Investigating the impacts and management of grazing and fire in ecologically and climatically sensitive and high biodiversity habitats in Namaqualand

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A project report

By

Agricultural Research Council
Animal Production Institute
℅ University of the Western Cape
Private Bag X17
Bellville, 7535
South Africa

And

Biodiversity and Conservation Biology Department
℅ University of the Western Cape
Private Bag X17
Bellville, 7535
South Africa
Executive Summary

This project investigated the effects of fire and grazing along with its management on plant diversity and productivity in the Leliefontein communal area which is situated within the Three Peaks Conservancy through various natural and social sciences studies. This project also set out to test and implements a long term rangeland and wetland monitoring system within the Leliefontein communal area. These studies made the following conclusions:

- The study testing whether the classical range succession model accurately describes Renosterveld vegetation dynamics after fire and grazing disturbances shows that vegetation characteristics (cover, species richness and structure) do not always return to the initial climax community after disturbance. Due to the variability in the physical environment of the vegetation, several stable states can exist for Renosterveld vegetation. *Since climate change is likely to alter the fire regime of Namaqualand, the impacts it will have on the vegetation depend mainly of the physical characteristics of the site and lesser on the grazing densities of livestock.*

- A study on the effect of grazing of wetland rehabilitation shows that grazing does not affect species survival and biomass production during the initial stages of wetland rehabilitation in the Kamiesberg Uplands. *This indicates that there is no need for fencing during this stage of rehabilitation.* However, grazing may affect the rehabilitation process during the dry seasons when forage in the adjacent rangelands becomes scares and thus continued monitoring is required.

- The study testing the Intermediate Disturbance Hypothesis shows that grazing does not affect plant species diversity, even within the different life and growth forms. *This directly challenges the popular view that livestock numbers need to be reduced in order to conserve plant species diversity in the region.*

- Three final scientific presentations highlighting the main research findings of these three honours studies (Appendices A-C) were delivered by the students to the Biodiversity and Conservation Biology Department on 20 November 2013.

- The study on assessing the long term institutional and organisational arrangements for sustainable use of ephemeral wetlands in Leliefontein shows that co-management remains a challenge to as how to incorporate local knowledge into wetland management.

- In Leliefontein, people would rather follow the rules of third parties because they have earned the trust of the community. Elsewhere in Africa, rural communities have respected the institutions that are attached to their historical and cultural lives more than those introduced by external bodies. But then again, third parties do not have the authority to enforce rules, thus they can assist with developing strategies that can best be executed by the communities.
Recommendations

- In further developing an integrated monitoring system in Leliefontein, we need to identify the roles of Working for Wetlands who could be crucial in monitoring ecosystems at the intermediate level. Moreover, a planning workshop should be held which would bring ecological and agricultural scientists working in Leliefontein together to discuss the methodologies, share experiences and work out a timeframe for monitoring at this level.

- The impact of fire in renosterveld vegetation is site specific. However, it would be important to assess the effect of fire on the ecotone between Renosterveld and Succulent Karoo vegetation. This is to establish whether the island of Renosterveld vegetation in the Kamiesberg will expand its range or might become extinct in the region.

- Since grazing did not have an effect on the initial stages of wetland rehabilitation, it is recommended that fences be kept to assess the effects of grazing of plant establishment in the longer term which would include the dry seasons and drought periods. Moreover, a detailed management strategy with the participation of local land users should be developed to manage the grazing resources in the wetland since livestock cannot be permanently excluded from these systems.

- Grazing density did not affect plant species diversity thus it would be important to develop and test a system that would promote the use of variable stocking rates across various spatial and temporal scales in the region. In this way, additional forage during wet periods can be utilized and similarly livestock numbers can be reduced during drought period when forage becomes scarce.

- An Adaptive co-management is an important approach that Working for Wetlands (WFW) can adopt since they do not yet have an established relationship as the other third parties and need to earn the trust of the community. However, WFW need a better understanding of the management of Act 9 communal areas, share their vision and strategies with the larger community with regard to management and re-vegetation of the wetlands and need to build capacity of the community and their social capital.
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Introduction

Climate change projections for the western parts of South Africa, which includes Namaqualand show that the environmental conditions for rural livelihoods will be harsher and more unpredictable. As the climate as well as the ecological and socioeconomic conditions is changing, the livelihood strategies of livestock farmers and other land users need to be dynamic in order to survive.

