REHABILITATING RANGELANDS FOR HEALTHY HEADWATERS

Steps Basotho communities are taking to reverse land degradation at the source of the Orange–Senqu River

ORANGE - SENQU RIVER COMMISSION
BOTSWANA LESOTHO NAMBIA SOUTH AFRICA
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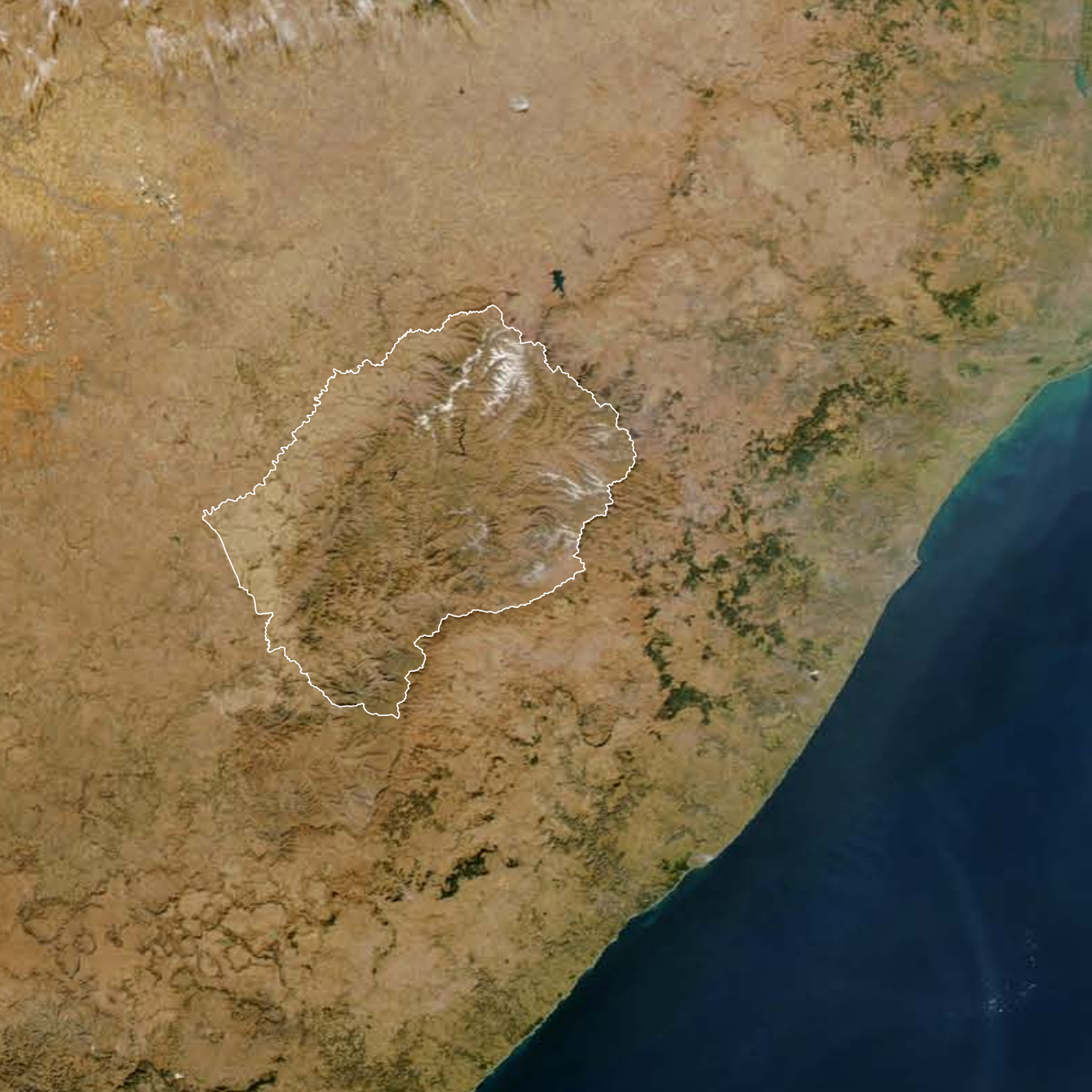

Seen from the air, the degradation of Lesotho is obvious from the paler band within the borders of the country.

Eighty per cent of Lesotho's population depends on the soil for their livelihoods. The health of the Orange–Senqu River also depends largely on this land in the highlands of Lesotho being intact. The grasslands and bogs at its headwaters filter and regulate the flow of the river's water.

How are the challenges of limited and degraded land for a growing population to be addressed? Guided by local experts, four rural communities in south-eastern Lesotho tested methods to alleviate degradation caused by overgrazing and erosion. They share their experiences in this booklet.

> "In many areas, the biggest threats to terrestrial and aquatic environments are poverty and lack of development, rather than development itself."
>
> (Strategic Action Programme for the Orange–Senqu River Basin, 2014)

FOREWORD

The highlands of Lesotho form the headwaters of the Orange–Senqu, which drains one of the largest river basins in southern Africa. It provides the water required to drive the most economically active area in southern Africa, supports large-scale irrigation and meets the domestic needs of 19 million people. In spite of making up less than five per cent of the basin area, Lesotho contributes over forty per cent of the Orange–Senqu's natural runoff. The well-watered grasslands that characterise Lesotho are essential for the retention and slow release of water, which help stabilise stream flow, attenuate floods, reduce sediment loads and absorb nutrients. These services are, however, at risk because the rangelands are being degraded through overuse, making them vulnerable to erosion. Soil is being washed away and the land is becoming less productive, making it more difficult for rural households to make a living; the waters of the Orange–Senqu are laden with silt and their flow is less tempered by the grasslands.

The Lesotho Rangelands Rehabilitation Project was initiated by the Orange–Senqu River Commission (ORASECOM) through our UNDP–GEF-funded Orange–Senqu Strategic Action Programme to test and demonstrate methods to address this degradation. With community members from four villages around Mount Moorosi, this three-year project has initiated practical methods for rehabilitating rangelands, and introduced improved and alternative livelihood options. The active participation of community members and the results they have achieved have been remarkable, encouraging them, surrounding villages and Lesotho's agricultural sector in general.

Lesotho's 2020 vision states: '*Lesotho shall be renowned for its environmental management. The country's diversity of life systems will be supported and protected by a nation which is environmentally conscious and whose people are in balanced existence with the natural environment. Basotho will derive continuing benefits from the conservation and sustainable use of their biological diversity. The several global conventions and treaties that Lesotho has signed and ratified shall be translated into concrete actions which will sustain care and management of the environment at large.* Initiatives such as this rehabilitation project can help Lesotho achieve this vision.

It is also part of ORASECOM's strategic programme to reverse environmental degradation and improve land use in this vital catchment area of the Orange–Senqu by scaling up and rolling out these piloted rehabilitation efforts. This demonstration project has opened doors for networking and amalgamating with similar projects being conducted in Lesotho and, through the lessons learnt, could be successfully adapted by rural communities elsewhere in the basin. This booklet describes the problem faced by people living in the Mount Moorosi area, the steps they have taken to address them, the successes they have achieved and the lessons learnt along the way. It provides a useful tool for the expansion of rehabiltation efforts that we are planning to implement.

Lenka Thamae
Executive Secretary
ORASECOM

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Map of Lesotho showing drainage of the Orange–Senqu River and the four sites of the rangeland rehabilitation project near Mount Moorosi

LESOTHO HIGHLANDS: SOURCE OF THE ORANGE–SENQU RIVER

The Kingdom of Lesotho is a landlocked country and a true enclave, being completely surrounded by South Africa. It is mountainous and characterised by bare rocky outcrops, deep river valleys and high-altitude grasslands. The entire country falls within the Orange–Senqu River basin and contains the headwaters of the Orange–Senqu River high in the Maloti Mountains. The health of these headwaters is essential for the health of the water resources along the entire transboundary Orange–Senqu River.

The headwaters of this important river are characterised by wetlands and highland bogs that act like sponges retaining and slowly releasing water. These high-altitude wetlands assist in regulating flow, attenuating floods, assuring a healthy base flow, reducing sediment loads and improving the absorption of nutrients. It is the storage capacity of the soils that ultimately defines the health of the wetlands and the grasslands.

Although mining and garment manufacturing play an important role in Lesotho's economy, the Basotho people are largely dependent on the land for their livelihoods, either through crop or livestock farming. Merino sheep and Angora goats are bred for their much sought-after wool and mohair. Cattle are important culturally and as draught animals, and horses and donkeys for transport and as pack animals. Three-quarters of the population is rural. Almost all these households have a small field on which they grow staples contributing to their livelihoods and food security.

The grasslands on which these activities depend are fragile and, with population growth, under increasing pressure from overgrazing, over-harvesting of plants and crop cultivation in unsuitable areas. Degradation and severe soil erosion are evident in many areas.

