ISLAMIC REPUBLIC OF PAKISTAN
FOREST DEPARTMENT
N.W.F.P.

KINGDOM OF THE NETHERLANDS
MINISTRY OF FOREIGN AFFAIRS
DIRECTORATE GENERAL FOR
INTERNATIONAL COOPERATION

BASIC CONCEPTS OF RANGE MANAGEMENT AND THE IMPLICATIONS FOR MALAKAND DIVISION

Training Series -3-

SOCIAL FORESTRY PROJECT

MALAKAND / DIR

EDC
Islamabad, Pakistan

DHV Consultants BV
Amersfoort, The Netherlands

ISLAMIC REPUBLIC OF PAKISTAN
FOREST DEPARTMENT, N.W.F.P.

KINGDOM OF THE NETHERLANDS
MINISTRY OF FOREIGN AFFAIRS
DIRECTORATE GENERAL FOR
INTERNATIONAL DEVELOPMENT
CO-OPERATION

BASIC CONCEPTS OF RANGE MANAGEMENT AND THE IMPLICATIONS FOR MALAKAND DIVISION

Training Series -3-

November 1993

Nick van Eekeren

DHV Consultants
Amersfoort
The Netherlands

EDC Pvt Ltd
Islamabad
Pakistan

Social Forestry Project
Malakand / Dir
Saidu Sharif, Pakistan

PREFACE

Many of the hills in the Malakand Civil Division are being used as rangelands to feed the livestock of the local population. The NWFP Forest Department has since long felt it cannot treat the issue of management of forest resources in isolation from the problems associated with use of rangelands. The Social Forestry Project Malakand-Dir has played a pioneer role in this regard since 1989. During the past years it has become apparent that it is of utmost importance to understand in detail how and why people use their ranges as they do. Only then can meaningful programmes for improvement be suggested.

Nick van Eekeren, Range Management Advisor, has taken up the task to summarise the most important technical and socio-economic concepts in this compact document. Wim van der Donk, Training Advisor, provided support in the final drafting of the document and Riazat Hussain, Media Production Technologist, designed and developed the drawings. The manual is meant for Forest Department staff involved in programmes that aim to improve vegetative cover of the hill sides.

The use of this manual will hopefully lead to an increased understanding of range management and, and consequently to the design and implementation of better range management programmes for the benefit of the local rangeland users.

Comments and suggestions on the contents of this manual will be highly appreciated.

Mumtaz Khan,
Project Director/
Conservator of Forests

Titus Bekkering
Chief Technical Advisor

TABLE OF CONTENTS

SUMMARY

The objective of the range management programme is to improve the rangelands in the Malakand Division. Range improvement is literally any management which permanently increases both stability and productivity of range resources. Before discussing any improvement one must first of all understand the present management.

At present, a free grazing management is practised in most villages. Animals are left on their own and can graze where they want. In some cases the animals are herded. However, this mainly for the protection of the crops as a particular grazing pattern is not followed.

The present management, free grazing, leads to selective grazing which results in overgrazing and overrest next to each other. Consequently, the range productivity decreases and water run off and soil erosion increases. This downward trend will be a disaster in a few years time, leading to a range production of almost zero, to a decrease in livestock production and finally to a loss of livelihood for the people.

An improved range management should break this downward trend and change it towards an increase in productivity and stability of range resources.This can be done by optimizing the energy, water and mineral cycles on a rangeland by means of intensified animal impact and by controlling the grazing time. The first step in such management is control over the animals by means of herders. Once the control over the animals is there, a start can be made with the second step towards an improved range management; namely, intensifying and timing of grazing.

The technical message is clear. However, the big question is, how to put this technical message in a management which can be adopted and organized by a village itself. The traditional herder systems were disrupted as a result of changes in the motives of people towards management of the communal hillsides, changes in the village organization and difficulties with respect to herders. It is, however, not realistic to think that herder systems can be reintroduced on the same bases as 20 years ago. Modifications of the traditional ways will be needed to get such management organized on a sustainable basis.

For the future of controlled grazing management the following set up of a village organization looks most optimal: a VDC with decision making power in which management committees are represented, a management committee with implementation power in the management unit with representatives of tenants and gujars, and a strong "nagha" system for offenders of the management.

Present motives for range management are; livestock/fodder production, protection of crops, protection of trees/shrubs, security of animals and environmental problems. Motives, however, differ for the various interest groups in the village. This creates a dilemma in the whole set up of a controlled grazing management. The motives for step 1 of the technical message, control over grazing, is present in each interest group. For

step 2, intensifying and timing of grazing, the motives for owners is very weak. Since the latter group will probably be the main implementing power behind the whole system their monitoring of the intensifying and timing of grazing will be minimal because it is not their direct interest. Therefore it will be very important to raise the level of awareness of this group concerning the long term effect of the present management on their environment.

To come to a sustainable and controlled grazing management a balance should be found between the amount villagers are willing to pay for such management and the amount herders want to earn. Willingness of villagers to pay for a herder will depend on their motives for a controlled grazing management. The amount paid per animal will determine if it is easy or difficult to get a herder. Furthermore it will have an effect on the livestock/herder ratio. This again will determine the intensity and timing of grazing and thus the grade of improvement on the range.

GLOSSARY

asher	traditional system of labor sharing
barani agriculture	rainfed agriculture
ghoba	cow herder
Gujar	ethnic group of nomads
jirga	traditional meeting of village elders
nagha	traditional fining system
pashakaal	monsoon
sponkai	sheep/goat herder

1 INTRODUCTION

For the implementation of the range management programme everybody involved must have an understanding of the basic concepts of range management. This document describes the present range management practices in the project area and the socio-economic context. Also indicated is how the basic concepts of range management should be applied for successful implementation of improved range management. It is partly based on the literature cited under the heading Sources and Further Reading.

The document has been written for Range Forest Officers, Divisional Forest Officers and Social Organizers to give them the necessary background in range management during the Village Land Use Planning process.

Chapter 2 starts with the analysis of the technical problems on the rangelands. In the same chapter the technical solutions for these problems are discussed.

Chapter 3 describes the socio-economic concepts concerning this technical message.

This introductory document of range management, is followed by a manual on range management. This manual details the procedure of discussing range management with villagers and presents the steps to be taken in the drafting, implementation and follow-up of range management plans.

2 TECHNICAL CONCEPTS

2.1. DEFINITIONS

Before any activity can be started, the key concepts must be clearly defined.