In Namaqualand, land users have been able to adapt to changes in their environment for millennia but it is argued that current and future changes are more rapid than in the past as existing socio-economic pressures become coupled with changes in climate. As a result, rural communities such as the Leliefontein community in the Three Peaks Conservancy will likely become more vulnerable since land users have not yet developed ecosystem-based adaptations and coping mechanisms which would improve their resilience to these new socio-ecological conditions. An option to build the resilience capacity of rural communities is to provide them with extensive knowledge on ecosystem services and function within their local environment and to build their institutional and social capacity to manage their natural resources. Furthermore, rehabilitating habitats that are important to land users would positively affect their livelihood strategies and provide more services to the ecosystem.

The overall goal of this project was to build on biophysical and governance research conducted on 3 wetlands in 2012 to investigate and understand the impacts and governance of ecosystem based adaptation on ephemeral wetlands and adjacent rangelands within the Three Peaks Conservancy.
1  Part 1 – Developing an integrated land use monitoring system for the Three Peaks Conservancy

1.1  Introduction

Various methods for assessing rangeland condition and have been tested in different arid and semi-arid rangelands throughout the world. Assessment of rangeland condition is normally based on primary productivity, animal health and secondary production, vegetation composition, soils and geohydrology, multi-criteria approaches and the use remote sensing and GIS. The choice of a particular approach to rangeland assessment will depend on the scale of the assessment, the type of rangeland and the knowledge, time and resources available to the assessor. Multi-criterion approaches are currently the most accepted to assess rangeland condition at a smaller, local scale. In resource poor communities these methods should ideally be simple, yet efficient enough to accurately monitor the condition of rangelands. Assessing rangelands at a landscape level requires more advance techniques and is usually done by specialists in their respective fields. The first attempt to use multi-criterion approaches at local level in rangeland condition was in the 1970’s, but was rejected due to the subjective nature of the method. In the 1980’s Neil Tainton and Alan Savory separately developed methods using soil and biological criteria, but both methods were consider to be too time-consuming.

The Quick Rangeland Health Assessment method for Karoo rangeland involves subjective assessment of cover and population status of palatable and unpalatable plants, of soil surface condition and of the indicators of subsurface plant and animal activity. This method relies to a large degree on the subjective scoring of such indicators by land users. More objective, multi-criterion approaches such as the Local Level Monitoring method for Namibia and a method developed by the National Department of Agriculture have proven to be rather acceptable to land users and scientists to monitor environmental change. These methods are quite simple to use, is not time consuming, and do not require a large amount of resources.

Our aim is therefore to develop a method that meet these requirements and is suited to the specific needs of the Leliefontein community and applicable to measure local environmental
conditions in the Three Peaks Conservancy. Furthermore, the aim is to develop a three-tier approach which could be used to measure rangeland condition at a **land user level**, **intermediate level**, as well as at a **specialist level**. This method will be used as a tool to ensure integrated and participatory monitoring of biodiversity, ecosystem services and livelihoods in the Three Peaks Community Conservancy. This component of the project and thus this part of the report reflects on the work done by both the Agricultural Research Council and Conservation South Africa.

### 1.2 Level 1: Land user

A participatory research approach was followed in developing land user level monitoring, which involved active participation of the local land users of Leliefontein village. Members of the Biodiversity and Redmeat Initiative (BRI) were specifically targeted to gain input in developing the method. Two workshops were conducted during 2013 where BRI members, Agricultural Research Council (ARC) staff and Conservation South Africa (CSA) developed and tested the indicators to be used for monitoring. The framework based on work done by Reed and Dougill (2002) was used in the approach (Figure 1). This involved identification of objectives, the workshops, following up with evaluation of the indicators, and developing an assessment guide that will be further improved as the method is developed.

In the first workshop in March 2013, the idea of a monitoring approach was explained to the land users. Land users were asked to identify parts of the rangeland within Leliefontein that reflect the best and worst ecosystem conditions and to motivate why they came to this conclusion. A map was used to identify land features and boundaries and the poor and good veld was pinpointed on the map (Figure 2a & b). Feedback from this exercise is captured in Table 1.
Figure 1: A flow chart of the method followed to develop the monitoring indicators (Reed and Dougil (2002)).

