

# Acknowledgements

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# *List of Acronyms*

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**NRMPS** - National Rangeland Management Policy and Strategy

**MAWF** - Ministry of Agriculture, Water and Forestry

**NNFU** - Namibia National Farmers' Union

**NECFF** - Namibia Emerging Commercial Farmers' Forum

**MET** - Ministry of Environment and Tourism

**NAU** - Namibia Agricultural Union

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*With the present poor situation of Namibia's rangelands and the current and potential impacts thereof on the livelihoods of a large number of Namibians in mind, it is of paramount importance that something be done drastically and urgently.*

# 1 Introduction and rationale for the NRMPS

Agriculture is the predominant land use in Namibia, where some 70 % of the population depends directly or indirectly on the natural rangeland resource for their economic well-being and food security. Beef production is the most important livestock related activity in Namibia, followed by small stock (sheep and goat) production. Since 1990, the Namibian commercial livestock sector accounts for almost 70% of the overall annual agricultural output value. This activity is almost completely dependent on the country's natural rangelands.

The alarming state, in which much of Namibia's rangelands are, its inability to support a substantial portion of the nation and concomitant increase in poverty levels and the impact of land degradation on the national economy, is well known. It further impacts negatively on the tourist industry as the degraded state of the country's rangelands, seen most obviously in bush encroachment, soil erosion and deforestation, is also unacceptable from an aesthetic point of view.



*Degraded rangeland near Okakarara in the eastern communal lands. (Bertus Kruger)*

Grain yields in sub-Saharan Africa remained virtually unchanged since 1975, compared to ever increasing yields in the USA and Asia. A decrease in overall rainfall, more frequent droughts, a loss of more than 30% of the maize crop by 2030, and dramatic changes in land suitable for crops are predicted for southern Africa. This emphasizes the importance of beef and mutton production in Namibia and highlights the role that livestock will play as a pathway out of poverty. The climate for Namibia will become warmer and drier due to climate change. Seasonal rainfall patterns will be more erratic and Namibia will experience droughts more

frequently. Evaporation is anticipated to rise by 5% per degree of warming. So, even if rainfall remains unchanged, the availability of water is likely to decrease. Water is already a scarce resource in Namibia, so decreases in rainfall and increases in evaporation will have an unfavorable effect on our biological and economic growth. These conditions will lead to a decrease in rangeland productivity and make the user/manager more vulnerable.

Reasons for rangeland degradation include too many people and livestock in one place for too long (between 60 and 70 % of Namibia's population practice subsistence agro-pastoralism on communal land, which constitutes approximately 41% of the total land area); land clearing for crop farming and in many cases the application of inappropriate cultivation techniques; inappropriate provision of artificial water points and poor range management associated with them; and over-exploitation linked to insecure land tenure arrangements. Long term land degradation could be costing families (in communal lands) around N\$ 80 million/year in lost income and increased expenditure and it is generally accepted that the decline in the carrying capacity of Namibia's rangelands could be anything from 100% or more, with a concomitant loss of income of about N\$ 1.4 billion per annum.



*Towards bush encroachment in central Namibia. (Dave Joubert)*

With this present situation of Namibia's rangelands and the current and potential impacts thereof on the livelihoods of a large number of Namibians in mind, it is of paramount importance that something be done drastically and urgently. The development and implementation of a National Rangeland Management Policy and Strategy (NRMPS) is therefore urgently required.

## 2 What should the NRMPS achieve?

The goal of the National Rangeland Management Policy and Strategy (NRMPS) should be to enable resource users (farmers and managers) to manage their rangeland resources in such a way that:

- animal production per hectare is sustainably improved;
- vulnerability of users to a highly variable resource base is decreased;
- awareness of the current situation is created;
- biodiversity is improved and maintained.

To sustainably improve animal production per hectare, care should be taken that the NRMPS contains strategies that are economically viable, socially acceptable, environmentally friendly and politically conducive.

### 2.1 Optimizing sustainable production/ha

In order to sustainably improve animal production, the NRMPS should focus on:

- improving the nutrient cycle
- improving the water cycle

#### 2.1.1 Improving the nutrient cycle

Minerals and other nutrients are constantly used and re-used, following a typical cyclical pattern. Minerals and nutrients have to be brought above ground by living plants and then returned underground for reuse. A good and healthy mineral cycle is where nutrients are prevented from escaping the cycle and where the volume of nutrients that are circulating within the cycle increases. The key to a healthy mineral cycle lies in the condition of the soil surface. The soil surface should be loose and covered by enough live plant material and litter to prevent capping and the creation of a harsh micro-environment with very little microbe activity. Capped soil surface reduces air exchange between the atmosphere and the soil, resulting in reduced oxygen and increased carbon dioxide levels. This in turn inhibits root growth and eventually negatively impacts on the dynamics of the mineral cycle.