The Orange–Senqu River Commission's (ORASECOM's) demonstration project under the UNDP–GEF Orange–Senqu Strategic Action Programme empowers local communities to address landscape degradation by implementing locally designed measures. Launched in 2011 and implemented by the Serumula Development Association, a Lesotho non-governmental organisation, this project builds on indigenous knowledge and understanding of the challenges at hand and the importance of rangelands in traditional culture, while expanding alternative economic opportunities for the communities involved. The aim is to rehabilitate rangeland and introduce alternative livelihood options to help diversify production and improve household food security. The project works with four village communities near Mount Moorosi, Quthing District, who rely primarily on livestock and livestock products for their livelihoods.

LOSS OF BIODIVERSITY

The wetlands of the mountain grasslands are important because of the many critical functions that they perform, including supporting high levels of genetic and biological diversity. They provide a critical refuge and breeding ground for many species. Rangeland health and function, and biodiversity are closely related. Traditionally in Lesotho, rangelands are considered a source of grazing, a source of materials for constructing homesteads and for livelihood support. The grasslands are also important for cultural and traditional use, such as providing veld food, medicines and potions and to a lesser extent for the manufacture of crafts. Overgrazing of the rangelands has led to a decrease in diversity of species.

The Orange–Senqu River basin

ORANGE–SENQU RIVER COMMISSION

The Orange–Senqu River Commission – ORASECOM – was established by the governments of Botswana, Lesotho, Namibia and South Africa to promote equitable and sustainable development and management of the resources of the Orange–Senqu River. This joint commitment was sealed through an *Agreement on the Establishment of the Orange–Senqu River Commission* signed in November 2000 in Windhoek, which conforms to best international practices regarding the joint management of shared rivers.

The highest body of ORASECOM is the Council, consisting of delegations from each country, supported by various 'task teams' that manage projects, and a Secretariat. The Council serves as technical advisor to the member states on matters related to the development, utilisation and conservation of water resources of the Orange–Senqu River basin. The Secretariat, established by agreement with South Africa in 2006 and hosted there, coordinates ORASECOM activities, implements ORASECOM decisions and is the focal point of the institution.

A BASIN-WIDE PERSPECTIVE

The Orange–Senqu River rises in the highlands of Lesotho, some 3,400 metres above sea level and more than 2,300 kilometres from its mouth on the west coast of southern Africa. Covering an area of almost a million square kilometres, the Orange–Senqu River basin is one of the largest in Africa, encompassing the whole of Lesotho and parts of Botswana, Namibia and South Africa. Its many tributaries include the Vaal River in South Africa and the ephemeral Fish River in Namibia.

The water resources of the basin support over 19 million people and the river system plays a vital role in sustaining livelihoods and stimulating economic growth in the four countries. Water is abstracted for agricultural, domestic and industrial use and harnessed for hydroelectric power via several water transfer schemes and a number of large storage dams. The combined effect of abstraction and evaporation is a reduction by more than 60% in the average natural runoff of 11,300 million cubic metres per year. Demand for water is predicted to increase with economic growth and development, affirming the need to manage and develop water resources in a sustainable and balanced way that takes into account social, economic and environmental interests.

The governments of the four basin states are committed to working together to protect their shared water resources and, through an agreement in 2000, established the Orange–Senqu River Commission (ORASECOM) to facilitate this. ORASECOM provides a forum for consultation and coordination between its member states to promote integrated water resources management within the basin.

In support of ORASECOM, the Orange–Senqu Strategic Action Programme, funded by the Global Environment Facility (GEF), was developed through the United Nations Development Programme (UNDP). This UNDP–GEF project has assisted in identifying transboundary problems and developing national and basin-wide plans to address them. One of the priority transboundary problems affecting the amount and quality of water in the basin is land degradation, particularly of the rangelands in Lesotho which form the headwaters.

A project demonstrating the potential for effective community-based rangeland management and rehabilitation to restore ecosystem functioning and the flow of benefits from the rangelands in Lesotho is currently being implemented by the Serumula Development Association through ORASECOM's Orange–Senqu Strategic Action Programme. In addition, the project developed an improved livelihoods component through the introduction of improved breeding stock, keyhole vegetable gardening techniques and the introduction of Koekoek chickens.

It is expected that such interventions will not only help to restore and enhance benefits that directly contribute to the local rural economy and livelihoods dependent on natural resources, but also to urban livelihoods and the broader economy, by supporting water provision, hydropower generation and tourism. Such rangeland management interventions will also contribute intangible benefits such as aesthetics and spiritual services.

The rangelands of Lesotho provide a number of benefits (clockwise from facng page top left):

Lets'eng-la-Letsie, although based around a human-made lake and bog, is a proclaimed Ramsar site. It is the source of the Quthing River, a tributary of the Senqu, and recognised as being important as a relatively less-disturbed, high-altitude wetland and for its natural biodiversity.

Croplands have expanded into rangelands in many places, limiting grazing areas for stock.

The highland sponges retain water and release it slowly, stabilising stream flow.

Communities use many natural resources provided by the rangelands. For example, peat is collected and dried as a source of fuel.

Thatching grass is a valuable commodity for construction.

Merino sheep for wool production and to a lesser extent, meat, are a major source of income for many rural households. One of the objectives of the rangelands demonstration project is improved livestock breeding to enhance the quality of these herds.

Most communities cultivate small areas of croplands to provide staples and vegetables for the households.

The Mohale Dam is part of the Lesotho Highlands Water Project that helps augment South Africa's water supply and generate electricity for Lesotho through a treaty between the two countries.

RANGELAND BENEFITS

The rangelands of Lesotho not only provide for the livelihood needs of the local population, but a range of services across Lesotho and the downstream Orange–Senqu River basin. These services include water provision for urban and industrial use, livestock production, crop cultivation, spiritual and cultural use and tourism development.

PROVISION OF WATER

While only making up a small proportion of the basin area (3.4%), Lesotho contributes almost half (41%) of the natural mean annual runoff of the Orange–Senqu River. Its requirement for the water, however, is relatively low and overshadowed by South Africa's demands. This allows Lesotho to generate income from water exported to South Africa in accordance with a bilateral agreement, which led to the development of a water storage and transfer scheme known as the Lesotho Highlands Water Project (LHWP). In addition, the scheme generates electricity for Lesotho.

The key to effective and efficient stream flow and water provision lies in healthy catchments with good grass cover, functioning wetlands and minimal erosion. Thus the quality and quantity of water provision depends on the health of Lesotho's rangelands in this important catchment area. Sufficient grass cover is needed to slow down surface water movement, promote infiltration and stabilise the soil to prevent erosion.

GENERATION OF LIVELIHOODS

Livestock production

Sheep, goats and cattle play an important role in the livelihoods of the Basotho as a source of income and resources. Using the grasslands for extensive farming is the most economical way to provide forage for livestock, and rangeland maintenance is essential for continued health of the ecosystem to provide this natural resource. Because of the scale of livestock production in Lesotho, it is the most important factor affecting rangeland health. If livestock production is carried out on a sustainable basis,

LESOTHO HIGHLANDS WATER PROJECT

The Lesotho Highlands Water Project (LHWP) is Africa's largest water transfer scheme and is a key economic development initiative for Lesotho through the receipt of royalties for water transfers to South Africa. Its hydropower component generates sufficient energy to meet almost all Lesotho's needs.

For South Africa, the water transfers from Lesotho are essential to supply adequate water to Gauteng Province, its economic heartland and home to more than 12 million domestic consumers. The LHWP illustrates benefit-sharing in practice through payment for water, purchase agreements for power, and financing arrangements. The recently approved Phase II of the project foresees the construction of the Polihali Dam and a 1,200 MW pump-storage scheme in Lesotho.

SADC is promoting regional electricity cooperation and power pooling through the extension of grid interconnections to cover all four Orange–Senqu basin states and the creation of a regional electricity market.

then rangeland health can be maintained, which serves to support all the other services provided by the rangelands. Conversely, if livestock production causes degradation of the rangelands, all other services provided by this ecosystem are impacted.

Crop production

Generally, rain-fed crop production in Lesotho is practised on small, household-sized fields for family subsistence. The major crop is maize, followed by wheat, sorghum, peas and beans. After harvesting, field stover provides a valuable fodder resource, especially in winter. Sustainable and low-impact approaches to cultivation practices can maintain the contribution that rangelands provide to food security. However, insufficient in-field soil conservation measures, compounded by high-impact climatic events, are steadily reducing output and compromising future productivity and food-provisioning benefits from the rangelands.

SPIRITUAL AND CULTURAL VALUES

'*Khomo ke Molimo o nko e metsi*' – a cow is a god with a wet nose – is one of the powerful Sesotho proverbs that reflect the importance of cattle by elevating them to deity-like status.

Lesotho's cultural heritage is notably rich. Rangelands have always been a valuable natural resource base for the Basotho, providing basic materials whose continued use defines their way of life, cultural beliefs and indigenous practices. Many aspects of the indigenous knowledge of the Basotho relate directly to the use and management of the rangelands. This includes harvesting materials such as reeds and a variety of grasses and other plants, to perform important rituals, for medicinal purposes, for roofing and other building materials and as a resource for raising cattle.

Herbs found mainly in the wetlands, are used in the medicinal treatment of colds and flu (*Mentha aquatica*), livestock stomach ailments (*Rumex lanceolatus*), toothache and septic wounds (*Ranunculus multifidus*) and general ailments (*Gunnera perpensa*). In order to preserve this heritage, the government of Lesotho has officially recognised the need to conserve these medicinal resources, which are in grave danger of being over-harvested.