RANGE/RANGELAND:
Areas which, because of their environmental conditions, can only be used for the production of vegetation (grasses, forbs, shrubs, trees), livestock, wildlife and water retention.

RANGE MANAGEMENT:
The science and art of optimizing the production from rangelands.

RANGE IMPROVEMENT:
Any management which **permanently** increases both **stability** and **productivity** of range resources.

STABILITY:
A condition on the range in which the effects of erosion and decay are balanced by the effects of growth and reproduction.

PRODUCTIVITY IN PLANTS:
The increase in size and number of leaves, and/or root mass, above maintenance.

The following sections will use these definitions while describing the basic concepts of range management.

2.2 PRESENT RANGE MANAGEMENT PRACTICES

In the former section, range improvement is defined as "any management which permanently increases both stability and productivity of range resources". Before any improvement can be discussed, one should first understand the present management.

At the moment, in most villages, free grazing management is practised. This means that animals are left on their own and can graze where they want. In some cases the animals are herded. The percentages of animals free grazed and herded will differ per village and per season. In case animals are herded, three different systems can be distinguished:

1) Each household herds its own animals, mostly mixed herds with goats, sheep, cows and donkeys. In most cases, the size of the herd is small. Herding is usually done by children when they do not have to go to school, or otherwise by elder members of the family.

2) Households take turns in herding each other's animals which are either mixed herds or separate herds of cows or sheep and goats. In this case as well, herding is done by children or elder members of the family.

3) The animals are herded by a specialized herdsman, who is paid for his services. In this case, you see mostly separate herds with a large number of animals.

The motive for herding is usually to protect the agricultural crops, not to manage the range. In most cases, there are a lot of small herds which are only taken to a particular area and left there on their own. For this reason, this management is also called free grazing with a herder. The grazing pattern used is either very simple or non-existent (e.g. one the day on northern aspect of the hill and the other day on the southern part of the hill).

In the northern parts of Dir some villages have a trans-humance system. This means that in winter the animals stay in the village but in summer are taken to the alpine pastures.

With respect to cutting, most villages also have a kind of free cutting system. However, in some villages, people practice "pashakaal nagha", meaning that at the start of the monsoon grasses in an area will be protected form grazing and cutting. When the grass starts drying in September, people will cut it in an "asher".

2.3. CONSEQUENCES OF PRESENT MANAGEMENT

For a better understanding of the consequences of the present management, first the consequences for individual grasses are discussed first and then followed by the consequences for the range as a whole.

2.3.1. Consequences for individual grasses

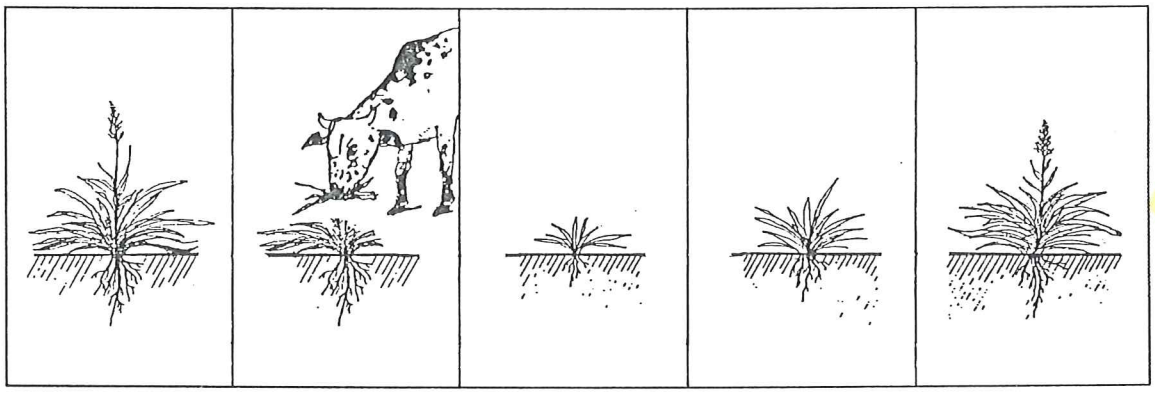
To understand the consequences of the present management for individual grasses, two essential things about perennial grass physiology must be known:

1) Grasses need energy (sunlight), water and minerals for growth. Lacking one of these elements grasses can not grow. When the availability of one of these elements is limited, production will not be optimal.

2) Perennial grasses are adapted to periodic grazing or cutting by two means:
   - The growing points of a grass are close to the ground so that they are not easily damaged.
   - A grass can store energy in its roots which can be used again when needed.

In a normal situation, grasses produce energy in their leaves and store this in their roots. In the figure below this is indicated by the thick black roots.

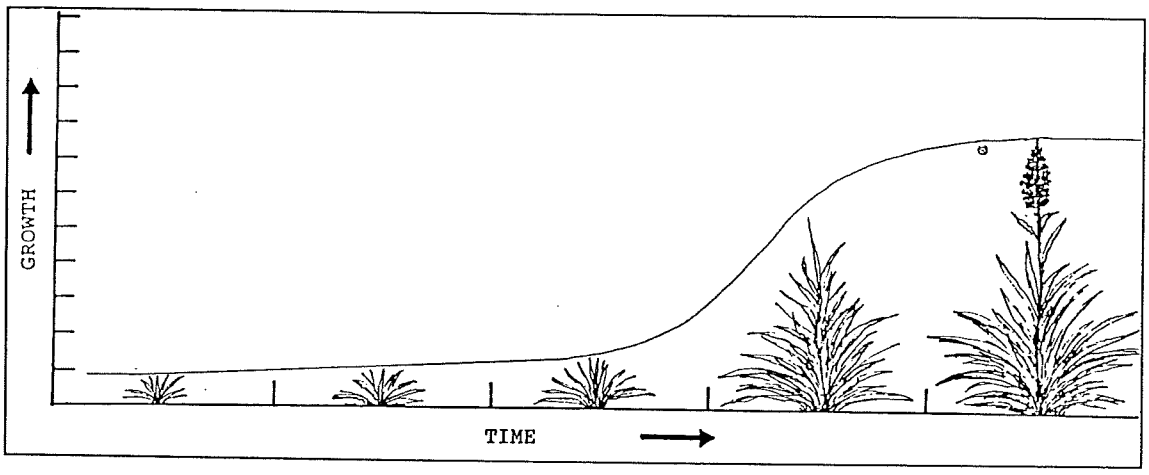
NORMAL GROWTH OF GRASS:



When a grass is grazed, new shoots will start growing again. Since the leaves of these new shoots are very small, they will use more energy than they can produce and as a result will use energy from the roots. This is indicated in the drawing by the thin black roots. In this stage energy is the limiting factor and the growth of grasses is very slow.