Figure 2: Map used to identify veld in poor and good condition in Leliefontein
Table 1: Identification of areas in poor and good condition and the reasons given for the selection of these sites.

<table>
<thead>
<tr>
<th>BEST RANGELAND IN LELIEFONTEIN</th>
<th>WORST RANGELAND IN LELIEFONTEIN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AREAS IDENTIFIED</strong></td>
<td></td>
</tr>
<tr>
<td>High-lying areas</td>
<td>Low-lying areas</td>
</tr>
<tr>
<td>Veld on top of the mountains</td>
<td>Previously ploughed areas</td>
</tr>
<tr>
<td>e.g. Natpad</td>
<td>e.g. Baileysvlakte</td>
</tr>
<tr>
<td>e.g. Bakleikraal</td>
<td>e.g. Langvlei</td>
</tr>
<tr>
<td>e.g. Baileysvlakte in spring</td>
<td>e.g. Kameelkrans</td>
</tr>
<tr>
<td><strong>REASONS</strong></td>
<td></td>
</tr>
<tr>
<td>Veld in good condition</td>
<td>Flood damage</td>
</tr>
<tr>
<td>Plenty of edible plants</td>
<td>Few edible plants</td>
</tr>
<tr>
<td>Good soil/ ground</td>
<td>Topsoil is removed</td>
</tr>
<tr>
<td>Nice bushy veld</td>
<td>Trampled by animals</td>
</tr>
<tr>
<td>Lots of seasonal annuals</td>
<td>Low diversity of plants</td>
</tr>
<tr>
<td>Availability of water</td>
<td>Bushes have been used for firewood</td>
</tr>
<tr>
<td>Grazing is available throughout the year</td>
<td>Very little summers grazing</td>
</tr>
<tr>
<td>Livestock in good condition</td>
<td>Too many farmers using the area</td>
</tr>
<tr>
<td>Best rainfall</td>
<td>High stocking densities</td>
</tr>
<tr>
<td>Wetlands and abundance of water</td>
<td>Toxic plants</td>
</tr>
<tr>
<td>Variety of palatable plants</td>
<td>Near the residential area —thus heavily used</td>
</tr>
<tr>
<td>Few signs of erosion</td>
<td>Old sowing plot—was ploughed</td>
</tr>
<tr>
<td>Lots of ground cover</td>
<td>Signs of erosion</td>
</tr>
<tr>
<td>Limited grazing</td>
<td>Overgrazed</td>
</tr>
<tr>
<td></td>
<td>Poor ground cover</td>
</tr>
<tr>
<td></td>
<td>Lots of bare ground</td>
</tr>
<tr>
<td></td>
<td>High densities of renosterbos</td>
</tr>
<tr>
<td></td>
<td>Only one water point for the specific areas</td>
</tr>
</tbody>
</table>

The following factors were identified as indicators that are important for land users. Indicators could be linked to ecological and agricultural factors (Table 2). The ARC added livestock health, which is used by local people in Namibia and Botswana as an additional indicator.
Table 2: Indicators identified by the workshop participants.

<table>
<thead>
<tr>
<th>Good veld</th>
<th>Poor veld</th>
</tr>
</thead>
<tbody>
<tr>
<td>High plant diversity</td>
<td>Low plant diversity</td>
</tr>
<tr>
<td>Lots of palatable plants available</td>
<td>Few palatable plants</td>
</tr>
<tr>
<td>High plant cover</td>
<td>Low plant cover</td>
</tr>
<tr>
<td>Plants not grazed</td>
<td>Plants intensely grazed</td>
</tr>
<tr>
<td>No erosion</td>
<td>Signs of erosion</td>
</tr>
<tr>
<td>Good animal condition</td>
<td>Poor animal condition</td>
</tr>
<tr>
<td>Lots of fire wood available</td>
<td>Firewood overharvest</td>
</tr>
</tbody>
</table>

A subjective approach similar to Esler et al. (2006) was used to test the method using the following indicators in a 20m transect in the veld close to Leliefontein village:

- Plant diversity
- Ground cover
- Erosion
- Palatable species
- Animal condition
- Firewood abundance / woody biomass

The exercise gave participants a good understanding of what the end result will look like, but the method as a whole was too subjective and open to personal interpretation.