The NRMPS should therefore contribute towards improving the nutrient cycle by:

- promoting a diversity of plants with diverse root systems to allow for maximum upward movement of nutrients from as deep and wide as possible;
- promoting an effective way of getting excess plant material (litter) back onto the soil surface as well as into the top soil;

- creating a healthy soil surface with active biological activity to speed up the process of putting minerals back into the soil for re-use;
- improving the structure (crumbing) of the soil in order to prevent unnecessary leaching of minerals beyond the root zone and to improve the aeration of the soil.

#### 2.1.2 Improving the water cycle

In an effective water cycle plants make maximum use of rainfall. Very little water evaporates directly from the soil surface and runoff is slow and carries little organic matter with it. A good air-to-water balance exists in the soil, enabling plant roots to absorb water readily. In a non-effective water cycle plants get minimal opportunity to use the full amount of rainfall received. Most of the water is lost through surface evaporation or runoff and that which infiltrates is not always readily available to plants due to a poor air-to-water balance in the soil. An effective water cycle tends to even out the erratic nature of rainfall by making rain that does fall more effective. Effective rainfall means total rainfall received minus runoff, evaporation, interception, transpiration and percolation outside the root zone. Effective rainfall is water that soaks in and becomes available to plant roots, insects and micro-organisms or which replenishes underground supplies with very little subsequent evaporating from the soil surface. To make rainfall as effective as possible means producing a cycle that directs most water either out to the atmosphere through plants or down to underground reserves.



*Improved soil cover through herding livestock (Colin Nott)*

Water Use Efficiency (WUE) is the amount of dry matter produced by plants for a certain amount of water used. Veld in good condition produces with the same amount of rainfall received, nearly 4 times more fodder than in poor veld. Differently stated, 4 times more rainfall is needed to produce the same amount of fodder on poor veld than on good veld. Veld in poor condition can have as much as 180% more runoff than veld in a good condition. This situ-

ation is even further compounded by the fact that veld in poor condition produces fodder that is less palatable than fodder produced in good veld.

The NRMPS should therefore contribute towards creating and maintaining a healthy water cycle by:

- promoting the creation of a good soil cover;
- promoting the creation of sufficient organic matter (live plants and litter) in and on the soil surface;
- promoting good aeration of the top soil;
- reducing the competition for soil moisture between undesirable bushes and preferred grasses.



*Bare soil surface, resulting into a poor water and mineral cycle. (Bertus Kruger)*

## 2.2 Reduced vulnerability of users to a variable resource base

Namibia is the most arid country in sub-Saharan Africa with a very low and highly variable rainfall, both between different years and geographically over the country. Drought and aridity are two totally different phenomena, although they are closely related. Very often farmers confuse the two. The one (aridity) describes the general climatic conditions (e.g. low rainfall and high evaporation) that prevail in a certain area and should be seen as normal, while the other (drought) indicates an extremely dry situation created by a number of consecutive low rainfall years that negatively impact on the ability of rangeland to produce adequate fodder. The one is a given reality and the other needs to be mitigated through proper pro-active planning. As aridity increases, so does variation in rainfall between years as well as geographically. Climate change is definitely going to contribute towards an increased frequency of occurrence as well as the severity of drought.

In order to reduce vulnerability of resource users to a variable resource base, the NRMPS should focus on:

- well-planned and proper rangeland management;
- timely and flexible adjustment of animal numbers to available fodder sources;

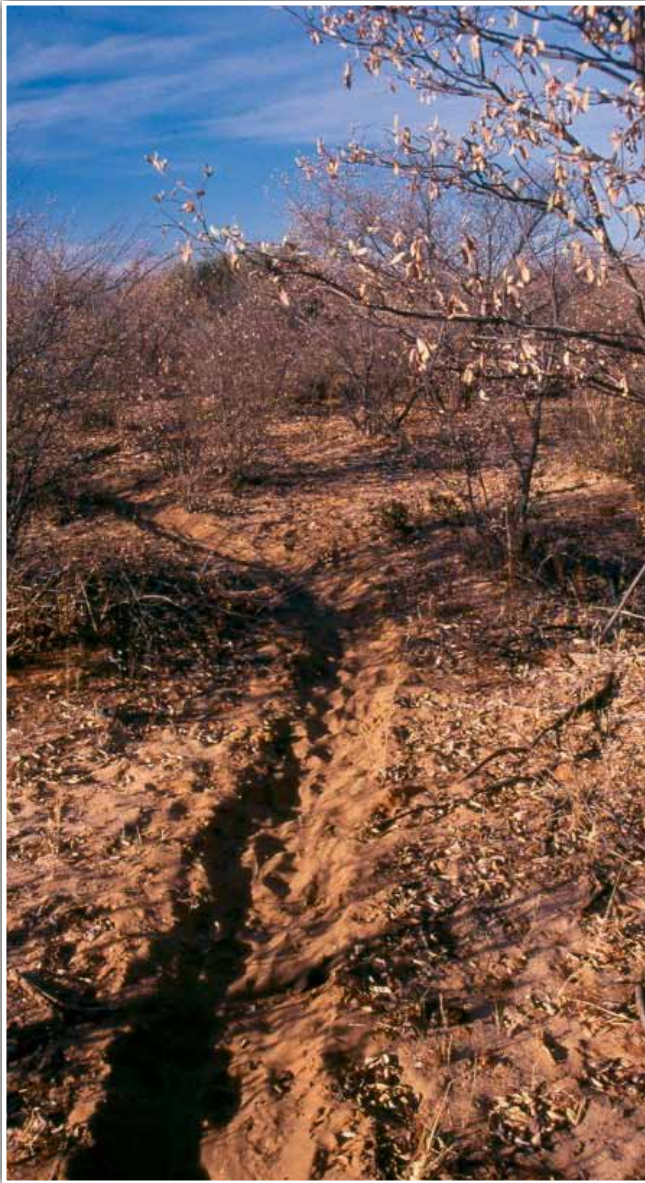
- timely provision for disaster drought situations;
- careful planning and developing further water infrastructure in unused and under-used areas.