PROVIDING A BASE FOR TOURISM

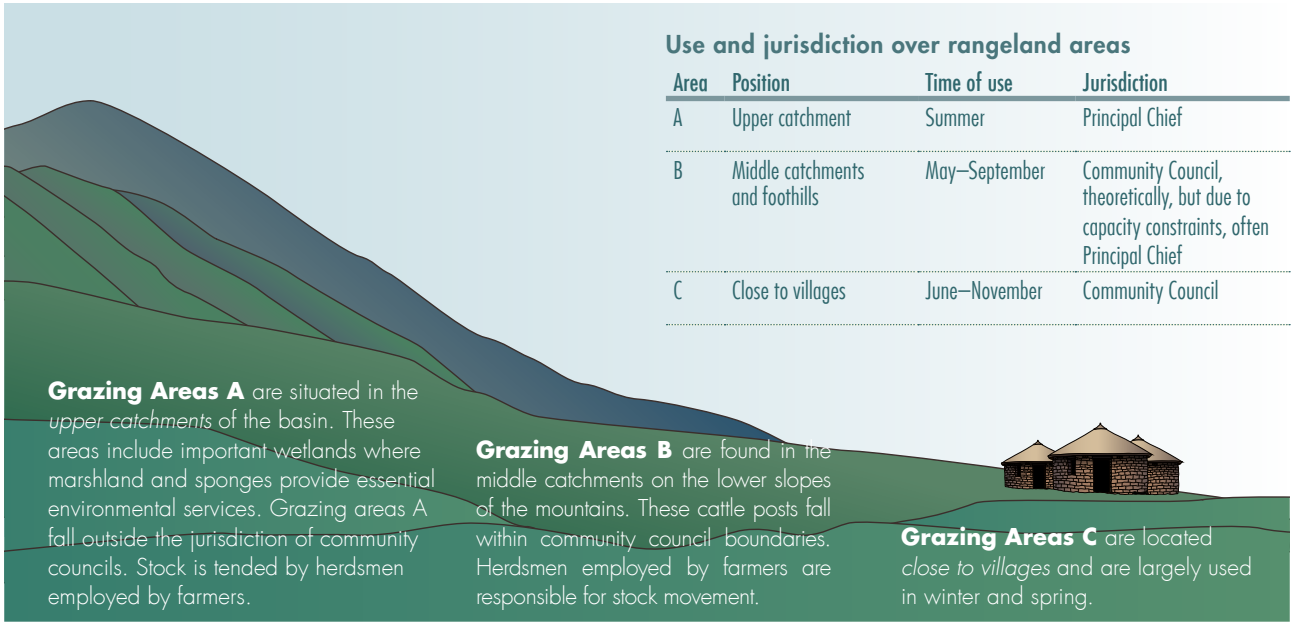
Lesotho's tourism sector is branded on the country's mountains, rivers of crystal-clear water and memorable scenery. Key tourism activities and recreational opportunities are based on these natural assets and features of the country, and include fly-fishing, snow skiing, pony trekking, hiking, cycling and birding.

The benefits of these types of tourism activities to local economies are significant where they occur, and could form a sound basis for Lesotho's economic development. Although the travel and tourism industry in Lesotho is still in its embryonic stage, the government considers it an important source of growth and job creation for the medium-term, particularly in rural areas.

Exceptional biodiversity, good environmental condition, well-managed rangelands and high-quality water underpin the tourism opportunities and potential in Lesotho.

The improvement in the area could have potential for other benefits that could spill over, for instance, tourism. There are some noteworthy tourist attractions in the area, so it could be of use. There are those small animals and birds that are coming back to the area following the [UNDP–GEF demonstration project's] intervention.
Community participant, Ha 'Mantsoepa

TRADITIONAL RANGELAND AREAS



Grazing Areas A are situated in the *upper catchments* of the basin. These areas include important wetlands where marshland and sponges provide essential environmental services. Grazing areas A fall outside the jurisdiction of community councils. Stock is tended by herdsmen employed by farmers.

Grazing Areas B are found in the middle catchments on the lower slopes of the mountains. These cattle posts fall within community council boundaries. Herdsmen employed by farmers are responsible for stock movement.

Grazing Areas C are located *close to villages* and are largely used in winter and spring.

Use and jurisdiction over rangeland areas

Area	Position	Time of use	Jurisdiction
A	Upper catchment	Summer	Principal Chief
B	Middle catchments and foothills	May–September	Community Council, theoretically, but due to capacity constraints, often Principal Chief
C	Close to villages	June–November	Community Council

FIRES AND RANGELANDS

Despite high grazing pressure, large areas of grassland burn every year in Lesotho. While grasslands, particularly in higher rainfall areas, are well adapted to frequent fire and may even require periodic fire, frequent burning can be detrimental, especially on areas that have been heavily grazed. These human-induced fires are normally of low intensity and do not effectively control invasion of shrubs and possibly encourage it by reducing grass biomass. Fires set in late summer to improve the quality of winter grazing can increase erosion, as denuded grasslands are susceptible to runoff from intense storms experienced at this time of year. Any regrowth on these burnt areas will be heavily grazed during the winter, leaving very little vegetation cover for soil protection when the spring rains start.

TOWARDS TRANSFORMATION

Although the Basotho have historically farmed with livestock and crops, these initiatives were on a small scale and usually situated on flat or gently sloping land, surrounded by dense grassland. By the early 20th Century, the advent of motorised farming equipment in combination with colonial attitudes to more intense farming practices led to significant erosion.

Early attempts to combat erosion through afforestation and contouring of croplands were largely unsuccessful. The dense grasslands, which served to facilitate water infiltration and trap soil were eroded. Planting crops in rows, as opposed to traditional methods of broadcasting seed, reduced the canopy cover of the crops, increasing the susceptibility of soils to the impact of rain. Increased population pressure resulted in marginal lands, often on steep slopes, being exploited and then abandoned once they became unviable, leaving them bare and exacerbating the pressure on existing rangelands.

Traditionally, strict seasonal movement of stock was practised under the supervision of traditional leaders. The rangelands were divided into three grazing areas, known as A, B and C, which were used seasonally according to their condition. These designations still apply today, although the jurisdiction over them has changed and the rotation from one to another is no longer strictly adhered to.

The establishment of village grazing schemes and grazing associations is underway with the associations determining agreed-upon by-laws that are endorsed by the Principal Chief of the area and ratified by Central Government. This system allows village-based structures to take ownership of their grazing resources.

The Orange–Senqu River is one of the most silt-laden rivers in the world, underlying the importance for the need to restore vegetation in the catchment areas of Lesotho. In recent years, it has become increasingly obvious that ecosystem function is highly dependent on biological diversity. The management of ecosystems can no longer focus on separate objectives, but needs to be addressed holistically, taking into consideration socio-economic as well as environmental issues.

The major problem is the grazing control. In the past people assumed that the village chiefs or the councillors were the ones that were responsible for managing use of the rangelands, but with the recent efforts of the Ministry [of Forestry and Land Reclamation] and the project, we have established village grazing schemes, which now get membership into the larger grazing associations, and that in itself enables the community to understand their responsibility to manage and control utilisation of the range resources. Pitso Morolong, Grazing Control Supervisor, Ministry of Forestry and Land Reclamation, Mt Moorosi Area

Left: The high-altitude wetland of Lets'eng-la-Letsie and Lesotho's only Ramsar site is also a popular grazing site. Having open access, the site suffers from overgrazing, trampling and overexploitation of its diverse natural resources.

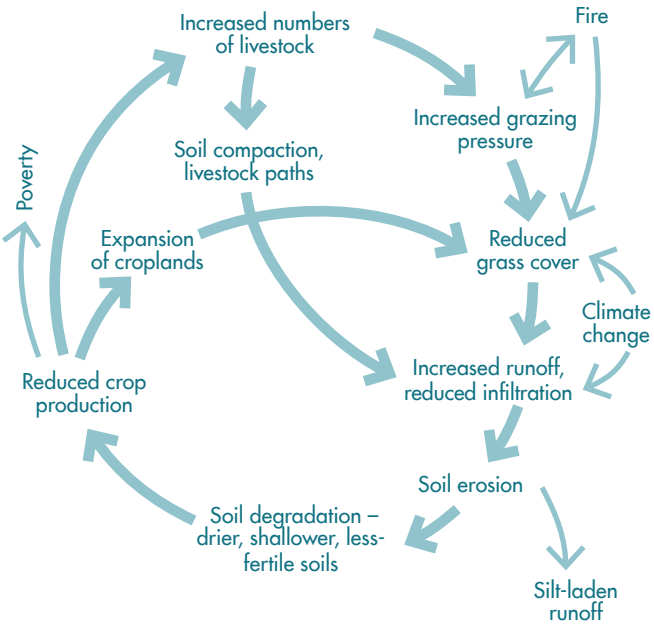
DRIVERS OF DEGRADATION

Declining levels of crop production due to erosion has increased the importance of livestock for rural livelihoods. The stocking rate in most areas far exceeds the recommended number of livestock per hectare. Sustained grazing pressure over time reduces grass cover and the increased movement of livestock develops paths. Soil is exposed and compacted and facilitates runoff instead of infiltration, resulting in sheet and gully erosion. Soil fertility is lost, the water table is lowered leading to artificially induced aridity, biodiversity is lost, shrubs take hold and rangeland for grazing and suitable land for cropping is lost. Pressure on the grasslands is further increased by frequent fires.