At a certain height the new leaves will produce more energy than they use. The remaining energy will be stored again in the roots (thicker black lines). In this stage there is enough energy so that the growth is very fast.

The growth of grasses can also be represented in a graphical form, as is shown in the figure below.



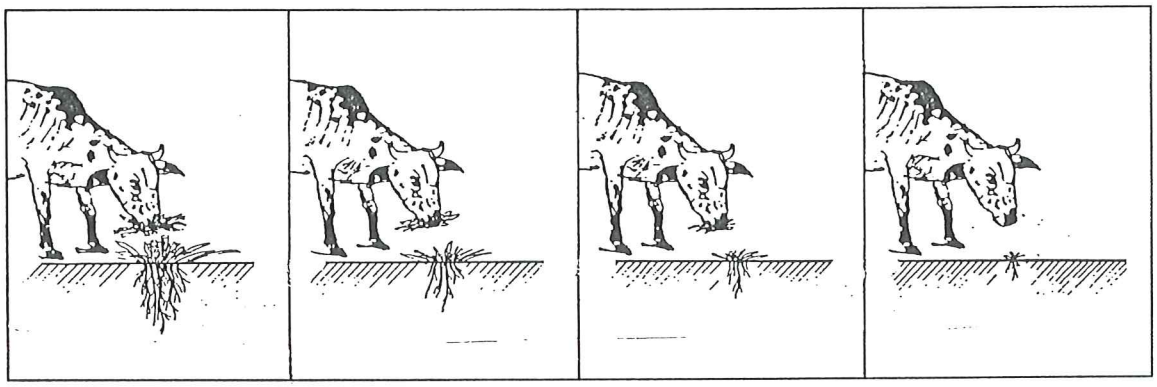
Grasses grow slowly in the beginning because they have a very small leaf area to produce energy. When the leaf area increases, more energy will be produced and growth will be faster. For optimal production of grasses it is very important that they can reach this stage of growth. This does not only hold for perennial grasses but also for other perennial plants. Take the example of Dodonea, cutting a plant of Dodonea each year will give less total production than cutting it once every four years. The only difference with grasses is that grass has an optimal growth cycle of 30-90 days while Dodonea has an optimal cycle of 4-5 years.

From the above it is clear that grazing is not harmful for grasses. This is quite logical since grasses and animals have adapted to each other throughout the process of evolution. However there are two situations, caused by the present management of free grazing, which are not good for the health of grasses.

Free grazing leaves it to the animal's choice what it wants to graze and where it wants to graze. An animal which can select what it can graze will always go for the most palatable grasses, leaving the less palatable species. This leads to overgrazing of the more palatable grasses and overrest of the less palatable grasses. Since young shoots are also more palatable, animals will go for the grasses which have recently been grazed, contributing to more overgrazing. On the other hand, coarse old stems will be left, which again increases overrest of that specific grass.

In the situation of overgrazing, the grass does not get a chance to restore energy to the roots. Each time the newly grown grass shoots are grazed grass has to sacrifice energy from the roots to grow new shoots again. In such situations, the root mass will slowly decrease and finally the plant will die.

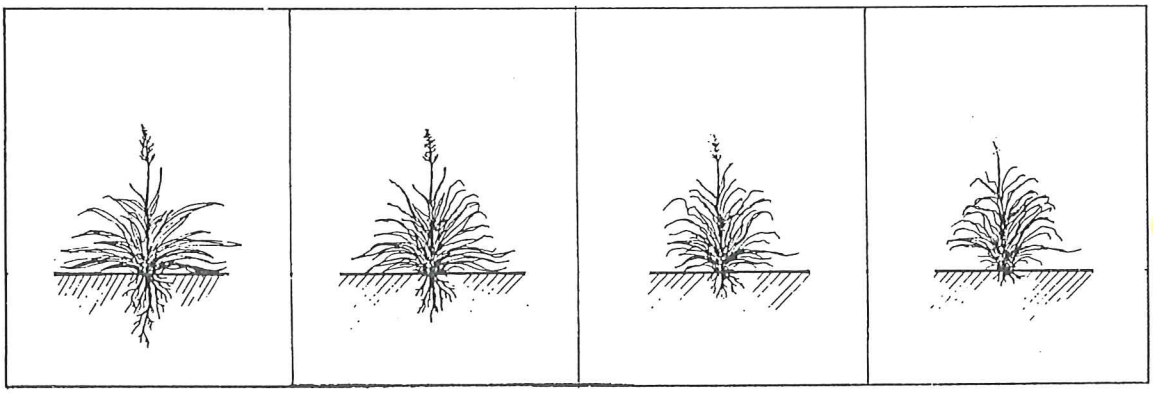
OVERGRAZING OR OVER-USE OF GRASS:



How can we recognize overgrazing? The first signs of overgrazing are the creeping growth of grasses which normally have a very upright growth. The flowering stems of these grasses are very small compared to the same grass growing under a bush where they are protected from grazing. Since the root mass of overgrazed grasses is decreasing, they can easily be pulled out from the soil. Finally you will find dead tufts of grasses on the range and certain species which can only be found under bushes or in the cracks of rocks.

In the situation of overrest, dead standing grass is shading out new shoots. These new shoots do not get enough sun light so that they can not function optimally and restore energy to the roots. Again and again the grass will try to survive by growing new shoots sacrificing stored energy from the roots. Finally the same will happen as with over-use. The root mass will decrease and slowly the grass will start to die from the centre of the plant.

