lesotho in 2001 (Environment Act 2001) and commencement date is yet to be published. When gazetted, the law will provide for the management of the environment and natural





resources of the country. The act proposes the transformation of NES into a statutory body with perpetual succession – the Lesotho Environment Authority (LEA).

## What it is the state of the environment?

Capacity to manage the environment is critical. For NES and line Ministries to execute their responsibilities efficiently, it is necessary that their capacity in environmental management is enhanced. The trends over the past two years show an increase in capacity of the Government to manage the environment as well as increase in financial resources allocated to environmental management, although human and financial resources are still inadequate.

### *Capacity building in environmental management*

As part of the preparations for the implementation of EA 2001, the Government with the assistance of DANCED, in 2000 initiated a project that was aimed at enhancing the capacity of NES, EUs, Ministry of Development Planning and some parastatals in environmental management. A total of 16 short courses were offered during the first two years of project implementation. Table 7.1 shows the courses and number of participants who received some training in environmental management.

The project has made significant contribution to capacity building in environmental management within NES, line Ministries to an extent that EUs are now capable of assisting NES with evaluation of Project Briefs and Environmental Impact Statements (EISs) at their respective Ministries.

### *Number of EIA applications*

The NEAP and the NEP highlight the importance of EIA as a tool for sound environmental management. Additionally, the Environment Act 2001 presents the national Environmental Impact Assessment (EIA) requirements. The Environmental Impact Assessment Section in NES was established with a mandate of ensuring integration of environmental issues (biophysical and socio-economic) into development activities. Despite the problem of inadequate staffing within the unit and the absence of legal mandate, the unit has successfully reviewed 28 project briefs between July 2001 and April 2002. Most developers who submitted project briefs however did not implement the recommendations made by NES. The recent trends show an increase in the number of developers who are at least prepared to submit project briefs despite the absence of a binding legal instrument.

### *Environmental standards and guidelines*

The following environmental standards and guidelines have been prepared with the aim of improving environmental quality. WASA - Effluent standards, NES - Draft Water Quality Standards (1998), NES - EIA - Sectoral environmental checklists (2002), EIA Draft Manual ( for NES and EUs) (2000) and DRWS EIA Manual (2001).

Standards provide policy-makers and society with thresholds above which environmental degradation is likely to occur, while guidelines/manual provide standardised procedural steps for application of various environmental management tools.



Table 7.1 Courses in environmental management offered in 2000 to 2001

	Course title	Year	Number of participants
1	Environmental Issues, Management and Governance	2000	34
2	Monitoring, Pollution Control and Inspection	2000	34
3	Environmental Management Tool	2000	40
4	Environmental Guidelines, Standards and Criteria	2000	40
5	Environmental Awareness: Tools and Methods	2000	40
6	National Environmental Policy and Legislation – Environment Act 2000	2001	29
7	Environmentally Sustainable Land Use Planning – an introductory course	2001	37
8	Pollution Control and Inspection	2001	38
9	Cleaner Production in Textile Industry	2001	34
10	Environmental Impact Assessment – Advanced	2001	25
11	Environmental Awareness and Introduction to GIS	2001	34
12	Environmental Risk Assessment	2001	40
13	Project Management and Resource Economics	2001	30
14	Conflict Management and Team Building	2001	28
15	Strategic Environmental Assessment	2001	30



## Committees

The NES implements its mandate of co-ordination and environmental management through a number of committees with membership drawn from various Governmental and Non-governmental agencies. The committees include, 1) Chemical Management Committee (CHEMAC) that co-ordinates the implementation of POPS and PIC Conventions, 2) Committee on Waste Management (COWMAN) that co-ordinates implementation of Basel Convention, 3) National Desertification Steering Committee (NDSC) that co-ordinates the implementation of United Nation Convention to Combat Desertification (UNCCD) and 4) Committee on Environmental Data Management (CEDAMA) that co-ordinates environmental data management and facilitates a clearing house mechanism.

## Number of staff recruited by NES

The number of staff at NES and its efforts to increase capacity for environmental management are briefly discussed here to show the country's capacity and willingness to manage the process. During 1994 there were only three professional staff employed by NES and by 1996 the number had increased to eight. In 1998, when the Ministry of Environment, Gender and Youth Affairs was established, NES was accordingly transferred from the Prime Minister's Office to the new Ministry and its staff complement increase significantly. The transfer from the Office of the Prime Minister was accompanied by an increase in the number of technical staff. Currently, there is a total permanent staff complement of 12 technical staff. Despite this increase, the NES remains under resourced in many critical areas, including the EIA section which is presently manned by only four officers.