Crop production on marginal lands is often abandoned when it loses its productivity, creating vast tracts of land susceptible to erosion. Higher intensity storms of greater frequency, shifting seasons as a result of changes in rainfall patterns and warmer overall conditions are predicted as a result of climate change. As a result the already marginal rangelands are likely to become more sensitive because of lost soil fertility and reduced capacity to absorb and store water.

The underlying high incidence of poverty and unemployment exacerbates the self-reinforcing feedback.

A self-reinforcing feedback is a process that gathers momentum as it accelerates, leading to instability in a situation. Usually started by a small trigger, the process leads to disproportionately large consequences, which in turn aggravate the trigger forming a vicious cycle.



The vicious cycle of degradation

Clockwise from top left:

Horses and other stock have a clear impact on the grasslands surrounding Lets'eng-la-Letsie, a Ramsar site and source of the Quthing River; Sheet and gully erosion are the results of over-utilisation of land; Lowering of the water table and desiccation of the rangelands, together with the loss of natural predators, encourages the encroachment of ice rats, *Otomys sloggetti robertsi*, into wetland areas; Merino sheep are the preferred livestock species and are prized for their wool, but over the years, the quality of breeding stock has declined; The height of the grass within this exclusion plot at Lets'eng-la-Letsie gives an idea of the effect that grazing has on the grasslands in this area.

THE CHALLENGE

Rangeland degradation in Lesotho has basin-wide repercussions. Increased levels of soil erosion, reduced infiltration of water and loss of wetland water-storage capacity result in higher sediment loads, increased levels of flooding, reduced base flow and siltation of dams, which in turn disrupt the flow and quality of water downstream. Locally, the impact on productivity and livelihoods can be devastating. At a time when increasing numbers of people are faced with dividing the land into smaller pieces, they are also faced with decreasing productivity of the land.

The vegetation of these rangelands is dominated by grassland that forms a dense cover, which is critically important in preventing erosion under conditions of heavy rains and severe storms as sometimes experienced in Lesotho. The underlying causes of grassland degradation include more intensive farming activities, increased population pressure and the loss of traditional grazing management practices, amongst others. Furthermore, the effects of these causes have been exacerbated by self-reinforcing feedbacks over the years. The key to improving catchment health lies in breaking this degradation spiral by managing grazing in a manner that allows the rangelands to rest and recover.

Remedying unsustainable land management practices is a crucial step in improving conditions. Technical measures to curb erosion and restore grasslands, capacity-building and participatory monitoring and planning are required. In addition, the establishment of appropriate institutional organisations incorporating government, traditional leaders and livestock owners to sustainably manage rangeland is essential. Such principles and approaches have been shown to be possible, although a lot of work still has to be done for this to become general practice.

TOWARDS CATCHMENT HEALTH

The key to improving catchment health lies in managing grazing in a way that allows for rest and recovery of rangelands. In some cases, further interventions are necessary to break the vicious cycle, such as removal of pioneer shrubs and alien vegetation, and re-seeding of degraded areas. Control over livestock movement to prevent erosion along livestock paths, or remedial action on existing livestock paths is essential. Interventions to address and reverse rangeland degradation also need to offer tangible benefits to households to incentivise changes, while avoiding reduced food security and increased poverty.

ORANGE–SENQU STRATEGIC ACTION PROGRAMME

In close collaboration with the Orange–Senqu River Commission (ORASECOM), this four-year project funded by the Global Environment Facility through the United Nations Development Progamme assists the basin states to identify principal threats to the water resources of the Orange–Senqu and to develop and implement a sustainable programme of reforms and investments to address these. The objective of implementing such initiatives contributes towards ORASECOM's programmes and the long-term goal of sustainable development of the Orange–Senqu River basin.

The project used a transboundary diagnostic analysis (TDA) process to identify and prioritise major water-related, environmental problems facing the Orange–Senqu basin and its four states. This led to the development of national plans and a recommended basin-wide strategic programme to address priority areas. A number of demonstration and research projects and activities were run concurrently to help strengthen ORASECOM, test interventions, fill knowledge gaps, and raise awareness and encourage participation of the public.

The four countries in the Orange–Senqu River basin collectively set basin-wide objectives and targets to be met over a ten-year period to address the priority problems identified by the TDA. These led to the Strategic Action Programme (SAP) and four national Action Plans being developed through a participatory and consultative process with relevant stakeholders. The Action Plans will comprise national components of basin-wide activities and specific national activities. They provide the vehicle to integrate basin-wide actions outlined in the SAP into national planning processes and budgets.

SAP objectives and targets cannot be achieved through national action alone and instead require coordinated action within and by several, or more often all, basin states. The SAP objectives for addressing catchment degradation are to reduce the adverse effects and improve the sustainability of land use on a basin-wide level. Within the priority area of land degradation, these interventions include:

- up-scaling of catchment protection initiatives and implementation in priority areas
- strengthening institutional frameworks for effective catchment management
- rehabilitation of degraded rangelands and wetlands
- improvement of ecosystems of the catchments.

In line with the above SAP objectives, the Lesotho Action Plan's recommendation for replicating and up-scaling good land management practices and community-based rangeland management projects includes the extension of the rangeland demonstration project in Mount Moorosi. The aims of this national plan would be to identify and develop alternative livelihood sources, strengthen community-based natural resource management mechanisms and promote continued research and adaptive land management practices.

MOUNT MOOROSI

The place is named after Chief Moorosi, the most powerful leader and last chief of the Baphuthi tribe. He died in 1879 at Mount Moorosi and was buried there. Legend has it that Chief Moorosi's treasure is hidden there. It is said that a Bushman was lowered down from a ledge to hide the silver in a crevice in the rock cliffs.

To the Baphuthi tribe, Mount Moorosi is a very important place as it reminds them that they were once a powerful people, as symbolised by Chief Moorosi's stance to fight colonialism till his demise. Each year, those that remain of the Baphuthi tribe in Lesotho, whose language and cultural heritage is almost extinct, gather at Mount Moorosi to celebrate their heritage as they remember their fallen hero. The total population of Phuthi-speaking people both in Lesotho and in South Africa (along the northern parts of the Eastern Cape Province) is unknown, but is estimated at around 20,000 people.

MOUNT MOOROSI PROJECT SITES

Communities in four villages located on the slopes and in the valleys of the Senqu River in the Mount Moorosi area participated in the rangeland rehabilitation demonstration project. The rainfall in the area is relatively low and extremely variable. The steep slopes make erosion a constant threat, especially along livestock paths and roads. Human activities around the villages, such as cultivation, act as triggers initiating erosion, which then spreads. Wood harvesting has impacted the distribution of trees and shrubs, particularly close to settlements.

The natural grasslands around the Mount Moorosi area comprise Senqu Montane Shrubland in the river valleys and Lesotho Highland Basalt Grassland in the higher lying areas.

The Senqu Montane Shrubland, which predominates in the project area, is found mainly on the steep slopes of the river valleys and is characterised by shallow and rocky soils with a mix of shrubs, grasses and small trees. The short shrubs (also called dwarf shrubs) are an important group and include *Chrysocoma ciliata*, *Felicia filifolia* and various *Helichrysum* species. The grasses include a wide range of species from palatable species to those that are not useful for grazing. A range of herbs and geophytes make up the balance of the very diverse vegetation.

The population in the area has increased significantly over the past 10 to 20 years, and this is locally recognised as the cause of increased pressure on the rangelands. Through a baseline socio-economic survey carried out at the beginning of the project, it was apparent that there is general consensus among the local communities that the condition of the rangelands is deteriorating, particularly the areas surrounding villages, the so-called C grazing areas. The main reasons given for this degradation include overgrazing, uncontrolled burning of the grasslands, and poor control or enforcement of rangeland management rules that already exist.

Most people in the area are not formally employed. Poverty

levels are high. People are primarily dependent on agriculture and home-based enterprises for their livelihoods. Most households keep livestock as a form of wealth (savings). Apart from selling animals as the need arises, income is also generated by selling products such as wool and mohair. Cattle also play an important role as a source of draught power – often critical for ploughing – while horses and donkeys are important for transport and as pack animals.

The survey showed that livestock owners widely agreed that the poor condition of rangelands in the area has had a major negative impact on livestock production and believed that if the condition of the rangelands could be improved they would be able to harvest more wool and mohair per animal and thereby boost their livelihoods. In addition, community members also believed that if the condition of the rangelands was better, other important natural resources such as thatching grass and firewood would be more available. Some suggested that this would create new livelihood opportunities (e.g. harvesting and selling natural resources) especially for those who do not own livestock.