The follow-up workshop, attended by 32 participants from land users, BRI, ARC and CSA, was held on the 23rd of May 2013. The purpose of the workshop was to refine the method for level one monitoring. The scorecard was refined by the ARC to make the measurement of each indicator less subjective. A 4m x 4m plot, marked out with a rope was suggested. Each environmental indicator as identified in the previous workshop was then assessed within the 16m² area. The size of the plot was based on the work done by one of the CSA sponsored Honours students who measured plant diversity in the rangeland (see Jamie Paulse thesis – Appendix F).
The indicators assessed within the plots are as follows:

- **Plant species diversity**: counting the number of different species found within the plot but only perennial plants were counted.

- **Plant abundance/cover**: The rope was marked at one metre intervals to create points on the perimeter and at intersections of these points. At these points the presence or absence of perennial plants were recorded as a ‘hit’ or a ‘miss’ for a total of 20 points. This gave a more objective count of the perennial vegetation cover.

- **Palatable Species**: local knowledge was used to identify palatable and unpalatable perennial plants. The assessment of this indicator is still fairly subjective, but a ratio between the percentages of palatable to unpalatable plants was used to determine the availability of palatable species. This is based on the fact that overgrazed veld is normally dominated by unpalatable species, like renosterbos (Jamie Paulse thesis- Appendix F).

- **Grazing intensity**: the focus of this indicator is to identify the most palatable plant within the plot. Plot should therefore be selected to include highly palatable plants if it is present in the sample area. An ‘indicator plant’ such as *Muraltia spinosa* (Figure 3), which occur at high frequency in the Kamiesberg Uplands, would be an ideal plant to consider. It would be ideal to include pictures that illustrate various degrees of grazing intensity in the field guide.
Figure 3: ‘Indicator plant’ *Muraltia spinosa* grazed at different stages

- **Soil condition:** This indicator is similarly measured as described by Esler *et al.*, (2006). Positive indicators are insect activity, the presence of biological soil crust, plant material, signs of animal activity, and the absence of erosion). Negative indicators are erosion, physical soil crust, no signs of animal or insect activity, no plant material and bare ground.

- **Livestock condition:** The condition of livestock can be tested by a method developed by the National Department of Agriculture for the Karoo. It is based on the percentage of fat and muscle adjacent to the spine of the animal. It was suggested that 10% of the herd needs to be sampled.
Firewood abundance / woody biomass was removed from the set of indicators tested at this workshop, although it was identified as a potential indicator.

All indicators have a score out of five to be completed on a one-page worksheet (Table 3).
Table 3: Score sheet developed to score each of the identified indicators.

<table>
<thead>
<tr>
<th>Species richness</th>
<th># of species</th>
<th>&lt;4</th>
<th>4 to 5</th>
<th>6 to 8</th>
<th>9 to 10</th>
<th>&gt;10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vegetation cover</th>
<th># strikes</th>
<th>&lt;6 (less than 30%)</th>
<th>6-7 (30%-35%)</th>
<th>8-9 (40%-45%)</th>
<th>10-12 (50%-60%)</th>
<th>&gt;12 (more than 60%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Palatable plants</th>
<th>% Ratio unpalatable: palatable plants</th>
<th>90:10</th>
<th>80:20</th>
<th>60:40</th>
<th>40:60</th>
<th>20:80</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grazing intensity</th>
<th>Description</th>
<th>no food left</th>
<th>little grazable material left</th>
<th>reasonable amount of grazable material left</th>
<th>Lot of grazable material left</th>
<th>Not grazed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Soil condition</th>
<th>Positive signs</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score</td>
<td>-1</td>
<td>-2</td>
<td>-3</td>
<td>-4</td>
<td>-5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Livestock condition</th>
<th>Description</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
<th>Class 4</th>
<th>Class 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Participants were split into three groups and asked to set up a 4m x 4m plot to complete the exercise on their own in a different area of veld (Figure 5). Results were then compared and discussed in plenary.
The indicators around plant species diversity, palatable species, and vegetation cover worked very well in the field test and yielded robust and comparable results. Moreover, the methods for counting number of species, and measuring plant cover over 20 points were straightforward and were easily implemented by the workshop participants. Grazing intensity, which is a subjective measure, was interpreted differently by the land users and proved to be challenging for some participants. Assessments of grazing intensity of a given plant varied amongst participants and between participants and facilitators. The ARC team plans to include photographs of different grazing intensities on plants as references in the final monitoring tool. Soil condition proved most difficult to rigorously measure using the draft scorecard. After the workshop, it was decided to try accumulative points for this indicator. Given a list of five positive signs of soil health on the score card, each item, if present, could be allocated 1 point. Given a list of five negative signs of soil health on the score card, each item, if present, could be allocated -1 point. The total out of five for this indicator would then be the total number of positive signs out of five, minus the total number of negative signs out of 5. This alternative needs further field testing. Livestock condition was not assessed as it was not possible to access some livestock in the veld in the area where the vegetation assessment took place. Testing livestock condition needs further field testing with the farmers, and the indicators may need to be adjusted using local knowledge of livestock condition compared with an objective measure of livestock condition.
1.3 Level 2: Compliance officer