OVERREST OR NON-UTILIZATION OF GRASS:

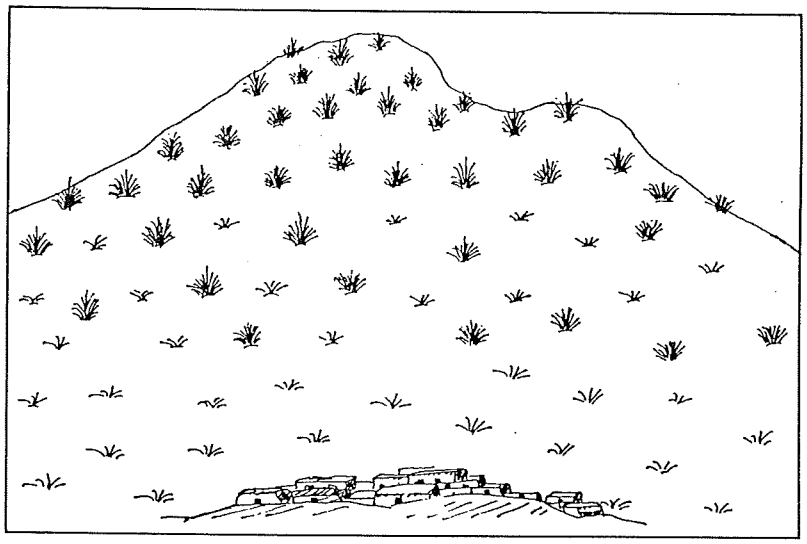


How can we recognize overrest? The first signs of overrest are the old seed heads standing on a tuft of grass. The grass does not look healthy and green leaves grow only weakly around the outside. The grass starts dying from the centre of the plant and the dead material can easily be pulled out.

2.3.2. Consequences for the range as a whole

In the previous section we have seen what happens to individual grasses when they are overgrazed or overrested. Free grazing animals on a range will choose what and where they want to graze. This will show a certain pattern of overgrazing and overrest of individual plants.

The figure on the right shows one of the most common patterns near a village.



1) The lower part of the mountain is completely overgrazed, both the palatable and less palatable species. Because of the high animal pressure, the availability of grass is less and the animals will choose the less palatable species instead of walking further up the mountain.

2) At a certain level on the mountain less animals are grazing because it takes more effort to walk up. The animals which go there only eat the palatable grasses. On this level you find clear signs of overgrazing and overrest next to each other.

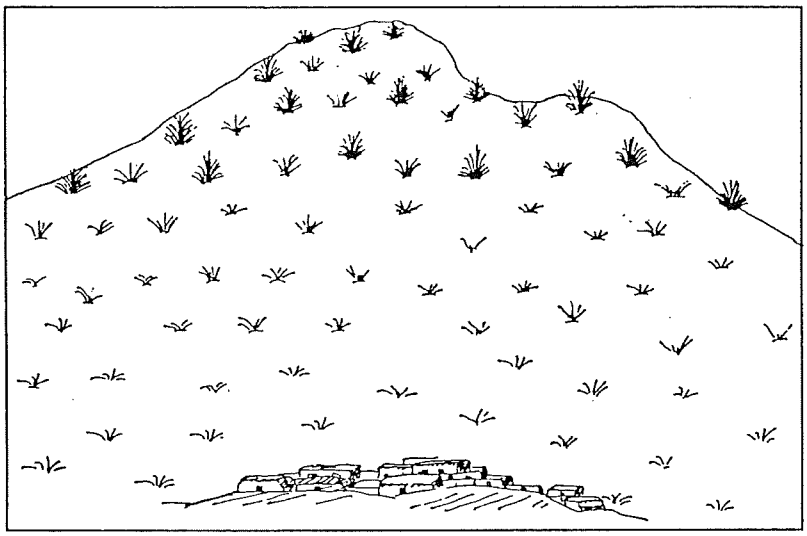
3) Higher on the range, grazing almost stops. If it does occur at all, it is very selective overgrazing. Grasses which are not grazed are sometimes used for cutting. The cutting slows down the process of overrest.

Consequently, all the grasses on this range are not healthy because they are either overgrazed or overrested. Due to the overgrazing and overrest, energy conversion in the leaves and mineral and water intake through the roots is sub-optimal so that the production from the grass is low.

At the top of the hill, hardly any animals come at all and on the lower areas the animals usually follow the same path every day. In areas where animals do not come, the soil is forming a crust (capped soil) because the hooves of the animals do not disturb the soil. This crust prevents rain from infiltrating the soil and thus increases the run-off. The increased run-off and the reduced grass cover in the lower portion increases the soil erosion. Less infiltration of rain and less minerals available in the soil due to soil erosion, reduces the production of the rangeland even more. Less

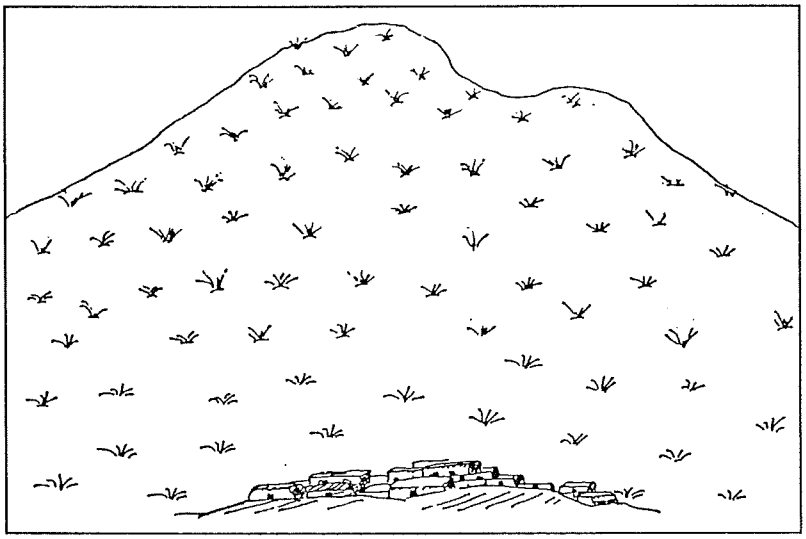
production of the range means that the animals will have to go higher up the mountain to eat the same amount of grass. This will result in the following situation on the range after 5 years.

The area with clear signs of both overgrazing and overrest has shifted to the top of the range.



Over the years, the production of the range is decreasing. Animals will go higher up on the hill to get their bellies filled. This will finally result in the following situation.

All grasses on the range are overgrazed.



Finally, the production of the range has decreased to such a level that it can no longer support the initial number of animals. As a result people have to sell part of their livestock.