The Ha 'Mantsoepa site (top left) is close to numerous large croplands, but crops are often planted late, which means the site is grazed well into summer as well as after harvesting in winter. The project aims to ensure that the site is rested for longer during the summer to ensure healthy veld, while at the same time accumulating more forage for use in winter.

At Ha Sekhonyana (top right) grazing animals have been kept out of the steeply sloped area to ensure a return to stability. This 'no-graze' approach will be encouraged until vegetation cover has improved at the site.

The Ha Koali site (centre left) contains old, abandoned croplands that have poor vegetation cover and are actively eroding. Apart from excluding livestock for a period, this is an ideal site for demonstrating rangeland restoration by means of re-seeding indigenous grasses.

Ha Moqalo (bottom left) is located on a relatively steep slope with some actively eroding gullies. These have been re-seeded with *Eragrostis curvula*, and will be excluded from grazing until this has stabilised. Once the area has stabilised, adequate resting during summer will contribute to improved rangeland health.

THE RANGELAND PROJECT

The focus in this rangelands restoration project has been to break the vicious cycle causing land degradation. It focuses on addressing the factors initiating and promoting the self-reinforcing feedback process: sustained grazing pressure, shrub invasion, increased runoff and decreased water infiltration. Activities have included:

- construction of stone walls to form physical barriers on steep slopes and in gullies to slow down the flow of surface water, trap sediment and promote infiltration of water
- physical removal of invasive shrubs, such as *Chrysocoma ciliata*, that outcompete indigenous grasses
- sowing grass seeds on cleared areas and bare ground to help re-establish grass cover
- excluding livestock from rangelands to allow the grasslands to recover and regenerate.

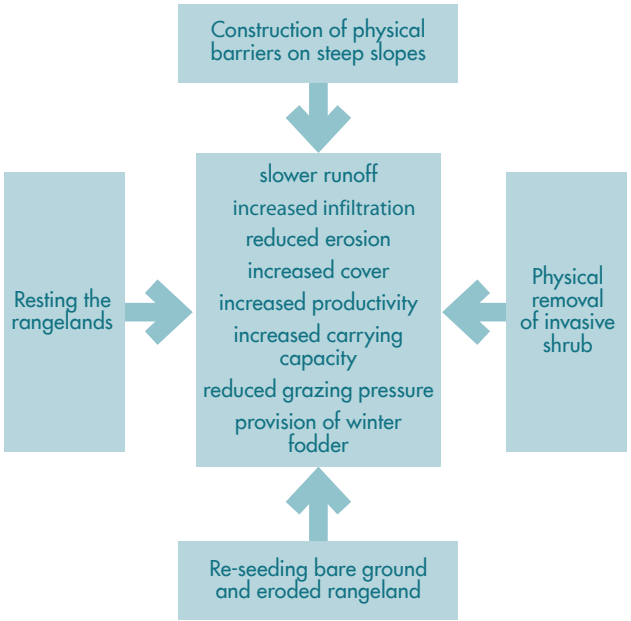
These activities have been carried out while concurrently introducing improved management practices and breeding stock, and alternative livelihood options to communities.

BOTTOM-UP APPROACH

Serumula Development Association, the non-governmental organisation that implemented the project, was well aware from other projects in Lesotho and further afield that a top-down approach to community mobilisation usually fails. Consequently, they followed a bottom-up, consultative approach from the start, encouraging the participation of community members and other stakeholders, including government departments and NGOs.

Community members have been involved at all levels of decision making, which in turn led to their voluntary physical participation in the implementation of the project. While some members of the community have seen the project as being of long-term benefit and are enthusiastic to continue, others feel that some remuneration is necessary, especially in the light of having to exclude their livestock from rangelands that are being rested.

I took part in this project upon realising that there's a great loss of soil that we need to be using for various purposes, but the soil is being washed off and dumped into the river and we are being left with nothing that we can use. Makama Ramangole, participant from Ha Sekhonyana



Remedial actions taken during the rangeland project

SERUMULA DEVELOPMENT ASSOCIATION

Serumula is a Lesotho-based non-governmental organisation that operates in the agriculture and natural resources management sector.

First registered in November 2002, the association was born out of Helvetas-Lesotho (Swiss Association for International Cooperation) which had been operating in Lesotho for more than twenty-five years in the areas of water and natural resources management.

Serumula's vision is to have improved livelihoods for rural communities in Lesotho through the establishment of income-generating projects, while becoming a viable, well-managed and self-sustaining business entity by 2020.

The long-term goal of Serumula is to support, advocate and promote applied research, training and learning in order to facilitate the engagement of rural communities in the improvement of livelihood strategies, while investing Serumula's resources in business development enterprises for its own survival and growth.

Active rehabilitation efforts on Ha Sekhonyana have been focused on erecting physical barriers on the steep slopes to slow down surface water movement, trap sediment and promote infiltration of water into the soil. In addition, livestock have been excluded from the area. The stone walls and donga reclamation structures have been extremely successful in trapping silt and slowing down water movement. The regrowth of vegetation on the site is remarkable. Exclusion of livestock has also contributed to the success of regenerating grass cover, as illustrated here, which shows a site at five months (top) and one year (bottom) after the erection of a stone wall.

TACKLING EROSION

Soil erosion is considered the biggest limiting factor affecting livelihoods. The loss of soil through erosion and resultant declining levels of crop production has increased the importance of livestock for rural livelihoods. Despite indications that higher numbers of sheep and goats lead to more selective grazing and greater degradation, the income-earning potential from the sale of wool and mohair drives households to increase their herds. This leads to overgrazing and a decrease in ground cover, leading to further soil erosion.

The overall stocking rate for livestock in most areas far exceeds the recommended carrying capacity. Recommended carrying capacity is ten hectares per animal unit, but records show that present grazing area can be as low as four hectares per animal unit. Grass cover by the end of the season is inadequate, exposing soils to rain and resulting in sheet erosion, while livestock paths provide channels for gully erosion.

Once erosion has been initiated, it usually increases rapidly in extent. Sparse vegetation cover reduces infiltration and allows water to move more rapidly over the surface, eroding the soil as it goes. Gullies become larger, allowing more water to flow through them, which erodes them further.

BUILDING STONE WALLS

Building physical barriers to slow down the flow of water, reduces its energy. Soil being carried by the water is deposited and trapped by the barrier, providing a base on which vegetation can re-establish. Building such stone walls was the main focus of rehabilitation activities at the Ha Sekhonyana site. Further actions to promote the re-establishment of vegetation cover – the removal of invasive pioneer shrubs, re-seeding grasses and excluding grazing animals from the areas under restoration – will contribute positively towards restoring the rangelands.

Basically what we were doing was to control soil erosion – where the dongas were already there, we were building silt traps to trap the soil so that the site doesn't continue to be eroded and washed down into the river. Ha Sekhonyana project participants

CHANGING VEGETATION TYPES

The grasslands of Lesotho are generally dominated by a range of grass and non-grass species. Among the non-grasses are a class of shrubs, typified by *Chrysocoma ciliata*, that are increasing in density. These encroaching Karoo species have negative effects on grazing capacity, rainfall infiltration and soil conservation.

Although there is significant evidence that invasion of grassland by shrubs can be ascribed to overgrazing or inappropriate grazing management, there is increasing evidence that rainfall patterns may also play a causative role.

PHYSICAL REMOVAL OF INVASIVE SHRUBS

Chrysocoma ciliata – commonly known as bitterbos – and other similar shrubs that out-compete indigenous grasses, are being physically uprooted from high-value grazing areas at the Ha 'Mantsoepa, Ha Koali and Ha Moqalo sites. At the same time, livestock were excluded from the sites to allow for regeneration of grass in the bare spots previously occupied by the shrubs. There appears to be very little or no regeneration of *Chrysocoma* on the sites where it has been removed.

The success that was clearly evident after initial efforts, motivated communities to continue the work and expand the pilot areas being cleared.

As it was a voluntary effort, we were even using our own tools. For instance, when we were doing the uprooting of the Chrysocoma, *we were using our tools and these were wearing down because of the drought. So, in future, if we could be provided with working tools it could speed up the process very much and we would appreciate it a lot.* Ha 'Mantsoepa project participants

Right: The weeping willow (*Salix babylonica*), sisal (*Agave sisalana*) and a host of other alien plants threaten the biodiversity and water resources of the basin in Lesotho.

Facing page, clockwise from top left:

Chrysocoma shrubs are placed in an erosion gully after they have been cleared from the rangeland to slow down water movement and trap soil

An area denuded of grass, invaded by shrubs

Seedlings of the indigenous grass, *Heteropogon contortus* (black spear grass), taking hold in a bare spot where a *Chrysocoma* shrub was removed

Members of a community uprooting *Chrysocoma* shrubs

Chrysocoma ciliata

INVASIVE ALIEN SPECIES

Invasive alien species constitute one of the biggest threats to biodiversity globally by competing with indigenous vegetation for resources. In Lesotho there are several alien species that have an impact on rangeland health. Invasion by alien plants has an effect on stream flow and hydrology as well as impacting directly on agriculture and livelihoods. While alien invasive plants are currently not being cleared by the communities at the demonstration sites, awareness programmes on the impacts and consequences of alien species are being developed at the sites. These programmes will be extended to demonstrate the process of clearing wattle trees and other invasive plant species, and rehabilitating the cleared site by planting grass, thus re-establishing grazing potential and improving the ecosystem health of the rangelands.