Monitoring at this level will be done every month by BRI Compliance Officers measuring rainfall, stockpost movements, stock losses and reproduction, livestock condition and health, annual plant biomass, erosion, and production of indicator plants. The methodology to be used at this level is still being developed and will be tested in 2014.

1.3.1 Monthly rainfall

The plant life cycle and primary production of the vegetation is largely dependent on the frequency of rainfall. There are not adequate rain meters within the Three Peaks Conservation area and therefore BRI compliance officers, who are currently responsible for collecting rainfall data have a key role to play in keeping accurate data of current and future rainfall meters.

1.3.2 Stockpost movements

Since the Conservancy does not have a fixed rotational grazing system, but rather a system of animal movement triggered by environmental and social considerations, it is imperative to keep record of livestock movement. Livestock grazing do have direct and indirect impacts on vegetation, therefore the flock sizes and amount of time spent within a specific region need to be documented. These movements only need to be kept for the grazing season during the warmer months when animals actively graze the uplands.

1.3.3 Stock losses and reproduction

BRI compliancy officers are currently keeping records of livestock losses and births. Livestock losses can mostly be attributed to predators, illness, environmental conditions and accidents. Predation from leopards, caracals and black-backed jackal is significantly lower compared to national figures. This can possibly be linked to the fact that livestock is herded and that herders keep a close eye on their animals. Moreover, if data is available on the success of herding to
prevent predation, these lessons could be conveyed to other communal and commercial farming systems in South Africa and beyond.

1.3.4 Livestock condition and health

At level one livestock condition is used as one of the indicators to score veld condition. Livestock condition is very much linked to the animal weight. At this level the BRI compliance officers can assist in weighing livestock on a monthly basis. A livestock scale will need to be acquired for this purpose.

1.3.5 Annual plant biomass and diversity

Namaqualand is very well known for its flower displays after the first winter rains. These flushes of annual plants are a key source of forage for livestock from May to October, mostly peaking in September. Not a lot is known about the production of this source of forage, therefore the ARC has started measuring production and diversity of annuals within 0.2m$^2$ plots. BRI compliance officers can be trained to monitor the production and diversity of annuals within a 0.2m$^2$ plot.

1.3.6 Erosion or soil build-up

From the field tests with workshop participants it was extremely challenging to measure erosion. Erosion or soil build-up can be fairly easily measured with erosion pegs that are strategically placed in the landscape. Metal droppers are hammered into the ground until only 10cm can be seen above ground. These erosion pegs can be measured monthly by BRI compliancy officers to determine for any erosion or soil build-up in these areas.
1.3.7 Production of indicator plants

*Muraltia spinosa* has been identified by the ARC as one of the potential indicator plants that might give insight into the impact of livestock grazing within the area. *Muraltia spinosa* is very palatable, but remains persistent in the veld even though it is heavily grazed.

1.4 Level 3: Specialists

Monitoring at this level is done by specialists in the field of ecology and agriculture. Different landscapes and special features (e.g. wetlands), primary production, diet selection of livestock, and rehabilitation of rangelands are closely monitored. This would involve complex measurements of the different variables. In some instances more advance equipment and techniques are used compared to level one and two monitoring.

1.4.1 Role players and responsibilities:

1.4.1.1 Conservation South Africa (CSA)

The resident ecologist of Conservation South Africa will be responsible for the long-term monitoring of renosterveld vegetation in the conservancy. The rapid assessment method which was developed specifically for renosterveld is currently favoured. A 20m x 5m plot is used to measure species diversity, species richness and growth forms. Three sites have been identified on an altitudinal gradient, with one degraded and one reasonably intact sample within each site. These sites are permanent marked. Adjacent to these sites transects for annual monitoring will be done using the descending point method along four 50m transects.