2.4. BIOPHYSICAL MANAGEMENT OPTIONS

2.4.1. Succession

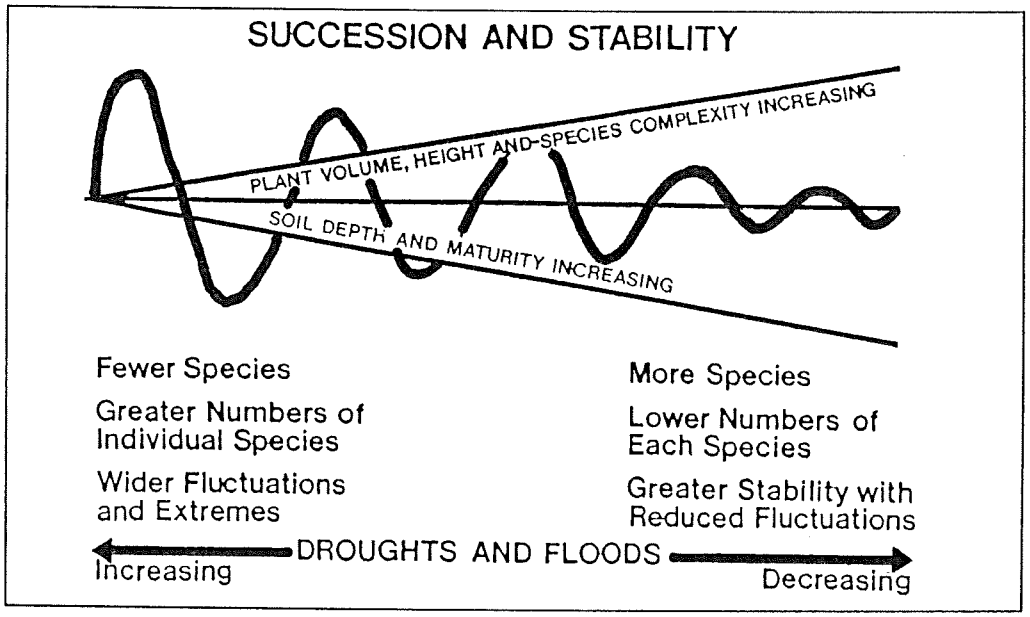
Improved range management should break this downward trend and change it towards an increase in productivity and stability of range resources. The key indicator of a land's stability and productivity is succession. In English the word "succession" means "following". To people who study plants and animals "succession" means the way different kinds of plants and animals "follow" each other when something happens to the land.

SUCCESSION:
The process of change and development in entire communities; soil, microorganisms, animals and plant life.

In plants, succession starts with lichens and algae, followed by annual grasses, perennial grasses, shrubs/bushes and finally ends with trees.

By law of nature, succession always tries to go forward as far as the climate and soil will allow. However, succession can also go backwards. This has happened in places where grass and other plants have disappeared where they used to grow. Overgrazing/over-use and overresting/non-use usually causes succession to go backwards down the same steps. For example, a Dodonea/perennial grassland vegetation will change by over-use and overgrazing in an annual grassland vegetation.

The following figure shows the different levels of succession and stability.



The successional level of the community can be identified by the following characteristics:

CHARACTERISTICS	LOW SUCCESSION	HIGH SUCCESSION
Number of species (plants, animals, birds, insects, etc):	few species	high number of species
Soil between plants:	soil exposed, no complete cover	covered with mulch and litter
Soil surface temperature:	subject to daily extremes	not subject to daily extremes
Soil surface moisture:	subject to extremes within few hours	not subject to extremes within few hours
Micro-environment for small animal life:	poor	good
Plant community composition:	mainly pioneers	high proportion of woody tap-rooted plants

How can we see if succession is going forwards or backwards? The best way to find out, of course, is to ask someone who has known the area for a long period. Sometimes the name of an area can be an indication. For example, in Haryankot a place called "Gona tange" indicates that the area was covered with Olive trees in the past. At present hardly any grass can be found in the area. Succession has definitely moved backwards. On the other hand a lot can be noted from observations on the range. If young seedlings are growing on bare ground, succession is probably moving forwards. If they only grow in the protection of other plants, it is probably going backwards.

One thing has to be said about the presence of shrubs like Dodonea. Theoretically, this would mean a higher succession. However, in the environment of Malakand Division this can also mean that succession is moving backwards. Shrubs often flourish in declining grassland. They will take their water from deeper soil layers. However this can be a passing phase as damaged water cycles eventually cause the shrubs to die as well.

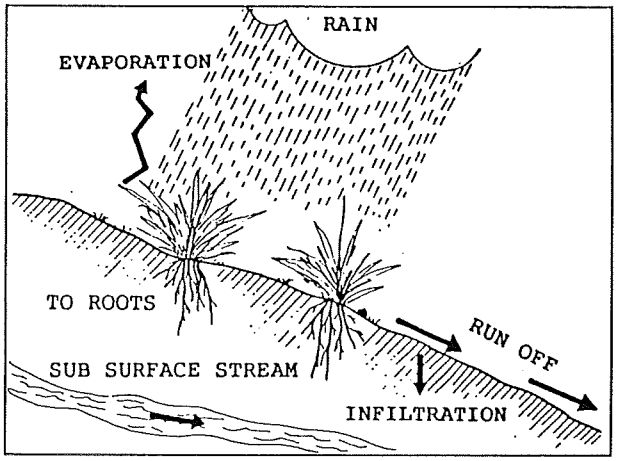
2.4.2 Managing for succession is managing for production and stability

A higher succession means more stability on the range. Furthermore, when succession moves forwards, the plants and animals on the land make better use of the available water, minerals and the energy from the sun. To say it the other way around: to increase the production from a range, optimal use must be made from available resources like water, minerals and sun light, which means moving forwards in succession. For grass production, managing for succession means managing for perennial grasses.

As stated before, grass needs energy, water and minerals to grow. These elements determine the productivity of the grass. To reach a permanent increase in productivity and stability on the ranges, the use of these elements or rather cycles should be optimized. The different cycles and their weak points, are shown on the following pages.

Water cycle

Rainfall falls on the ground, part of the water runs off, part infiltrates the soil. From the water in the soil, part is taken up by plants, and part of the water evaporates or reaches subsurface streams.