Above: Steep slopes in Ha Koali were severely eroded in places, initiated largely by livestock paths. Re-establishing grass cover quickly in the degraded areas to break the erosion cycle was of prime importance. Community members sowed *Eragrostis curvula* in shallow furrows of about one centimetre in depth along contours. This served to trap any soil movement. At the same time, livestock were excluded from the site to allow time for the grass to establish. This approach proved successful and will be extended to include indigenous, locally harvested seeds in an attempt to restore vegetation diversity in degraded areas.

Left: *Eragrostis curvula* seeds provided by the project

ADVANTAGES OF USING LOCAL GRASSES

- local species are adapted to local environmental conditions
- several species can be established, promoting biodiversity
- a diversity of species could offer greater soil protection than a single species
- a diverse range of species is likely to lead to better livestock production than a single species
- working with indigenous grasses could lead to opportunities for training and developing local expertise, with potential to develop small-scale entrepreneurial opportunities

CHALLENGES OF USING LOCAL GRASSES

- seeds of local species are difficult to harvest and store, and plants require careful management to ensure successful establishment
- seeds are often slow to germinate and establish
- there is currently no source of indigenous grass seed available, other than 'improved' pasture species such as *Eragrostis curvula*
- specific expertise needs to be generated.

RE-SEEDING BARE AREAS

In order to re-establish grass cover quickly, cleared and degraded areas were re-seeded with *Eragrostis curvula* (weeping lovegrass). The impacts of this were encouraging, with good establishment of the grass reported in some areas. At the Ha 'Mantsoepa site, *Eragrostis curvula* seed was scattered in the bare areas after shrub removal, and left on the soil surface. There was not, however, much evidence of *Eragrostis curvula* establishment although there was evidence of indigenous grass seedlings establishing in these bare sites, which should lead to rapid regeneration of grasses following shrub removal.

Monitoring the impacts of re-seeding as well as the natural establishment of grasses in areas cleared of shrubs is ongoing.

The practice of using purchased *Eragrostis curvula* seed is practically viable, however it may be more beneficial from the perspective of biodiversity, ecosystem health and livestock production to consider using locally harvested seed from indigenous species of grass for rehabilitation.

An approach using indigenous grass species for re-seeding is being tested at Ha Koali on abandoned croplands, at Ha Sekhonyana to establish buffer zones around croplands and at Ha Moqalo on the degraded slopes and potentially on sites cleared of invasive wattle trees.

Such an approach takes time to develop and implement, and would not replace the current seeding with *Eragrostis curvula*, but could complement it initially. Grasslands in the project sites will be rested for up to three years to allow for recovery and should produce reasonable amounts of seed of a variety of grass species. These could be harvested, dried, stored and planted on trial sites, preferably old abandoned croplands.

We saw something we never thought could happen –that we could preserve that area and bring it back to its natural state – so the greatest benefit has been seeing the improvement to the area where we did activities such as re-seeding the grass and seeing the condition it's in now – so different from what it was before the interventions. Ha Moqalo project participants

Since we started the project there are notable impacts on the ground, especially in areas where the rangelands have been re-seeded…, also for the production initiatives – people who were involved in that have even harvested and collected seeds that they can use in the future for producing fodder. Masheane Maoeng, Area Chief of the Mount Moorosi Area

RESTING THE RANGELAND

At all four demonstration sites, livestock were excluded from the areas that are being cleared of *Chrysocoma* during the summer to allow the grasslands to recover and regenerate. The resting period proved successful in terms of allowing the grass to recover in vigour. Increases in both basal and canopy cover provided by the grass thus increased the protection it offered to the soil. Seed was also produced.

Grazing of grassland in winter has little impact on the grass compared to grazing in summer when it is actively growing. Most rangeland rested during summer was allocated for grazing during winter to reduce the risk of wildfire. However, the very steep slopes and severely degraded areas at the Ha Sekhonyana site and the steep re-seeded slopes at Ha Koali were not allocated for grazing during the first winter.

The effects of summer resting clearly demonstrated to local livestock owners how it benefited them in the short term by providing winter forage and in the long term by improving the condition of the rangeland.

The exclusion of livestock usually involved all livestock owners, and the local chiefs. However, in some cases, not all the community members took part in the project, which did lead to misperceptions by those not involved.

Some people feel that the non-payment of it [the project] means it will stop them from grazing the area, so they are against that because they are used to just grazing any how they want. They look at it and it's a development area, it's reserved and animals are not supposed to go there. So they are looking at it as something that is just going to stand in their way from grazing their animals in there. The long and short of it is if the entire community could be understanding and taking part, the work would be better and everybody would benefit. Ha Moqalo project participants

… the grass is coming back after resting for the two years. You can immediately see the grass is coming back, even those that were no longer there are coming back… there's a lot of improvement that we are able to see. Ha Sekhonyana project participants

Far left: Rural households in Lesotho typically own a few livestock and crop a small area of land.

Left: In the long term, resting the rangelands improves their condition.

MANAGING THE LAND

GRAZING

Livestock owners are caught in the dilemma of the immediate problem of maintaining and feeding their flocks and herds using rangeland resources, while attempting to ensure sustainability of resources for the future.

Planned forage rationing involves setting aside areas of rangeland during the summer to allow for regeneration and conserving forage for winter use. Although the quality of conserved rangeland is relatively low in winter, it nonetheless provides a source of roughage without which livestock would lose condition. This approach emulates traditional rangeland management practices which are no longer being applied and is designed to benefit both the rangeland as well as the livestock.

Further strategies for improving forage supply (and thus easing grazing pressure on the rangelands) include restoration of abandoned croplands, using suitable grasses to boost forage production as well as integrating forage crops with food crops.

CROPS AND CROPLANDS

Forage production can be increased by sowing seed of suitable grasses, such as thatch grasses, as a buffer around croplands. This can have the effect of slowing down surface water movement, reducing erosion potential, providing thatching material and providing forage. The croplands on the relatively flat areas above the steep slopes on the Ha Sekhonyana site would benefit from developing a good buffer zone around them. This would ensure infiltration and slow the movement of surface water above the slopes. It is planned to use this site to demonstrate the development of buffer zones.

Many croplands are left fallow for one or more seasons and are typically covered by weedy grasses and forbs that do not provide useful grazing or adequate protection against soil erosion. Planting good quality forage crops on these lands that can grow in summer for winter forage, is one strategy introduced into the demonstration sites. Tall fescue (*Festuca arundinacea*) is a potentially suitable forage grass that should last for several seasons, and the annual teff (*Eragrostis tef*) can be used for human consumption as well as forage.

CONSERVATION AGRICULTURE – NETWORKING FOR SUSTAINABILITY

Conservation agriculture is an integrated approach to maintaining livelihoods in an ecologically sustainable manner by communities for communities. It consists of a set of agronomic practices that aim to restore ecological soil processes to sustain and increase agricultural production. The three main principles of conservation agriculture are: minimal soil disturbance; maintaining and enhancing soil cover, and crop rotation and diversification. These practices have significant physical and biological benefits on the soil and consequently agricultural production. An important benefit of conservation agriculture in the long term is that, while yields in wet years are improved, in dry years, yield reductions or losses are minimised.

Despite the evidence of the benefits from conservation agriculture practices, the transition to and uptake of these practices by farming communities such as those in Mount Moorosi is typically slow and limited. Conservation agriculture initiatives across Lesotho have illustrated that the introduction of these techniques and capacity building alone, does not ensure the transition to these practices. Farmers tend to be risk averse and stick to tried and tested farming practices that they and their fathers have used for decades.

The focus of the conservation agriculture efforts across all four demonstration sites is therefore to network the pilot site communities with existing conservation agriculture programmes, such as those being undertaken by the Food and Agricultural Organisation and the Ministry of Agriculture and Food Security. Members of the communities involved in the demonstration project have participated in study tours to conservation agriculture programmes in other parts of Lesotho and extension support is provided for the farmers in the four sites. The intervention at the demonstration sites is not an attempt to develop a separate programme, but rather to connect farmers with a network to provide long term extension and support to promote conservation agriculture more widely in the demonstration sites.

Capacity-building, while important to introduce new techniques, is not enough to ensure transition to improved management techniques. Long-term extension support and networking with other communities and programmes are essential.

Clockwise from top left:

Angora bucks were introduced into the communities' herds to improve breeding stock

Community members erecting stone barriers on steep slopes at Ha 'Mantsoepa

Successful keyhole gardens contributed to the wellbeing of communities. Training on the construction of the gardens, and provision of vegetable seeds were part of the rangeland project activities.

Koekoek chickens were introduced during the rangelands rehabilitation project to improve meat and egg production.

IMPROVING LIVELIHOODS

High levels of poverty and a lack of alternative options severely limit the livelihood strategies of households in the Mount Moorosi area. Enhancing livelihood opportunities through the introduction of viable alternatives and improving the returns and yields from existing activities became a cornerstone of this community-based rangeland management initiative.