In the ephemeral wetlands CSA is involved with developing wetland assessment protocol based on WETHealth, also incorporating a participatory element. Furthermore, CSA is also responsible for biennial socio-economic surveys in the nearby Spoegrivier and Tweerivier villages.
1.4.1.2 Agricultural Research Council (ARC)

In collaboration with CSA six ephemeral wetlands has been assessed using WEThealth method. This information has set up a baseline in understanding the current condition of wetlands. It is advisable to repeat the measurements on these wetlands within five years. The conditions of the rangelands as well as the impacts of livestock on rangelands are important aspects for the work done by the ARC. The organization has access to data on livestock mobility within the area going back more than a decade. Continuous monitoring of livestock movements that will done on level two will contribute to the development of the database for analysis by the ARC. The ARC is also in the process of assessing the net prime productivity and forage production in entire communal rangeland using field based techniques, remote sensing and GIS. To understand the impact of livestock on plant species, monitoring has already been done on diet selection of different livestock species during different seasons in renosterveld rangelands.

1.4.1.3 Nurture Restore Innovate (NRI)

Veld condition is monitored within five long-term monitoring plots near wetlands using a method developed by the NRI. This method monitors plant functional groups and also fauna and is considered to be repeated every four years. NRI is also in the process of developing and comparing ecological rehabilitation protocols within the semi-arid Succulent Karoo and Renosterveld vegetation systems. The aim is also to design implementable rehabilitation protocols for rangelands in Namaqualand Upland systems.

2.4. Way forward

Level one of the three-tier monitoring approach has been fairly well developed. A few of the indicators need to be less subjective and will have to be assessed continuously in the field. Caution has to be taken to keep the technique simple, quick and objective. There is considerable amount of work that lies ahead in developing the methods at level two and it will depend largely on the ability and capacity of the BRI compliance officers to collect the data as required. A lot of
research and monitoring has already been done at the specialist level. The main challenge will be to set up data management system and protocol to capture the large amounts of information that has been and still to be collected. Even though far from finalized, this three-tier approach could potentially be used as a model for other conservancies to get all role players, from land users to specialists involved to ensure integrated and participatory monitoring of biodiversity, ecosystem services and livelihoods.
2 Part Two – Honours Research Projects in the Three Peaks Conservancy

2.2 The effects of fire and grazing on the dynamics of Renosterveld vegetation in the Kamiesberg Uplands

Summary of mini-thesis (Appendix D)

Climatic changes are expected to elicit considerable changes in vegetation dynamics and ecosystem services in natural ecosystems. Wildfires, which are expected to increase in incidence in Namaqualand due to climate change, will too have significant effects on ecosystem dynamics in the region. This is because fires have the potential to reshape the vegetation structure and composition, and influences the distribution and competitive ability of various plant species. This honours study investigated the effects of fire in addition to grazing on Namaqualand Granite Renosterveld vegetation in the Kamiesberg Uplands. In this thesis, the major assumptions of the classical rangeland succession model were tested to determine whether this model accurately describes the effect of fire and grazing on Renosterveld vegetation dynamics. The model assumes that vegetation will move to the initial climax community after disturbance and that there is a balance between the level of disturbance and vegetation succession.

The classical range succession model (Figure 6) depicts how the vegetation would shift between different stages towards a climax community. When the vegetation is in an unburned state (U1) plant diversity, cover and structure are expected to be high. Once a primary disturbance such as fire (D1) occurs, vegetation shifts to the burned state (B1) and these characteristics of the vegetation is likely to decrease. As the vegetation recovers over time (i.e. primary succession is still ongoing) from B1, the secondary disturbances such as grazing (D2) could also occur. The direction in which the vegetation would shift after a secondary disturbance is unpredictable due to the variability of semi-arid ecosystems. The vegetation could either return to the U1 state or shift to either of the alternative states (S2 and S3). This uncertainty was examined for Namaqualand Granite Renosterveld vegetation during this study.
The study was conducted in eight sites that have burned between 2000 and 2013 in the Leliefontein Communal Area. Historical data on fire occurrences were obtained from NASA’s fire map archive. The descending point method was used to study vegetation dynamics of Renosterveld in the burned and adjacent control sites.