## Summary of responses

- Implementation of Environment Act 2001. This would *inter alia* harmonise environmental management approaches through improved co-ordination of activities of different role players including Government, parastatals such as LHDA and private agencies.
- Strengthening of EUs through further training, additional staffing and provision of legal mandate through EA 2001. This is critical since EUs are expected to ensure that activities of various line ministries are in line with the requirement of EA 2001 and that they are capable of providing adequate support and advise to NES/LEA.
- Community participation and national information strategies for implementation of Agenda 21. Local agenda 21 can only be effectively implemented through genuine community participation in environmental management and extensive public awareness campaigns about environmental challenges. Extensive environmental awareness campaigns using various strategies such as media, theatre, publication etc. are urgently needed countrywide.
- Establish *Programmes and Projects Section* within NES for co-ordination of the implementation of Agenda 21, pending the establishment of LEA.
- Harmonise all existing laws with the Environment Act 2001 and ensure that regular reports such as the SoER are aligned with important national objectives embodied in the long-term development objectives such as Vision 2020.
- Develop regulations, which can be translated into local plans of action at local level



# 8

## Scenarios

Scenarios can be defined as alternatives, but internally coherent credible histories of the future, linked to a sequence of policy choices and decisions (Pinter, 1999). Scenarios combine both quantitative and qualitative information and numerical information to generate more reliable trends. There are numerous tools used for scenario analysis; amongst which are the object-oriented simulation software that increases understanding of dynamic interrelationships within and among biological, social and physical systems and those that provide customisable interface to communicate model results, to reveal systematic relationships and set key variables, and a layer to view relationships in mathematical form if required. The previous and the current SoER for Lesotho did not employ these approaches but instead projections are primarily made using qualitative information. It may however be necessary to acquire scenario analysis software (e.g. STELLA or PolarStar) to be able to generate more meaningful and reliable scenarios. However, there are two scenarios discussed below to infer indicative situations of the future. These are the first Scenario – Scenario I which projects the future based on current trends and the NEPAD scenario which predicts trends based on possible interventions.

### Scenario I (Business as usual)

Environmental degradation in Lesotho is very serious and if the current trends in Lesotho persist, the next few years will see Lesotho with declining biological diversity,

loss of cultural heritage, declining water and air quality, encroachment of settlements into productive agricultural land and declining ecosystem services. The HIV/AIDS scourge and increasing levels of poverty as a result of climatic variability will reduce economic growth and leave many people impoverished. These negative impacts can however be mitigated by interventions such as protection of important cultural and historical sites, enforcement of environmental standards, sound land-use practices, improved food security and self-sufficiency through for example, the implementation of irrigation policy, intensive HIV/AIDS awareness campaigns and infusion of appropriate low-input technologies and alternative community-based natural resource management initiatives.

However, environmental trends may not be as gloomy if the existing environmental policies and legislation (Environment Act 2001) are effectively implemented. The establishment of the Lesotho Environment Authority and strengthening of Environmental Units in line ministries are particularly critical for enforcement of environmental standards and compliance. Additionally, there are a number of proposed and on-going conservation and land management project (for example, the Maloti Drakensberg Transfrontier Conservation and Development Programme and Conservation of Biological Diversity in Southern Lesotho), which are likely to contribute significantly to poverty alleviation and conservation and sustainable use of biological resources if successfully implemented.



## Scenario II (NEPAD Scenario)

The NEPAD scenario was proposed in 2002 by the Southern African global assessment team, which is linked to the Global Millennium Ecosystem Assessment initiative. It is expected that the NEPAD scenario will achieve sustenance and strengthening of good governance, peace and security, which would attract foreign investment and infrastructural improvements and privatisation accompanied by enhanced information and communication technologies. Industrialisation and associated opportunities such as AGOA and COTONOU agreement will reduce unemployment and improve economic growth. Developments in the agricultural sector would increase productivity and relieve pressure to cultivate marginal lands. The energy needs of the many people in

the urban areas would be largely met by hydropower. The expanding manufacturing, agriculture and mining operations are expected to impact mainly on water and air quality. Water demands are likely to increase in the urban and peri-urban areas. Effluent from industries, pesticide and fertilizer runoff from farms will contaminate rivers, increasing water-borne diseases and thus the cost of providing safe drinking water. The expansion of monoculture farms will make the country more vulnerable to pest invasions and drought. Nevertheless, the impacts to the natural environment will be tremendous but their effects could be ameliorated by the implementation of Environment Act 2001 and other interventions such as enforcing environmental quality standards



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# Glossary

**Adaptation:** a particular part of the anatomy, a physiological process, or a behaviour pattern that improves an organism's chances to survive and reproduce

**Agrochemicals:** chemicals used in agriculture to destroy insects, fungi, bacteria, pests, weeds, and to regulate plant growth (e.g. fertilisers)