SUPPORTING ALTERNATIVE OPTIONS

Interventions that have been successfully introduced at the four demonstration sites at Mount Moorosi include:

- introduction of the Koekoek chicken breed, which is an excellent free-ranging breed for meat and egg production, even with poor or limited feed
- up-scaling the rollout of keyhole gardens for the production of nutritious vegetables at the homesteads
- production of fodder on marginal cropping lands to supplement feeding of livestock is key to addressing animal health and nutrition, and is also an effective way of controlling soil erosion.

Some of us were given vegetable seed to produce vegetables at our homesteads, so we had fresh vegetables that we produced ourselves. We were given the chickens; that made us very happy because we could eat eggs and also the meat. Some of us were given the breeding stock – the Merino rams; that made us happy – even the fodder seed – some of us produced fodder for our breeding stock, although the problem was drought. It was dry the previous season. We've only had some rains now, so drought was a major problem. Ha 'Mantsoepa project participants

The livelihood aspect, particularly the breeding stock has been very important to us. I now have offspring, because I used the rams and my livestock has expanded and that has been a very important thing. So my life, in a way, has changed and is going to change, because my source of livelihood has improved. Community participant, Ha Koali

IMPROVED LIVESTOCK BREEDING

Improved breeding stock of Merino rams and Angora buck have been provided to livestock owners at the demonstration sites. This has been done to improve the genetic quality of livestock in order to increase the yields of animal products, especially wool and mohair.

Increasing per animal yields would allow flock sizes to be reduced without compromising livelihoods, which would in turn reduce grazing pressure on rangelands, and create new opportunities for grazing management.

Ten Merino rams and 11 Angora buck of high quality breeding stock have been placed with participating farmers at the four demonstration sites. These stud animals are shared with other livestock owners among participating community members in the villages. The introduction of improved genetic stock goes hand-in-hand with training and capacity-building to improve animal health and husbandry practices and forms part of the grazing management initiative.

These livelihood initiatives have proved very important to the project, with communities viewing them as just rewards for the hard voluntary work that they have contributed to the project. The training and study tours to other similar projects in Lesotho and Botswana are also recognised as important elements of the project.

BENEFITS FELT BY THE COMMUNITY

We were seeing the area eroded and weren't able to do anything about it, but through the project we have been able to do something to stop the rate of soil erosion. Not only that, but before the Koekoek intervention we did not have easy access to eggs as a source of protein, but now, our children and ourselves are able to utilise the eggs and meat, and this is something that is benefiting our households immediately. We can eat the eggs and some of us have even been able to start breeding with the Koekoek, using our indigenous chickens. Ha Sekhonyana project participants

When you talk of birds… There are certain species of birds that were no longer here, but which are now coming back to the area – also rabbits. There are plenty of rabbits here. These are some things we can immediately identify. Ha 'Mantsoepa participants

We have seen restoration of the environment. The grasses are coming back. Those rocky patches where we removed the invasive bushes are now getting covered. The biodiversitiy – when we were talking about the wildlife, the birds and animals that were almost extinct in this area are back, some of which the children had never even seen; we're beginning to see them now because they are coming back. Before we did these activities we were not aware that so much damage had been done, but things are now starting to come back. We are seeing our piece of land actually reminding us of the past, which means things are getting back to normal, so to us it's a very big improvement to this area. So it's something we will happily continue with. Ha 'Mantsoepa project participants

Initially, looking at the extent of soil erosion, how these dongas existed – I didn't think it was something that could happen, that those dongas could actually be stopped from deepening, but upon joining the project and with the training we were getting from the project, we did believe… that we could realise the dream of stopping the soil erosion. Makama Ramangole, participant from Ha Sekhonyana

CHALLENGES AND LESSONS LEARNT

Project participants were enthusiastic about the project and felt they had benefited greatly but also identified major challenges and lessons learnt, and how they could be addressed if the initiative were to be up-scaled to a catchment level.

One of the lessons learnt has been the importance of identifying **leadership** early in the project.

Where you have strong leadership you find that people understand things better because they are being led. There are those people who can actually be leaders in communities, not by birth or anything else, they just have those qualities. [Communities] need to be mentored… to make everybody realise that it's important to do things for themselves. So I think it is one of the greatest lessons we can take forward. Bonang Mosiuoa of Serumula

Encouraged by the initial results of the demonstration project, the Ministry of Forestry and Land Reclamation initiated a project with similar aims of land rehabilitation adjacent to participating communities. While this was a positive step, it was run on a cash-for-work basis, unlike the totally voluntary approach of the ORASECOM project. The government cash-for-work project reimbursed participants for clearing shrubs with cash for a period of 28 days. This led to a **division in the communities**: those who had volunteered for the demonstration project versus those who opted for the month of cash payments. Both felt that the other group was opting out and there was resentment among the 'cash group' about exclusion from rangelands. In Ha 'Mantsoepa specifically, participants mentioned that detractors were entering the reserved areas at night and allowing stock to graze on rangelands that were set aside for rehabilitation.

Project leaders felt that (in hindsight) this needed early discussions with both government and communities to try to find a compromise before matters reached the divisive situation that had emerged.

The **need for payment** was mentioned in all four communities. It was particularly prevalent in the most impoverished communities of Ha Koali and Ha Moqalo, where the drop-out rate of volunteers was high.

People would work even harder if they were seeing the payments directly coming into their households, because we have a big problem of hunger – we have a big shortage of food and security, so we would work even harder to improve that area. Ha Moqalo project participants

Participants left the project to seek employment elsewhere and were not allowed to re-join the project. This was exacerbated by the drought situation in 2013. Once again, the need for early inclusion of this factor in the planning phase was deemed to be an important lesson learnt. In particular, there was a need to address the re-inclusion of those who had left, conditional to certain limitations of privileges agreed upon by the community.

This is understandable, if I were to be part of the project from 2011 to 2013 and there are some benefits, some incentives, and I get the same incentives as the people who were just there for two months or so, I would also feel robbed, I would also feel disgruntled and also be very unhappy. So we should have anticipated that this disgruntlement was imminent, but these are the lessons learnt that one misses with the first enthusiasm when the project starts, and they need to be shared. Bonang Mosiuoa of Serumula

While the **technical aspects** of the project were felt to have been successful, there was the opinion that it would have been more beneficial for rangelands in the A grazing areas in the upper catchments to be addressed first, and that this should be a consideration with any expansion of the project.

When you consider the topography of our country, we have all our important sources of water in Grazing Area A. We have important wetlands there which provide us with the water we need. So if we can establish these rehabilitation works up there, that would go a long way not only in rehabilitating the rangelands, but also protecting the important sources of water that supply downstream communities and even benefit other countries as well. Pitso Morolong, Grazing Control Supervisor, Mount Moorosi Area

Regarding aspects of re-seeding, which we did with the grasses and so on in the denuded areas. Perhaps we should have done it in a manner that we started in the catchment from the top going downwards. It should have started higher, because the grass is not spreading as much as we would expect if it had been started from the top. Ha Moqalo project participants

The rate of spread should not differ whether the grass is planted high in the catchment or lower down. However, there is some logic to starting with restoration high in the catchment, as this should slow down the surface water flow and increase infiltration, which should reduce erosion lower down.

The **inclusion of the youth** in the project was a major challenge. Participants said that when the young people returned from schools or tertiary education institutions, their expectations were of employment with remuneration and they did not consider voluntary work appropriate.

They're really not keen in participating. But we are not going to leave it as it is, we will have gatherings like this where we talk to them, make them aware of the importance of their environment, and that as the future generation they will be custodians as we die. Slowly, maybe their attitude will change. But as it is now, their mindset is still very focused on employment and getting money – not these kind of benefits. Ha 'Mantsoepa project participants

It was also felt that more direct engagement with stock owners and herders should have taken place early in the project.

We really need to focus on the herders and the livestock owners – try and win their hearts for the project, because they are the ones who destroy and they are the ones who can protect. So we need to be extra careful when we approach them, so that they have a feel for the project. Teboho Maolla of Serumula

One of the major challenges facing cohesion in the project was the need for government approval of by-laws essential for the establishment of **village grazing schemes**. Although the grazing schemes were fully subscribed by the farmers, approval was often delayed because the relevant headquarters are situated in Maseru. This created delays which often led to communities losing interest or losing confidence in the process. The need for decentralisation of this process was essential for the commitment of the communities to these schemes.

The project wasn't long enough and we are still in the initial stages and are still battling to understand what is going on and this is the time when it is perhaps reaching its peak and now it's about to end. If an extension could come and we could still have the extension officer here to guide us, it would be a very important thing for the sustainability of the activities we are engaged in. Chief Masheane Maoeng

While there was a broad **inclusion of all relevant stakeholders** during the initial planning process, certain issues that emerged during the application of the project indicated that broader planning looking at a variety of scenarios should have been initiated with the communities. These should have specifically addressed issues surrounding payments and voluntary work and the possibility that this would give rise to friction within communities.