### 2.2.1 Timely and flexible adjustment of animal numbers to available fodder sources

Carrying capacity (and therefore fodder availability) is not fixed and varies greatly between years, depending on veld condition and the amount and distribution of rainfall received. The challenge is to objectively and reliably determine the fodder availability at the end of the rainy season (May) and to timely adjust livestock numbers to it. This must be done every year.



*Continuous over grazing, resulting into the total loss of perennial grasses. (Bertus Kruger)*



Footpath formation due to continuous overgrazing. (Bertus Kruger)

The NRMPS should promote the timely adjustment of animal numbers to available fodder sources by the:

- development of easy and reliable methods to determine fodder availability;
- promotion of the use of these methods by as many as possible rangeland users and managers;
- consideration of incentives to enhance the timely adjustment of livestock on an annual basis;
- promotion of flexible livestock systems.

### 2.2.2 Timely provision for disaster drought situations

A disaster drought refers to drought conditions so intense or protracted that they are beyond what can reasonably be dealt with in terms of normal risk management practices and which justify State intervention. It is anticipated that the frequency and severity of disaster droughts will increase in future due to the effect of climate change.

The NRMPS should promote the timely provision for disaster drought situations with the implementation of the national drought strategy. This will contribute towards:

- development of a timely and pro-active marketing incentive scheme during disaster droughts, making provision for tax wavers where applicable;
- creation of a special drought fund;
- promotion of diversification inside and outside agriculture;
- promotion of planted pastures and other forms of fodder preservation.



Timely marketing of excess livestock is the best way to mitigate the impact of drought. (Bertus Kruger)

## 2.3 Improvement and maintenance of biodiversity

Biodiversity in rangelands refers to the diversity of plants and animals within a given community. The more diverse and complex communities become, the fewer fluctuations in terms of numbers of species occur and the more stable communities tend to be. There is a strong connection between diversity of species, productivity and stability within the rangeland ecosystem as well as the ability of animals to efficiently use available fodder.

The NRMPS should promote the creation and maintenance of rangelands that are high in biodiversity by, amongst others:

- correct utilization of key plants (intensity of utilization);
- adequate recovery of utilized plants (frequency of utilization);
- reclamation of denuded rangelands;
- strategic erosion control.



### 3 How will the NRMPS achieve this?

The long term goal of the NRMPS is to: “*significantly contribute towards improving the livelihood of people directly or indirectly dependent on management and utilization of rangeland resources*”. Over the short term however, the goal is: to empower rangeland managers and users to use their rangeland resources in such a way that “*animal production per hectare is optimized without the loss of rangeland productivity*” and “*that economic losses to a highly variable resource base is minimized.*”

#### 3.1 Objectives of the NRMPS

In order to achieve the short term goal and to significantly contribute towards achieving the long term goal, the following six objectives have to be realized:

*Objective 1:* The importance of Namibia’s rangelands is raised at local, national and international levels.

*Objective 2:* The understanding of the national rangeland management principles amongst all stakeholders is improved.

*Objective 3:* Best practices and lessons learnt regarding sound rangeland management are identified, documented and widely shared.

*Objective 4:* Sufficient support structures to implement the NRMPS are in place and functional.

*Objective 5:* The policy environment for the implementation of the NRMPS is conducive.

*Objective 6:* The implementation of the NRMPS on commercial and resettled farms, in communal areas and in national protected areas is supported.

#### 3.2 Major activities to achieve the different objectives

In order to achieve these objectives the following major activities need to be implemented:

##### 3.2.1 Objective 1: The importance of Namibia’s rangelands is raised at local, national and international levels.

- Brief decision-makers on the value of Namibia’s rangelands by using multiple media sources like radio, TV, pamphlets, fliers, presentations at Parliamentary Standing Committees, line ministries and inter-ministerial forums.