**Anthropogenic:** produced or caused by human activity

**Benthos:** bottom-dwelling; usually refers to organisms living on the substrate at the bottom of a water body

**Benthos:** the assemblage of organisms living on the substrate on the bottom of a water body

**Biodiversity:** the variety of all life forms: the different plants, animals and microorganisms, the genes they contain and the ecosystems they form

**Biological communities:** see 'ecological community'

**Biological indicators:** assessment of living organisms used to measure ecosystem health

**Biomass:** the total living matter in a specific area

**Biota:** collectively, the plants, microorganisms and animals of a region

**Biotechnology:** the use of biological processes, as through the exploitation of living organisms or biological systems, as a component in the development or manufacture of a product or in the technological solution to a problem

**Carrying capacity:** the maximum biomass which an area can maintain indefinitely (e.g. the maximum stocking rate which an area of grazing land can support throughout the greatest period of stress each year), or the maximum amount of harvesting of wild pop-

ulations that an ecosystem (or population) can sustain (e.g. maximum sustainable fishing yields)

**Catchment:** the drainage basin of a water body that captures all precipitation that falls on it

**Community (ecological):** aggregation of organisms characterised by a distinctive combination of two or more ecologically related species

**Concentration:** in solutions, the mass, volume, or number of moles of solute present in proportion to the amount of solvent or total solution

**Contaminant:** an undesirable or harmful impurity

**Diffuse-source pollution:** also known as non-source pollution; usually refers to multiple small sources of pollution spread over a wide area (e.g. catchment run-off of sediments from land use)

**Discharge:** (rivers) volume of water transported per unit time; (pollution) something that is released or unloaded

**Disturbance (ecological):** any discrete event in time which disrupts ecosystem structure and resource availability

**Ecological community:** an aggregation of organisms characterised by a distinctive combination of two or more ecologically related species

**Ecological footprint:** a measure of the impact of direct and indirect consumption of resources and production of wastes

**Ecosystem:** a functional system which includes communities of living organisms and their associated physical, non-living environment, which interact to form an ecological



unit, such as a tidal rockpool, wetland or forest

**Ecosystem processes:** the numerous interactions between different components (both living and non-living) of an ecosystem that support the biological elements of the system; these processes include the storage and recycling of nutrients and minerals, disturbance, competition, weathering and succession, and are generally necessary for maintaining the balance between interconnected elements of the ecosystem; for instance, green plants capture and process solar energy, which is then distributed throughout the ecosystem along food webs by animals

**Effluent:** the water discharged after use in the treatment of sewage

Electrical conductivity (EC): an indirect measure of charged particles in water which is used to estimate salinity

**Emissions:** gaseous or liquid discharge, or noise given out by a source

**Endangered species:** species or ecological communities likely to become extinct unless action is taken to remove the factors that threaten their survival

**Endemic:** originating in a given area and confined only to that area

**Erosion:** the loosening and transportation of soil, chiefly by wind and running water

**Eutrophication:** the over-enrichment of a body of water with nutrients, primarily nitrogen and phosphorus, resulting in excessive growth of organisms and depletion of the oxygen concentration

**Exotic:** a plant or animal that has been introduced to a region in which it does not naturally occur

**Fauna:** the entire animal life of a region

**Flora:** the entire plant life of a region

**Fossil fuel:** any hydrocarbon deposit that may be used for fuel such as petroleum, coal and natural gas

**Genetic diversity:** the diversity of genes present in a given population or species

**Global warming:** the expected rise in global temperatures caused by an increase in the concentration of greenhouse gases mostly emitted as a result of human activity

**Greenhouse effect:** natural warming of the earth and other associated effects as a consequence of the concentration of certain gases in the atmosphere which prevent the escape of solar radiation; see also 'enhanced greenhouse effect'

**Greenhouse gases/emissions:** atmospheric gases which enhance the natural greenhouse effect, including carbon dioxide, methane, chlorofluorocarbons, nitrous oxide, ozone and water vapour; see 'enhanced greenhouse effect' for the impact of these gases on the atmosphere and global climatic patterns

**Habitat:** a geographic area that can provide the key resources to sustain a population

**Hazardous waste:** any harmful solid, liquid or gaseous waste product which is inherently dangerous to handle or dispose of

**Heavy metals:** a group of metals with high atomic weights which are generally toxic to plant and animal life; some are always toxic (e.g. lead, mercury, cadmium) and others are toxic at high concentrations (e.g. zinc, copper)

**Herbicide:** any chemical agent that destroys or inhibits plant growth

**Herbivore:** an animal that consumes plants

**Household:** a social unit comprised of those living together in the same dwelling place

**Indicator:** a measurable item or unit used to monitor and report changes

**Infrastructure:** the system of essential services, utilities and public and community facilities necessary to enable human communities to function