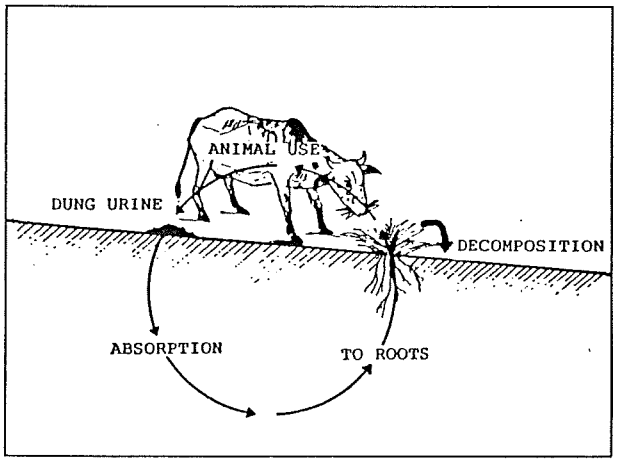


For grass production, the weak links in the water cycle on the ranges are:

- Less water infiltration through capped and compacted soil
- Less water infiltration through less vegetative cover
- Water losses through evaporation of exposed soil (absence of litter and/or vegetative cover
- Limited water intake by grasses due to damaged and reduced root system

Mineral cycle

Plants take minerals from the soil. These plants are eaten by animals and animals return minerals to the soil in the form of dung and urine. Grasses which are not eaten will decompose to minerals and will be absorbed by the soil were they will be used by grasses again.

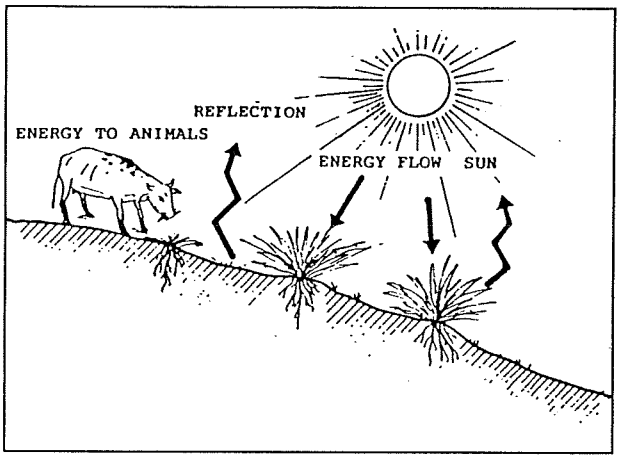


For grass production, the weak links in the mineral cycle on the ranges are:

- Less penetration of minerals through capped and compacted soil
- Losses of minerals through water and wind erosion because of less vegetative cover and litter cover
- Slow turnover of minerals due to standing litter (standing litter is like a bag of fertilizer standing on the range unutilized)
- Limited mineral intake by grasses due to damaged and reduced root system
- Removal of minerals through grass cutting and dung collection

Energy flow

Energy flows from the sun. Part of the energy is reflected by bare ground and part of it is used by plants. Plants are eaten by animals. Animals produce products for human consumption.



For grass production, the weak links in the energy flow on the ranges are:

- Loss of energy because of reflection from bare ground
- Less energy used by overgrazed grasses due to small leaf area
- Less energy used by overrested grasses due to standing dead litter
- Energy in overrested grasses not used by animals

Looking at the weak points in the different cycles the following has to happen to increase the production and the stability on the ranges:

1) Reduction of soil capping and soil compaction
2) Increase of vegetation cover
3) Decrease of standing litter and increase of litter on the soil
4) Healthy grasses: neither overgrazing nor overrest

For each of these points the following management should be applied:

1. Reduction of soil capping and soil compaction

On agricultural fields, farmers are using a plough to break the soil. In rangelands the hooves of animals can be used to break up the soil and increase the rain infiltration and penetration of minerals. As with ploughing, this involves timing and intensity. Ploughing each day in the same place will damage the soil structure. Animals walking each day on the same path will also damage the soil structure. Therefore good opening up of the soil needs a lot of animals for a short period of time.

2. Increase of vegetation cover

An increase of vegetation cover can be achieved through the increase in size of old grasses and through the establishment of new grasses. Old grasses will increase in size when they are healthy. Young grasses will be established when grasses get a chance to set seed and these seeds get a chance to germinate. For germination to happen the seeds have to be covered with sand and the soil needs to absorb water. Here again the hooves of the animals can be used to prepare a good seedbed, which means a lot of animals for a short period of time.

3. Decrease of standing litter and increase of litter on the soil

Standing litter should be broken down. A lot of animals together will break all the litter down and mix it with the soil.

4. Healthy grasses, neither overgrazing nor overrest

Healthy grasses mean neither overgrazing nor overrest. To overcome overgrazing a grass should be grazed for a short time only and then have enough time to recover. To overcome overrest a grass should be grazed. In an area where there is free grazing, there is also selective grazing, which means overgrazing and overrest next to each other. To overcome overgrazing and overrest next to each other all grasses should be grazed (not selectively) and have enough time to recover. This means that a lot of animals should be grazed together for a short period of time in one area, whereafter they are moved to another side to allow for recovery of the grasses which have been grazed.

The following example illustrates the points:

> Imagine a range of 100 acres with 100 animals. The main grasses are "Spin Wakhe" (liked by animals) and "Sagoree (not liked by animals).
>
> In a free grazing situation the animals will graze selectively. "Spin Wakhe" will be overgrazed and "Sagoree will be overrested. The grasses are not healthy, the sunlight is not used optimally. "Sagoree" will remain as standing litter, the minerals are not returned to the soil. The animals will all go one by one and walk only on the paths, which means the soil will not be made loose and no extra water infiltration will take place.

In a managed situation the 100 animals will be grazed on one acre one day and one acre the next day etc.. Since the animals have only a small place to graze on one day they will eat everything, "Spin Wakhe" and "Sagoree". They will have no choice. After this one day all grasses will have time to recover. This means the grasses are healthy and can make optimal use of the sunlight. Since the animals eat everything or trample it into the ground surface, no standing litter will remain which means that the minerals in the grass will be quickly available for the new grasses. When 100 animals graze on 1 acre they will make the soil loose so that most of the rain water can go into the soil. This creates a good seedbed for the germination of new grasses as well.

In summary, in order to get a permanent improvement of the productivity and stability of a rangeland, the energy, water and mineral cycles on a rangeland should be optimized. Therefore the required management is intensifying and timing of grazing.

To implement this management, the first step is control over the animals. Without control there can be no management, control is basic to any grazing program. For control there are 3 options; fencing, tethering and herding. The option of herding looks most logical in Malakand Division. Once there is control over the animals, a start can be made with the second step namely, intensifying and timing of grazing. Central in the second step is flexibility in timing.