Renosterveld has different stable states after the primary (fire) and secondary (grazing) disturbances. This was due to the effects of a combination of various biological as well as physical factors such as slope, aspect, grazing densities, fire and rockiness. For example plant species richness may be similar, less or it may even exceed those of the initial stages. However, this is site specific, as species richness is based on the physical characteristics of the sites and also the levels of grazing. It was also argued that the difference in richness could possibly be due to the different fire intensities. This study concurs with other findings that post-fire vegetation can occur in different states due to variation in each site. From this study fire and grazing changed the vegetation dynamics of most of the sites. However, there are instances where the vegetation did not change and the vegetation moved to a similar state to that of the

**Figure 6:** The classical range succession model.
initial stage. There was also no balance between grazing intensities and plant succession. In this study, Renosterveld succession does occur, however the vegetation may not return to the initial climax state which indicates that a balance does not exist between grazing intensities and plant succession.

*This study did not accept the main assumptions of the range succession model in that vegetation does not always return to the initial plant community and there is no balance between the level of grazing pressure and plant species richness, vegetation structure and cover. Thus, this questions the popular view that livestock numbers have to be reduced to conserve the vegetation of Leliefontein.*

**Part Two - Section 2:**

2.3 **Survival and growth of transplanted wetland species in ephemeral wetlands in the Kamiesberg Uplands**

**Summary of mini-thesis (Appendix E)**

Wetlands areas around the world are under threat from land uses such as cultivation and over-grazing which cause habitat transformation. This is despite that wetlands are being protected by local, national and international policies that promote their sustainable use. As a result of wetland transformation, these wetlands have to be rehabilitated in order to provide critical ecosystem services. The study aimed to determine how livestock grazing affected the survival of transplanted indigenous wetland species and to what extent grazing affected wetland rehabilitation processes in the Kamiesberg Uplands.

Seven sampling sites in total were chosen within four wetlands. Each of these sites had an enclosed (fenced) and an open (unfenced) 4×3 m sampling plot that were 3 m away from each other. The fenced plots served as a control to exclude livestock (Figure 7a), and the unfenced were open to livestock grazing (Figure 7b). Wetland species transplanted were *Pennisetum macrourum, Ficinia nodosa, Mariscus thunbergii, Cyperus marginatus* and *Zantedeschia aethiopica*. Survival and growth of these transplants were monitored over an 18 week period.
from May to September 2013. A non-destructive method was used to estimate biomass using the heights of the plants as a proxy for biomass.

![Figure 7: Fenced (a) and unfenced (b) plots](image)

Most of the mortalities in *Z. aethiopica* during the study period were due to water logging and die-backs were due to bacterium infection causing the soft rot disease. *The survival of all transplants in the open and enclosed plots was not significantly different, meaning that fences were thus not necessary. There was no significant difference in biomass produced in the open and enclosed plots between the different species, meaning that livestock did not affect the establishment of transplanted wetland species. As the study results suggest, no fences are needed for rehabilitation of wetlands in the Kamiesberg Uplands.*

It is recommended in the thesis that continued monitoring is needed as grazing might affect rehabilitation in the longer term when rangeland resources become scarce during the dry season. Temporary fences should still be in place, to exclude feral donkeys and other livestock during the dry season. Some level of grazing might also be allowed when temporary fences are erected since grazing might facilitate the re-establishment of the seed-bank and studies have shown that when grazing is totally excluded from wetlands, species cover, diversity, indigenous species decrease while alien invasion increases.

It is further recommended in the thesis that even though livestock grazing should be allowed, management plans that promote good livestock management in wetlands, which would implement appropriate stocking densities to allow for successful wetland ecosystem rehabilitation is needed. Moreover, future studies on wetland rehabilitation should take into
consideration the effects of livestock trampling, as it could be detrimental to soil structure and processes.

Part Two - Section 3:

2.4 The impacts of different stocking rates on vegetation within the Three Peaks Conservancy in the Kamiesberg Uplands

Summary of mini-thesis (Appendix F)

Diversity patterns vary across entire ranges of local, landscape and regional scales, and can be explained by many factors including grazing. Grazing, particularly livestock grazing is considered a disturbance which leads to many direct and indirect effects on vegetation. In ecology, disturbances affect the species diversity; therefore livestock grazing acting as a disturbance can be studied using the Intermediate Disturbance Hypothesis (IDH). The IDH is used on temporal scales predicting the disturbance at which the diversity of vegetation is maximised.