**Inorganic:** matter other than plant or animal, and not containing a combination of carbon, hydrogen and oxygen

**Invertebrate:** an animal without a backbone composed of vertebrae, such as insects, worms, snails, mussels, prawns and cuttlefish

**Land degradation:** the decline in condition or quality of the land as a consequence of



misuse or overuse, involving changes to soil, flora, fauna, water quality and quantity, visual quality and production levels by humans

**Landfill:** solid or liquid material disposed of by burial in the ground

**Macroinvertebrate:** larger invertebrate, with a body length that usually exceeds 1 mm

**Macrophyte:** a plant visible to the naked eye, especially in an aquatic habitat

**Microorganism:** a microscopic organism, including bacteria, protozoans, yeast, viruses and algae

**Monoculture:** the cultivation of a single species, usually a single crop on land

**Nursery** (ecological): a relatively sheltered area of habitat suitable for the early growth and development of juvenile fish

**Nutrient cycle:** the pattern of transfer of nutrients among the components of a food web and other non-living components of an ecosystem

**Organic** (agriculture): agriculture which excludes the use of synthetic chemicals for fertiliser and pest control

**Organic** (chemical): chemical compounds based on carbon

**Pesticides:** any substance used to harm or kill pest organisms

**pH:** a measure of the degree of acidity or alkalinity; expressed on a logarithmic scale of 1 to 14: 1 is most acid, 7 neutral and 14 most alkaline

**Photosynthesis:** the biochemical process in plants and certain other organisms by which energy from the sun, captured by chlorophyll, powers the production of organic matter from carbon dioxide and water, releasing oxygen

**Point-source pollution:** source of pollution that can be pinpointed, such as a drain or chimney stack (compare with 'diffuse-source pollution')

**Predation:** the killing and eating of an individual of one species by an individual of another species

**Rangelands:** areas of native grasslands, shrublands and woodlands that cover a large

proportion of the arid and semi-arid regions where regular cropping is not practised and the predominant agricultural use, if any, is grazing of sheep and cattle on native vegetation

**Rare species:** species which are uncommon but which are not currently considered endangered or vulnerable; may be represented by a large population in a small area or small populations thinly distributed over a large area

**Renewable resource:** natural resource that is naturally replenished, but whose continued supply depends, in many cases, on proper management (e.g. trees, fresh water, fish)

**Riffle:** shallow water flowing rapidly over stones and gravel

**Riparian vegetation:** vegetation situated on or belonging to a river or a stream bank

**Riparian zone:** any land which adjoins, directly influences, or is influenced by a body of water

**Run-off:** the portion of precipitation (rain, hail, snow) which flows across the land surface and does not soak into the ground; can be a major agent of water erosion

**Secondary pollutants:** pollutants formed by chemical reaction in the atmosphere (e.g. photochemical smog results from the mixing of oxides of nitrogen and volatile organic compounds in the presence of sunlight)

**Sedimentation:** deposition of material of varying size, both mineral and organic, away from its site of origin by the action of water, wind, gravity or ice

**Sewage:** waste matter discharged to a sewerage system

**Sewerage:** works for collecting, treating and disposing sewage

**Siltation:** deposition of sediments from water in channels or harbours

**Socioeconomic:** relating to or involving a combination of social and economic factors

**Species:** a group of organisms which are biologically capable of breeding and producing fertile offspring





**Species diversity:** a measure of the number of individuals and their relative abundance in an area

**Suspended solids:** any solid substance present in water in an undissolved state, usually contributing directly to turbidity

**Sustainability:** environmentally sound economic growth balanced over a period of time

**Taxa:** a group of organisms similar in characteristics such as biology, biochemistry, genetic composition and evolutionary history

**Threatened species:** species facing threatening processes such as extensive destruction of habitat, which may jeopardise the survival, abundance or evolutionary development of the species

**Toxicity:** effect of any substance which harms living organisms; described as acute (lethal) or chronic (sub-lethal)

**Toxicology:** the study of poisons, including their nature, effects, detection and methods of treatment

**Toxins:** any of various poisoning substances that are specific products of the metabolic activities of living organisms

**Transpiration:** the loss of water as vapour through the stomates of the leaves of plants

**Turbidity:** a measure of the amount of suspended solids (usually fine clay or silt particles) in water and thus the degree of scattering or absorption of light in the water

**Waste water:** water that carries waste from homes, businesses and industries; a mixture of water and dissolved or suspended solids

**Wetlands:** land areas situated along fresh and saltwater courses that are inundated with shallow fresh, brackish or saline water on a temporary or permanent basis, that is usually slow-moving or stationary