3 SOCIO-ECONOMIC CONCEPTS

3.1. INTRODUCTION

From the former chapter the technical message is clear:

STEP 1: control over the animals
STEP 2: intensifying and timing of grazing

The big question is, however, how to translate this technical message into management which can be adapted and organized by a village. Since the proposed management looks quite similar to the traditional herder system, clues to this question may be found in the organization of these systems in the past. In this context it would also be very interesting to know why these systems were disrupted in most villages in the first place. Therefore in section 3.2. the traditional herder system is discussed. In section 3.3. the future perspective of controlled grazing will be discussed, looking at the socio-economic aspects.

3.2. TRADITIONAL HERDER SYSTEM

Until 20 years ago, most villages in Malakand Division had specialized herders for cows ("ghoba") and goats/sheep ("sponkai"). In the morning they took the animals from central collecting places in the village to the rangelands. On the rangelands they took the animals to the best grazing area. When the grass in this area was finished they went to the next area. In this way, they were practicing a kind of rotation. After grazing the animals on the rangelands, they brought them back to the village in the evening. After each cropping season the herders were paid in grain or in rupees. In some cases they were paid in off-spring of livestock.

The decision making power for the system was with the central village "jirga" . The operational power was with the different lineages in the villages ("khels", "kandy's", "thals").

There were several motives for the villagers to follow these systems:

1) Protection of crops. The grazing with herders facilitated the protection of crops. Since agricultural production had and has a higher status than livestock production this was and is an important motive.

2) Livestock production. Animals were taken to the best grazing areas.

3) Security of animals. Rivalries between villages and the danger from predators made this an important motive to graze the animals with herders.

In many villages these systems have been abandoned. In Talash valley in Dir District, only two (5%) of the 44 villages still have a herder as against 19 (43%) out of 44 only 20 years ago. Several reasons can be mentioned for the disruption of these systems both from the village side and the herder side.

From the village side there were several reasons which caused the disruptions of these systems. They are however so interrelated that they can not be seen separately. First of all there was a quick development in agriculture. This, and the opportunity of off-farm employment (e.g. services, trade, Middle East), resulted in a decrease in poverty and made villagers less dependent on their income of livestock. In most cases this completely changed the role of livestock from an important source of income, to production for home consumption. Because of off-farm employment, land was not the only resource anymore to get wealth and power. This again effected the power of the "jirga". Combined with an increase in population, it was more difficult for the "jirga" to maintain the rules and regulations in the village. This resulted in an uncontrolled use of resources. Since however, the role of livestock changed from a major source of income to production for home consumption, and livestock production has low status, people were little interested in reversing this process.

From the herder side there were also several reasons why the system was disrupted. Other job opportunities led to higher salary demands of the herders. The changed role of livestock meant less interest from people in livestock production and less investment in this production. The combination of certain factors; such as other job opportunities, people not willing to increase the payment and the job becoming more difficult because grazing areas were further away, resulted in resignation of traditional herders.

3.3. FUTURE PERSPECTIVE OF CONTROLLED GRAZING

3.3.1. Introduction

As previously discussed, the traditional herder systems were disrupted as a result of changes in the village organization, changes in the motives of people towards management of the communal hillsides and difficulties with respect to herders. However, as it is necessary to keep control over the animals in order to implement grazing, herders still seem to be the best option. It is however, not realistic to think that herder systems can be reintroduced on the same basis as 20 years ago. Modifications of the traditional ways will be needed to get such management organized on a sustainable basis.

In this section the most important issues concerning the future of controlled grazing are discussed; village organization, motives for range management and herders.

3.3.2. Village organization

One of the reasons for the disruption of the traditional herder system was the erosion of power of the "jirga". For the future of controlled grazing, a strong village organization is highly necessary. In case a village has no organization, a Village Development Committee (VDC) should be established. When there are groups of people within a village using different grazing areas, the village area should be divided into management units.

Following the lines of the traditional village organization, the decision making power should lie with the central village organization. On the other hand, the implementing power should be on management unit level with the management committee. However, during the preparation process for controlled grazing in the different management units, the central village organization should be involved.

Tenants and gujars are the most important users of the rangelands for grazing and grass cutting. It is therefore highly necessary that they are involved in the whole process towards controlled grazing. Being realistic, they can probably not have a representation in the central village organization but must never the less be represented at management unit level.

Since grazing management can not work without full control over animals, there should be a strong "nagha" system for offenders of the management. Again, the decision on the "nagha" should be taken in the central village organization but the responsibility for checking the "nagha" should be with the management committee. The "nagha" should be collected from offenders by a strong body which is backed up by the central village organization (e.g. the action committee in Amlook Dara).

To summarize, the following set up of a village organization looks most optimal for the future of controlled grazing: a VDC with decision making power in which management committees are represented, a management committee with implementation power in the management unit, with representatives of tenants and gujars, and a strong "nagha" system for offenders of the management.

3.3.2. Motives for range management in the villages

The change in the role of livestock from a major source of income to production for home consumption, played an important role in the disruption of the traditional herder systems. Since increased fodder/livestock production is one of the main benefits of an improved range management, it seems that the introduction of such management will be very difficult when people do not have a clear motive for fodder/livestock production. However, before any early conclusions are drawn, it is important to know the exact function of livestock in the present farming system and the function of rangelands within the system. Furthermore the other motives for range management should be analyzed.

Looking at the function of livestock in the present farming system, four systems can be distinguished :

1 Settled livestock system based on irrigated agriculture.
2 Settled livestock system based on barani agriculture.
3 Settled livestock system based on rangelands.
4 Nomadic livestock system based on rangelands.

Land rights, main source of income, role of livestock and main sources of fodder can be attributed to these systems as shown in table 3.1.

Table 3.1: Distribution of land rights, main source of income, role of livestock and main sources of fodder for the different systems.