Whoever has intentions of starting a similar project – when they get into that area, they need to liaise with the local authorities – we've got our chiefs, we've got the councillors, we've got other actors in government, we've got non-state actors – everybody who's a stakeholder in that particular area – as well as to involve the community, because that would be a community-based initiative. In that way, when they have secured support from everybody who is in that area, it will be easy to achieve the results. Pitso Morolong, Grazing Control Supervisor, Mount Moorosi Area

RECOGNISING THRESHOLDS

A key lesson learnt has been the concept of recognising thresholds, understanding them and managing the natural and agricultural resources in a manner that does not exceed the thresholds.

In any natural system thresholds exist that are important to recognise. These thresholds play a critical role in triggering the self-reinforcing feedback systems that promote instability and degradation. Examples of thresholds could be:

- A minimum level of grass cover that prevents excessive surface water movement, causing the start of sheet erosion
- The amount of water that can move over lands without causing erosion
- The density of shrubs in grassland that reduces grazing capacity and decreases grass cover to the point where erosion will take place.

THE WAY FORWARD

The long-term vision for community-based rangeland management includes two important components:

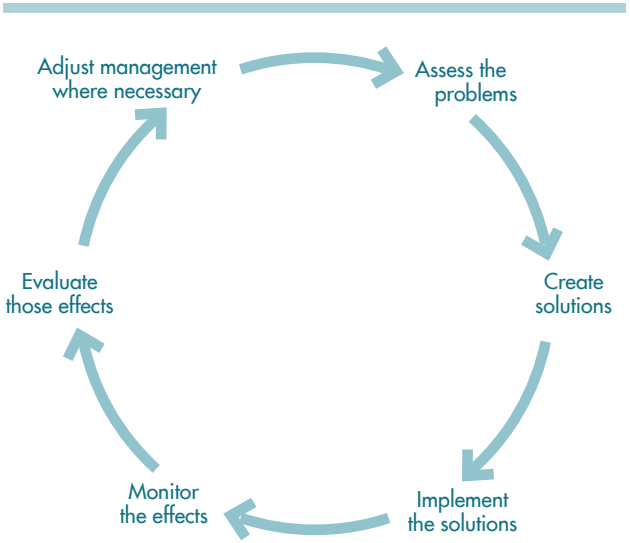
- Incorporating an adaptive management and community-based monitoring approach to inform the long-term effectiveness of rangeland management in Lesotho
- Up-scaling the demonstration site interventions to catchment level approaches.

ADAPTIVE MANAGEMENT

A strong emphasis of the project throughout has been on empowering local communities to make sensible decisions regarding the utilisation and management of their natural resources for both short- and long-term benefits. This has led to an approach of adaptive management or 'learning by doing'.

Adaptive management is based on the acknowledgement that scientists, government agencies, development organisations and local communities do not have all the answers to management of natural resources, particularly in unique local conditions. However, collectively, knowledge can be acquired over time to develop and refine management of natural resources. The adaptive management process involves collective assessment of problems, creation and implementation of solutions, monitoring and evaluating the effects of these and adjusting management accordingly.

The key to success in this process of community-based natural resource management is active participation by communities through all steps of the process, especially monitoring, evaluation and adjustment of management.



Adaptive management

COMMUNITY-BASED MONITORING

A management-oriented monitoring system (MOMS) is being developed that will enable communities to adopt an adaptive management approach. A fundamental principal of MOMS is that it is undertaken entirely at local level, from data collection to analysis and reporting. Communities need to be trained on how to apply MOMS and collect information on indicators of rangeland condition, such as grass condition, soil erosion, stocking rates, resting periods, etc. These data will enhance decision-making and be used to inform and adapt their management of the rangelands.

GRAZING MANAGEMENT

Grazing management is critical to rangeland health and livestock performance. The solutions generated from community workshops early in the project were implemented during the project. These have shown successes. It is envisaged that, through a monitoring, evaluation and adjustment process, and based on feedback received, communities are likely to expand the rehabilitation programme to other areas.

Staff from the Department of Rangeland Resources will be formally involved with scientific monitoring, while other monitoring strategies have been devised for community members to carry out independently. They will have data of their own to contribute at the evaluation phase on changes in productivity due to removal of shrubs and the rate of recovery of eroded areas.

One of the most important aspects for communities to decide on is which areas should be grazed or rested, and when, to assure the supply of forage for summer and winter. Communities have to be actively involved with implementation of grazing management, to ensure compliance by all livestock owners.

This approach empowers communities to make decisions, and to ensure that communities 'own' the decisions and implement them accordingly.

LIVESTOCK IMPROVEMENT

The current initiative to improve the genetic quality of the livestock is an important component of rangeland management. This goes hand in hand with ensuring an adequate forage supply to maintain the condition of the livestock and that good animal husbandry practices are followed. Important aspects are:

- increasing the proportion of breeding stock in the flocks to ensure optimal yield of animal products from the herds, which will contribute to higher economic returns from fewer animals
- ensuring that livestock are in good condition during the breeding season to facilitate high conception rates
- ensuring that the breeding takes place at the correct time of the year to facilitate acceptable rates of survival and growth of lambs and kids.

Partnerships between relevant government departments and agricultural organisations, such as wool and mohair associations, will help to provide technical input.

MANAGING FOR CLIMATE CHANGE

There is increasing evidence that rainfall patterns may play a role in determining the ratio of grass to shrubs in grassland habitats. Even rainfall distribution throughout the rainy season is likely to favour perennial grasses, while uneven distribution (severe rainfall events followed by lengthy dry spells), is likely to favour annual grasses and deeper rooted shrubs. Increasing levels of carbon dioxide are also likely to favour an increase in the abundance of shrubs at the expense of grasses.

The potential role of climate change in degradation highlights the need to manage variables that can be manipulated, such as livestock numbers, types and movement, supplementary forage supply, erosion and restoration.

Based on the expectations raised by current knowledge of climate change, monitoring and management should focus on changes in grass species and shrub invasions. If for example, shrub invasion continues to expand, then management can be adjusted, both in terms of livestock numbers and ratios, as well as resting and burning management to counter it. Shrub removal programmes can also be expanded.

UP-SCALING THE PROJECT

Up-scaling the interventions carried out at the four demonstration sites to catchment level, while in line with the long-term vision of the community-based rangeland management initiative, is still in the planning stage. The communities have expressed enthusiasm for the idea of expanding the programme as they feel the benefits that they have experienced can easily be extended to other areas.

They emphasise the need for patience and the willingness to work hard, and point out that the initiative will not show benefits overnight, but should be considered an investment for future generations. They feel that early discussions should include the questions of payment and the challenges of excluding certain grazing areas for rehabilitation. Drought, the exigencies

of poverty and the need to ensure improved livelihoods were important aspects to consider during initial discussions.

This extent of poverty could actually be reduced, if everyone could look at this project as being for them. Everybody should work hard – not just looking at it as one of the projects where you see the benefits overnight, but one where you see the benefits as you continue working in it. Ha Sekhonyana project participants

The communities' vision was that the project should be expanded as widely as possible, so that the benefits to the rangelands could spread across Lesotho and ensure greater productivity and security of water resources throughout the country.

If you look at the dongas, and how fragile our soils are – a similar kind of project would be very important if it extends beyond this area, because the problems we have here of soil erosion and depleted rangelands is not only the problem of Mount Moorosi, it's a widespread problem throughout the country. So an initiative like this would go a long way to bring back the condition of this country. Makama Ramangole, Ha Sekhonyana

Generally, participants felt that they would 'do it again' if given the chance and were enthusiastic to continue with the initiatives they had worked so hard for. Serumula Development Association feels however, that in view of the lessons learnt during the project period, in depth discussions need to be held with all stakeholders to plan in detail the 'how' of taking it forward, rather than just continuing with the project as it is.

The demonstration project has opened doors for networking and amalgamating with similar projects being conducted in Lesotho and provided an opportunity to have an input into the *Lesotho Action Plan for the Orange–Senqu River Basin* and the basin-wide *Strategic Action Programme for the Orange–Senqu River Basin*, as well as involvement in other integrated water resources management initiatives.

The whole point is to get this message out about what was achieved, so that it's widespread – so that people recognise the work. But of course we also learnt from other people. Bonang Mosiuoa of Serumula

The neighbouring villages admire the work that has been done. They always talk about it. Ha Koali project participants

… it would be my wish that in future other people could come to this area to learn from what the demonstration project has done. The most obvious would be if the community who were involved in this demonstration project, are the ones who encourage other people who are here to come on board, encouraging them with the impacts that are visible on the ground, pointing to those specific examples of this is what our project has achieved in our area and you are capable of maybe doing even better if you engage in the project. So their experiences of what impacts have been reduced would be incentive enough to encourage those people. Chief Masheane Maoeng

Additional recommendations for the way forward include:

- the need for greater involvement of women in rangeland management and rehabilitation activities to avoid creating tensions within the communities
- the need for governance issues to also be addressed in the community-based rangeland management initiatives and to proceed with the national decentralisation policy
- the need to explore alternative technologies or opportunities for ploughing
- the need for ongoing support of communities in terms of provision of seeds and materials as they are unable to afford to purchase these themselves.

In conclusion, effective rangeland management will require close collaboration between state and non-state actors including government ministries, traditional leaders, the rural communities themselves, NGOs, and the donor community.

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