- Brief international stakeholders like embassies, donors, scientific societies, etc. on the value of Namibia’s rangelands by using lectures, multiple media sources, papers at conferences, etc.
- Brief non-governmental organizations on the value of Namibia’s rangelands by using different media sources.
- Brief rangeland users and managers on the value of Namibia’s rangelands by using different media sources.



*Involvement of rangeland users in the planning and implementation of sound rangeland management practices. (Bertus Kruger)*

##### 3.2.2 Objective 2: The understanding of the national rangeland management principles amongst all stakeholders is improved.

- Publish and distribute national rangeland management principles in vernacular languages to all resource users and managers.
- Conduct comprehensive capacity building activities (e.g. training and exposure) for all users, managers and support agents involved in rangelands.

##### 3.2.3 Objective 3: Best practices and lessons learnt regarding sound rangeland management are identified, documented and widely shared.

- Document and share best practices and lessons learnt from successful farmers.
- Conduct a national rangeland audit as a baseline for future monitoring.
- Collate existing rangeland related materials and share as widely as possible.
- Expose rangeland users/managers to best practices in the country and abroad.

- Conduct demand driven on-farm rangeland research.
- Share best practices and lessons learnt with rangeland users and managers.

### 3.2.4 Objective 4: Sufficient support structures to implement the NRMPS are in place and functional.

- Recruit and maintain adequate and competent rangeland management specialists in the government system.
- Provide bursaries to support students in rangeland management at recognized universities.
- Solicit adequate budgetary support to effectively operate government extension and research services.
- Create a Rangeland Advisory Committee to advise the Minister of Agriculture, Water and Forestry on rangeland related issues.
- Solicit adequate and affordable financial support to enable farmers to effectively address land degradation.
- Introduce rangeland management into primary school curriculums.

### 3.2.5 Objective 5: The policy environment for the implementation of the NRMPS is conducive.

- Amend and update the existing Soil Conservation Act to make provision for non-title deed areas.
- Provide for security of tenure over rangeland resources in non-title deed areas.
- Approve and implement the Bush Encroachment Management Policy.
- Address current uncertainties amongst commercial farmers regarding processes and modalities of land reform.
- Amend the act on the sub-division of agricultural land (Act 70 of 1970).
- Amend the labor act to provide for part time/casual workers to clear bush for their own accounts
- Raise awareness amongst government and the public at large regarding their rights and responsibilities towards the different polices and legislation.
- Implement the Drought Policy and Strategy.

### 3.2.6 Objective 6: The implementation of the NRMPS on commercial and resettled farms, in communal areas and in national protected areas is supported.

The following measures are very specific for different land uses:

#### 3.2.6.1 Communal areas

- Raise awareness amongst traditional leaders and other stakeholders on the importance of rangeland resources and the need for sound rangeland management in their community.
- Improve understanding of farmers regarding sound rangeland management practices.
- Develop a common vision for participating farmers.
- Agree on size, location and extent of grazing areas.
- Develop a detailed map of the grazing area, including the major intra-structure and other features.
- Assess and evaluate the chances of current rangeland management practices towards achieving the new common vision.
- Form grazing groups or associations.
- Develop rangeland management plans.
- Implement local level monitoring.
- Do ongoing monitoring, evaluation and adjustments of the management plan (implementation of the plan over time).

#### 3.2.6.2 Resettlement farms

- Develop a detailed map of the farm indicating the allocation of different land units to different settler families.
- Improve understanding of the principles of sound rangeland management.
- Assess current and potential management practices.
- Form a Joint Management Body.
- Develop a Joint Rangeland Management Plan.
- Introduce local level monitoring.
- Do ongoing monitoring, evaluation and adjustment of the management plan.



Allocation of farming units on resettlement farms. (Bertus Kruger).

### 3.2.6.3 National protected areas

- Assess current rangeland conditions and identify reasons for current status of rangeland condition.
- Evaluate current rangeland management plans.
- Develop sound rangeland management plans.
- Introduce local level monitoring.
- Do ongoing monitoring, evaluation and adjustment of rangeland management plans as part of the implementation.



*Extensive root system of Acacia mellifera. (Nico Smit)*

### 3.2.6.4 Privately-owned farms

- Assess current rangeland management practices to identify challenges.
- Develop a detailed map of the farm.
- Develop (with the farmer) a sound rangeland management plan to implement rangeland management principles.
- Introduce local level monitoring.
- Do ongoing monitoring, evaluation and adjustment of the rangeland management plan by doing regular visits.
- Form study groups that share experiences and results regarding different rangeland management practices.