BASED ON:	SYSTEM 1 - settled - irrigated	SYSTEM 2 - settled - barani	SYSTEM 3 - settled - rangelands	SYSTEM 4 - nomadic - rangelands
LAND RIGHTS	owner/tenant	owner/tenant	tenant/gujar	gujar
MAIN SOURCE OF INCOME	agriculture	agriculture off-farm	livestock agriculture	livestock
ROLE OF LIVESTOCK	own consump. dung *) saving	own consump dung draught power **saving **)** income	own consump. dung draught power saving **income**	own consump. dung draught power **income**
MAIN SOURCE OF FODDER	crop residues **fodder crops**	crop residues fodder crops rangeland	crop residues **rangeland**	**rangeland**

*) dung can be used for fuel and for manure
**) bold means very important

From this table it becomes clear that the attitudes of the different groups towards livestock production and rangelands vary significantly. In practice this means that there are still people in a village whose motive for range management is fodder/ livestock production. This has however differentiated between the various groups. For a farmer having 5 acres of irrigated land (system 1) the situation is completely different from a farmer having 1 acre barani field living in the hillside (system 3). For fodder, the first depends completely on his agricultural fields to produce his two cups of milk each morning, while the second depends mainly on the range having livestock as his main source of income. Trying to motivate the first farmer to improve range management by discussing fodder/livestock production will be very difficult while the second farmer may be very interested. This has to be kept in mind when the issue of fodder/livestock production is discussed in the village.

Besides fodder/livestock production, the protection of agricultural crops was one of the main motives for herding in the past. At present, it is still one of the main reasons for animals being herded during the cropping season. The benefits of a controlled grazing management in this respect are twofold:

a) *Agriculturists will have benefits from a controlled grazing management when there is no "nagha" on agricultural fields.* "Nagha" on agricultural fields is a communal decision and is only implemented when the majority of a village is interested in growing a crop. Below the Malakand pass this will only be in the winter season, leaving no choice for the individual farmer to grow a crop in summer. Since a controlled grazing management puts a ban on free grazing, it is also possible to grow a crop in summer. Barani farmers will be more interested in this because their fields are in most cases further from the house and not protected by a fence. In contrast, irrigated agriculture is mostly protected already. Therefore, trying to motivate a barani farmer for communal herding will be easier than motivating an irrigating farmer.

b) *Livestock keepers will have benefits from a controlled grazing management when there is "nagha" on agricultural fields.* During the "nagha" on agricultural fields everybody is obliged to keep control over their animals. In practice this means that most people are herding their animals separately. When there is a controlled grazing management there will be a communal herd to which everybody can give their animals. This will also mean that children and/or women who normally have to herd the animals can spend more time on other activities.

A third motive of villagers to participate in a controlled grazing management, is management of the shrubs and trees in the communal area as well as on private lands. Control over the animals will facilitate this management. Since however the rights to decide on the use of the shrubs or trees from the communal hillside as well as private lands, lies mostly with the owners in the village, this benefit will mainly go to system 1 and 2.

A fourth motive of villagers is security of the animals. In the past this played an important role when predators were still abundant on the hillsides. It seems that at present, security of animals is still an important motive because people are afraid that their animals may get lost or stolen.

The fifth motive for range management is the environmental problem. It seems that most people have some knowledge about the environmental problems which the present management of the rangelands creates. However, they usually also have a very reserved attitude towards solving these problems. Since the area is communal they mostly show a kind of powerlessness but it is also clear that it is not their direct interest. Only the owners of the communal area (system 1 and 2) will see some direct interest.

Table 3.2. summarizes the importance of the five motives/benefits of range management for the different systems. They are indicated by asterisks, three asterisks means 'very important', while no asterisk means 'not relevant'. Furthermore it is shown with which step of the technical message the motive coincides; notably step 1: control over the animals and step 2: intensifying and timing of grazing.

For the motive of fodder/livestock production, both steps are necessary. However, for the motive of protection of crops, step 1, control over the animals, is enough. In practice this means that a farmer interested in fodder/livestock production will be interested in step 1 and 2 from the technical message; while for a farmer only interested in the protection of crops, the control over the animals is enough.

Table 3.2: Importance of the different motives/benefits within the various livestock systems for range management

MOTIVES/BENEFITS	SYSTEM 1	SYSTEM 2	SYSTEM 3	SYSTEM 4	STEP
FODDER/LIVESTOCK PRODUCTION		*	***	***	1+2
PROTECTION CROPS		***	***		1
PROTECTION SHRUBS/TREES	***	***			1
SECURITY OF ANIMALS		**	**	**	1
ENVIRONMENTAL PROBLEMS	*	*			1+2

To come to a sustainable management, a "win win" situation should be created for all parties involved. From table 3.2. it can be seen that all systems have their motives for a controlled grazing management and can benefit from such management. However, there is one dilemma. The motives for step 1 from the technical message, control over animals, is present in each system. For step 2, intensifying and timing of grazing, the motivation is very weak in system 1 and 2. Since this group will probably be the main implementing power behind the whole management their monitoring of the intensifying and timing of grazing will be minimal because it is not of direct interest to them. Therefore, to stimulate this group towards a grazing management it will be very important to raise their level of awareness concerning the long term effect of the present management on their environment.

3.3.4. Herders

Problems concerning the payment was the main reason for herders to leave the job in the past. Herders were demanding a higher salary and villagers were not willing to pay. To come to a sustainable controlled grazing, a balance should be found between the amount villagers are willing to pay for such a management and the amount herders want to earn.

The rate is more likely to be determined by how much the villagers want to pay (when they are not willing to pay, a herder can not demand). Willingness of villagers to pay for a herder will again depend upon their motives for controlled grazing. The amount paid per animal will determine if it is easy or difficult to get a herder. Furthermore it will have an effect on the livestock/herder ratio. This again will determine the intensity and timing of grazing and thus the degree of improvement on the range. For example when villagers are willing to pay Rs.7/animal/month and the herder is demanding a salary of Rs.1050/month, the livestock/herder ratio is 150 animals per herder. In this situation there will still be reasonable control over the animals on the range which will give a fair improvement. In a situation where the villagers are only willing to pay Rs.2/animal/month and the herder wants a salary of Rs.1200/month the livestock/herder ratio will be 600 animals per herder and the control over the animals on the range will be minimal. In the second example there will still be an improvement compared to the situation of free grazing but it will be less than in the first example. Once again the degree of improvement will have an effect on the motives of livestock/fodder production.

SOURCES AND FURTHER READING

Bingham S., Lee E., Rex Lee J. and the Rock Point Range Management Project (1984)
Living from livestock: Range management and ranch planning for Navajo Country.

Eekeren N. van (1992)
Considerations and options for range management in Malakand Division. Technical report no. 2.

Schwennessen E. (1992)
Range management programme assessment. Technical report no. 5.