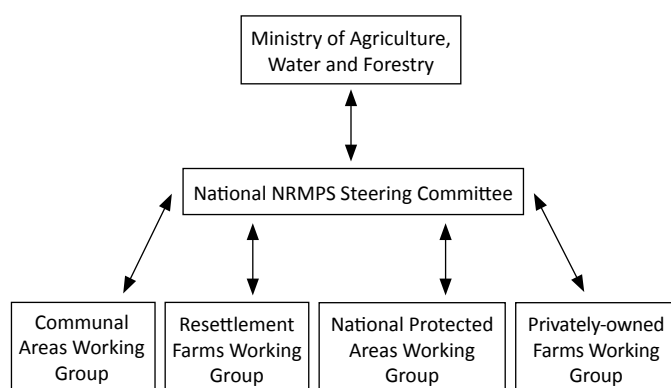


*A study group discussing rangeland issues on a privately-owned farm. (Ibo Zimmermann)*

## 4 Institutional framework for implementation

The implementation of the NRMPS is complex and it is recognized that government alone will not be able to do it. Successful implementation is dependent on various stakeholders from governmental and non-governmental levels and includes both decision-makers at higher levels and resource users and managers at grass root level. Government, via the Ministry of Agriculture, Water and Forestry, should have the overall responsibility for implementing the NRMPS, but implementation functions should be delegated and outsourced to other entities. This chapter suggests an institutional framework for the successful implementation of the NRMPS.

### 4.1 The structure



### 4.2 Leadership, roles and responsibilities

Each of these suggested structures will have specific functions. This section provides more information on the possible roles and responsibilities.

#### 4.2.1 Ministry of Agriculture, Water and Forestry

The Ministry of Agriculture, Water and Forestry takes overall responsibility for the successful implementation of the NRMPS and reports directly to Cabinet on the progress and status of implementation. The budget for implementation is also provided by this Ministry.

#### 4.2.2 National NRMPS steering committee

This body is chaired by the Ministry of Agriculture, Water and Forestry (MAWF) and consists of technical staff from the MAWF and representatives from the four working groups. This body is responsible for annual work planning and budgeting,

policy decisions, monitoring and evaluation and reports to the MAWF on the status and progress of the implementation.

#### 4.2.3 Communal areas working group

This working group consists of governmental and non-governmental rangeland experts and coordinates the implementation of the NRMPS in communal areas. It is chaired by the Namibia National Farmers' Union (NNFU) and is responsible for annual planning and budgeting, monitoring and evaluation and reports on progress and status of the implementation to the NRMPS Steering Committee.

#### 4.2.4 Resettlement farms working group

This working group consists of governmental and non-governmental rangeland experts and coordinates the implementation of the NRMPS on resettlement and affirmative action loan scheme farms. It is chaired by the Namibia Emerging Commercial Farmers' Forum (NECFF) and is responsible for annual planning and budgeting, monitoring and evaluation and reports on the progress and status of the implementation to the NRMPS Steering Committee.

#### 4.2.5 National protected areas working group

This working group consists of governmental and non-governmental rangeland experts and coordinates the implementation of the NRMPS in national protected areas. It is chaired by the Ministry of Environment and Tourism (MET) and is responsible for annual planning and budgeting, monitoring and evaluation and reports on the progress and status of implementation to the NRMPS Steering Committee.

#### 4.2.6 Privately-owned farms working group

This working group consists of governmental and non-governmental rangeland experts and coordinates the implementation of the NRMPS on existing commercial farms. It is chaired by the Namibia Agricultural Union (NAU) and is responsible for annual planning, budgeting, monitoring and evaluation and reports on the progress and status of the implementation to the NRMPS Steering Committee.

## 5 Principles of good rangeland management

The development of sound rangeland management principles aims to improve rangeland productivity. These principles will however need to be supported by an effective implementation strategy and an enabling policy environment. The principles for good rangeland management include:

### 5.1 Know your resource base

The land user must be knowledgeable as the following must be understood in order to manage the land effectively and to grow more fodder.

- The difference between annual and perennial grass plants. An annual grass plant grows from seed and dies at the end of the growing season. Annuals have small root systems, require significant rainfall events to germinate and generally put more energy into producing seed than into growing leaves. Their small root systems do not hold the soil well. A perennial grass if well managed will develop a strong tuft that keeps growing year after year.



Abundant perennial grasses. (Ibo Zimmermann)

- It is important to know the botanical composition, which species (grass and shrub) are “key” to production and at what times of the year.
- The user/manager must be aware of the state of the soil surface. The soil surface is a very good indicator of how effective your management is. If the soil surface is bare and hard and there is no organic matter on or in the soil, the soil tends to form a hard sealed surface layer (capped). Rainwater runs off these soils and evaporation is high (poor water cycle) and conditions are very hostile for germination and growth. Productivity from bare ground is low.



Veld that is dominated by annual grasses. (Bertus Kruger)

### 5.2 Manage for effective rest

Rest is applied to make provision for:

- The recovery of grasses after utilization by means of root re-establishment and the restoration of plant reserves (recovery period depends on the utilization level of the grass plant and growing conditions immediately after utilization);
- Organic matter to build up in this area so that it can be utilized to increase soil cover in the following season, as a drought reserve or for strategic marketing (usually achieved by applying a full growing season rest);
- Unhindered seed production;
- The establishment of seedlings.

### 5.3 Manage for effective utilization of plants (grasses and shrubs)

Managing the utilization levels of both grasses and shrubs is important. Perennial grass plants and favorable browse species are managed with the intention of increasing their vigor and productivity. Utilization of perennial grass plants is the defoliation of grass plants in such a way as to maintain or increase plant vigor and production over time. This is achieved by allowing grass plants enough time between grazing periods to recover and restore their root reserves. The higher the intensity of defoliation, the more time is needed for the grazing plant to recover. Active and healthy root systems are vital for aeration and nutrient cycling from the lower soil layers.



*Herding of livestock contributes towards seed bed preparation and planning of adequate recovering periods. (Colin Nott)*

Perennial grasses will be overgrazed if they are re-grazed before the plant's root reserves have been replenished. A sure sign of an overgrazed grass plant is leaves and flowers growing along the soil surface (often forming a rosette). Continued overgrazing over time results in the plant dying off. Perennial grasses are overgrazed if toothed animals (horses and donkeys) are able to pull them out by the roots. It is important to know that overgrazing can still take place, despite low stocking rates.

A perennial grass plant is underutilized if there is old grey standing material within the tuft. Underutilization results in decreased vigor and productivity of grasses. Parts of the rangeland may be underutilized if there are plants with large amounts of grey oxidizing plant material in the tuft. It is also possible to have an overgrazed plant next to an underutilized plant.



*Moribund grass due to under utilization. (Bertus Kruger)*

If the stocking density is too high for the available feed then feed will be consumed too fast and animals will return to the grazed area before the plants have recovered from the last grazing event. This depletes reserves, weakens the plant and eventually kills it. If animals are left too long in the same area during the growing season, animals may re-graze a plant they grazed when they entered the area to start with. The amount of time that plants need to recover is determined by the growth rate of the plant, which in turn depends upon factors such as, amongst others, rainfall distribution and temperature. When a plant has seeded it has generally recovered, but recovery often occurs well before this as well.

It is imperative that the amount of fodder on the farm should be assessed each year at the end of the growing season (end of the rainy season), which is around April/May. In doing this, provision is made to ensure that there is enough fodder for the animals until the rains can be expected (with a drought reserve built in). It also suits perennial grass plants in that they should be utilized during this period to enable their growth points to be exposed to the sunlight to enable effective growth in the next season. Too severe utilization in the dry season can result in the physical removal or damage of active growth points and should be avoided at all costs. Available fodder changes from year to year simply because of the variability of rainfall and other growth factors. Making use of a fixed grazing capacity should therefore be avoided. The timely adjustment of animal numbers to available grazing

is beneficial to the user/manager. The sooner de-stocking is done (various ways exist) the fewer stock will need to be removed later on and rangeland users will be less vulnerable to fodder shortages for their animals.



Good fodder production. (Wiebke Volkmann)

#### 5.4. Enhancing soil condition

In any grazing ecosystem there is a strong interaction between soil and vegetation. If the soil is in a good condition then it can support the vegetation needed to protect itself, provide fodder for the grazing animals and provide the organic material which influences the physical and chemical fertility of the soil. If it is in a degraded condition, then nutrient cycling, water infiltration, seed germination, seedling development and a number of other ecological processes are disrupted. It is therefore imperative that the land user should strive towards maximum protection of the soil by managing for a maximum basal cover by perennial grasses and increased organic matter on and in the soil.



Good organic matter cover on topsoil. (Bertus Kruger)

Apart from the soil protection function it introduces, it ensures low run-off levels and so creates a situation where water can penetrate the soil. Having the maximum amount of vegetation on the land is probably the best mechanism against soil erosion. This holds especially true for grass plants, as their fine root systems are far more effective in holding soil than the tap root systems of many woody plants.



Poor organic cover on topsoil. (Bertus Kruger)

#### 5.5 Addressing bush encroachment

It has been shown that in areas where bush is a problem, very little rainwater succeeds to infiltrate and reach the underground water table, and where bush densities are decreased, water tables start to rise again. Various control measures and guidelines exist to address the problem.

Biological control is a viable way of tackling bush encroachment. Large tracks of bush encroached rangeland are affected by the fungus *phoma glomerata*, resulting in the die-off of mainly *Acacia* bushes. Browsers like certain game species and goats can play an important role as after-treatments once thick bush densities have been cleared.



The inclusion of goats as after-care after eradicating bush encroachment should form an integral part of sound rangeland management. (Bertus Kruger)

The utilization of bush for charcoal and other products is seen as an asset, rather than a liability. If the goal of utilizing bush is to restore rangeland for improved livestock productivity, application and after-care methods will differ significantly from those where bush is seen as a sustainable resource for continuous utilization. In both cases, incentives from government are needed to support farmers to reach their specific goals.



Charcoal production. (Nico de Klerk)

A lot of work has been done on the chemical control of bush in Namibia, and a substantial amount of data is available on the effectiveness of the method, arboricides and cost aspects involved. The costs of this are well documented. The success over the long term is variable depending on follow-up management.



Chemical control of invader bush. (Nico de Klerk)

Mechanical control involves the use of bulldozers, axes, chainsaws and so forth. Bulldozing leads to severe soil surface disturbance and often leads to an even denser woody component than before. It is for this reason that it is not recommended as a method to deal with bush encroachment. Using axes, chainsaws and other such tools is only recommended if bush is removed in such a way that the coppicing buds are destroyed, or, where coppicing does occur, the stumps are treated with an appropriate arboricide.



Mechanical control of invader bush. (Nico de Klerk)

Veld burning has for long been a controversial aspect of range management and remains so. Fire, like animals, has evolved with savannas and the absence of fire is seen by many as one of the major reasons for bush encroachment. Care should be taken if and when fire is used to ensure that the neighbor's veld is safe. Fire can also be used as an after-care to keep savannah veld open. Fire does remove an accumulation of biomass, brings browse to available levels and it stimulates out of season growth. The effectiveness of fire in destroying parasites, controlling the encroachment of undesirable plants in the veld and altering vegetation composition is less conclusive. Injudicious burning can result in a degradation of the environment (deterioration of the botanical composition, reduction in plant biomass, reduction in crown and basal cover, higher run-off, destruction of grass seeds and erosion, to name a few). The timing, frequency, physiological plant conditions, environmental conditions, fuel load and other factors will influence the effect that the fire will have.



Fire as a means of addressing bush encroachment. (Dave Joubert)

## 5.6 Drought planning

Droughts are not a result of poor rangeland and animal management. Droughts are extended periods of below average rainfall. In Namibia it is not a question of if drought will occur, but when it will occur. Planning for drought is therefore crucial. Key aspects of this need to be:

- The promotion of good market prices and a supportive marketing environment in May when it is clear whether animal numbers will exceed fodder availability and by how much (severity index). Farmers not adjusting their numbers early and selling late should not enjoy these incentives;
- Making provision for a "spare camp" or key resource area is another strategy that can be followed. As a guideline it is suggested that at least 10% of the total surface area of the farm or grazing area should be set aside each year on a rotational basis to accumulate standing hay and so make provision for drought;



- Those areas receiving more than 500 mm/year can possibly plant pastures and/or drought resistant fodder crops. Planted pastures can either be grazed or the practice of zero grazing can be applied, which entails the process of haymaking;
- Making hay from natural grass lands, as well as grass material growing in the road reserve, are also possibilities to build up a fodder bank.



*Making fodder on the road reserves as a means of providing for fodder. (Andre van Rooyen)*

During drought it is recommended that redundant and unnecessary animals be marketed as quickly as possible. It is also best practice to first graze those areas in which the quality of the rangeland decreases the quickest and to ensure energy supplementation receives the same attention as protein supplementation for livestock.



*Plant prickly pear to serve as drought reserve. (Bertus Kruger)*

## 5.7 Monitoring of the resource base

Proper monitoring includes keeping record of the veld condition that enables the user to detect early changes in a number of important range condition parameters over time, for example: changes in soil cover, soil organic matter on and in the soil, density of perennial grasses,

changes in botanical composition, vigor of the grazing plants and the occurrence of seedlings of both desirable and undesirable plants. The productivity of the land unit in kg/ha and N\$/ha needs to be monitored.

It is also important to keep a record of veld management. Information that needs to be recorded here includes the numbers and type of animals in a camp, as well as the date-in, date-out (documenting the grazing plan applied). From this one can gain important information on data such as stocking rate, stocking density and season of grazing.



*Veld in good condition. (Ibo Zimmermann)*

It is also important to regularly (biannually) monitor water levels in boreholes (depth from surface to water table). Building a water level data base can also serve as an early warning system to land users.

## 5.8 Planning land use infrastructure

It is vital that the user/manager plans the infrastructure development on the farm or grazing area in such a way as to be able to apply the rangeland principles outlined above. The most important of these is the provision of water at strategic places.

The decision to put in more camps is an expensive one and may not be required if herding in existing camps is utilized. This is important for both communal areas where fencing is illegal as well as parks and game farms where fencing is undesirable.



*Good water infra-structure is needed to water large numbers of livestock. (Ibo Zimmermann)*

## 6 Policy Analysis

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Technical solutions to a biophysical problem often fail because of an in-conducive socio-economic policy and legislative environment. In this regard, the National Agricultural Policy states that if macro-economic policies do not create a stable and conducive environment, then specific policies to strengthen the agricultural sector are likely to fail. Land degradation and its prevention are therefore much wider than the biophysical aspect of the problem. As far as land degradation is concerned, government has committed itself in terms of direct involvement and support to the agricultural sector through the introduction of several new policies and laws, directly relevant to a rangeland management strategy. These include:

- The Constitution of the Republic of Namibia
- National Agricultural Policy, 1995
- National Drought Policy and Strategy, 1997
- Soil Conservation Act (No 76 of 1969)
- Subdivision of Agricultural Land Act (No. 70 of 1970)
- Forest Act (No 12 Of 2001)
- Forest Development Policy of Namibia, 2001
- Forestry Strategic Plan, 1996
- Guidelines on National Forest Fire Management
- National Land Policy
- National Resettlement Policy
- Agricultural (Commercial) Land Reform Act (No. 6 of 1995)
- Communal Land Reform Act (No. 5 of 2002)
- Poverty Reduction Strategy of Namibia, 1998
- Import and Export Control Act (No 30 of 1994)
- Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 of 1947)
- Weeds Ordinance (19 of 1957)
- Labor Act (No. 6 of 1992)
- Water Resources Management Act (No. 24 of 2004).

In addition, Namibia signed the United Nations Convention to Combat Desertification in 1994 and it was ratified in 1997. As such the Government has a serious intention to address this problem with all the means to its disposal. Furthermore, Namibia is also a signatory to the United Nations Convention on Biodiversity, the United Nations Framework Convention on Climate Change and the Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1971 which entered into force in 1995 (Ramsar Convention).

A very favorable environment exists in which the threats of rangeland degradation and desertification can be addressed. The National Agricultural Policy in particular regards land degradation as a serious problem. A major shortcoming, however, is that neither this policy nor others, nor any available legislation, provide any guidelines on how to deal with these issues. The major gap in this policy is however that no incentives are provided to prevent and mitigate the negative impact of land degradation. While the Soil Conservation Act provides for the payment of subsidies and grants to erect soil conservation works, the National Agricultural Policy questions the payment of subsidies.

Although the management of bush encroachment, as part and parcel of land degradation, is not explicitly addressed in the current policy framework, current policies – particularly in the agriculture and forestry sectors – provide important parameters within which bush management policies will have to be formulated. A number of specific issues can be mentioned in this regard:

- Policies in the agricultural and natural resource sectors have changed the respective roles of the State and farmers dramatically. The National Agricultural Policy, the National Drought Policy and Strategy and the Namibia Forest Development Policy devolve the responsibility for managing natural resources to resource owners and users. The role of the State is limited to regulatory functions and providing technical support that will enable farmers to improve their capacity to manage resources more effectively. The State will only provide direct financial support in emergencies. This implies that farmers will have to bear the responsibility of managing their rangelands. More specifically, they will be responsible for the prevention of bush encroachment and its eradication where densities are too high.
- It follows from these new roles of the State and farmer that the thinking on subsidies has changed as well. It should however be emphasized that bush encroachment can already be regarded as a national disaster and that State and society should be co-responsible for reversing the process. The study titled 'Bush Encroachment in Namibia' rightly points out that the farmers are not the only ones to be blamed for the present state of affairs. In terms of the National Agricultural Policy long-term or continuing subsidies will be

avoided. However, the policy still allows for the possibility that well-targeted subsidies can play an important part in achieving short-term agricultural and socio-economic objectives.

The formulation and implementation of a policy to manage savannas on both freehold and non-freehold land needs to be regarded as a priority. Thus, policy needs to create a socio-economic environment that provides incentives for farmers to improve the productivity of their rangelands by controlling intruder bush and preventing re-infestation in an environmentally sustainable way. At the same time, improved rangeland management practices need to be encouraged to minimize the risks of future land deterioration.

It is however not recommended that separate legislation be introduced to deal with bush encroachment and its thinning. As a first prerequisite the provisions of the Forest Act and the Soil Conservation Act should be amended to incorporate issues pertaining to encroached savannas that fall outside the definition of forest and classified forest. In its present form the provisions of the Forest Act apply to classified forests only. The roles and responsibilities of

ministries that are directly involved in resolving the bush encroachment problem need to be defined in this policy as well as these two acts. This will ensure that directions for the management of all savannas in Namibia are much clearer. A Bush Encroachment Management Policy is urgently needed to facilitate and encourage the control of bushes on an economical and profitable basis. A draft policy, with the involvement of all key stakeholders and national consultation, was finalized more than two years ago. Since then nothing has been done to submit this important document to Cabinet.

Some Water Point Users Associations (WPUA) and Water Point Committees (WPC) do not interact with land boards and traditional leaders at all times unless traditional authorities are members of these bodies or have designated representatives there. The main reason for this is that the users of water points have obtained full ownership of the resource. Control over water resources could also *de facto* means control over surrounding rangeland resources. The incorporation of sound rangeland management principles into constitutions of local WPCs and the subsequent promotion of good relations with local traditional authorities, should be supported.