In this study, the impacts of livestock grazing on plant diversity were assessed along a grazing gradient by testing the main assumption of the IDH, which states that species diversity at a maximised level will be maintained at intermediate frequencies of disturbance (Fig 8). The impacts of grazing on plant species, life form and growth form diversity were examined, including impacts on vegetation cover and species richness.
Eleven stocking densities were considered, with three repeats being done for each stocking density. Abundances at each stocking density was completed using 4 x 4 m plots, whilst vegetation cover was examined using a 50 m line transect. Analysis of the impacts of grazing on species, life form and growth form diversity was done using the Shannon-Wiener and Simpson diversity indices.

Results showed that grazing had no effects on species, plant life and growth form diversity, as well as species richness as no significant relationship was shown. However, livestock grazing did show to have an impact on palatability as the increase in grazing activities caused the replacement of palatable plants by unpalatable plants. As grazing alone has no effect on plant diversity alone, other biophysical factors in addition to grazing may affect plant diversity. Other possible factors such as climatic conditions, competitive dominance and fire play a role in vegetation condition. Palatability decreased along a grazing gradient resulting in unpalatable plant species dominance at higher stocking densities. The occurrence of more annuals in overgrazed areas might be beneficial temporarily or seasonally, as more annual production is for forage is produced. However, perennial plant species are depended on in times of drought and throughout dry periods, and forage demands in times of stress may possibly be affected by the dominance of more unpalatable and annual plant species.

In conclusion, the Intermediate Disturbance Hypothesis was rejected for renosterveld vegetation. Its incorporation of a single disturbance causing a predicted trend is too simplified for the

![Figure 8: Theoretical representation of the Intermediate Disturbance Hypothesis (IDH).](image)
unpredictable and variable system under investigation. It is argued in the thesis that a system in nature is complicated, and it is rare that one factor independently can cause a predicted outcome when investigating the relation of a disturbance to diversity. The occurrence of maximum diversity at intermediate levels of disturbance should only be considered as one of the many possible outcomes and we should acknowledge that environmental conditions and physical attributes of the system do play a role in plant diversity and thus need to be considered collectively.

The main implication of this study was directed to the local people as results show the possible introduction or removal of livestock from the area. This could affect the local economy, as more or less livestock may increase or decrease local income. Some rangeland professionals and conservationists views involve vegetation conditions and herbivory being in equilibrium and thus their goals to reduce the impacts of grazing by allowing a fixed carrying capacity in Leliefontein can be challenged. Local perceptions should be taken into consideration as livestock keepers see no need to reduce the number of stock as environmental factors such as rainfall determines vegetation condition. Variable climatic conditions result in differential forage production and availability thus vegetation indices are bound to vary, whether or not grazing is part of the system.
3  Part 3: Assessing the long term institutional and organisational arrangements for enhancing the sustainable use of rehabilitated ephemeral wetlands in the Leliefontein Communal Area

3.2  Background and Introduction

Up until the dawn of democracy in 1994 in South Africa, a top-down approach to governance of land and natural resources had been adopted by the authorities and structures. This centralised management mostly embodied a hegemonic formal institutional / de jure order, which undermined and marginalised local people’s informal / de facto institutions. Marinus (1998) made a compelling argument that ‘colonialism and the rise of the nation state severely undermined the informal institutions of the Nama people in Namaqualand and in the process systematically broke down their established system of governance. Samuels (2013) also illustrated how legislation from the 19th century onwards was used to curtail the land use management strategies of the Nama people.

Following the first democratic elections in South Africa in 1994, the new ANC led government embarked on a quest to change the country’s philosophy, priorities, and approach to land and water resource management. During this period South Africa embarked on its own version of decentralization in a range of areas. It could be inferred that decentralisation speaks directly to transfer of power from central/ national government to local government. Thus, decentralisation ‘brings government closer to the people’ and can be defined as:

“… the transfer of authority, and/or responsibility for decision making, planning, management or resource allocation from any level of government to its field units, district administrative units, other levels of government, regional or functional authorities, semi-autonomous public authorities, parastatals, private entities, and NGOs or voluntary organisations ” (DPLG 2003:27).

This change is of great importance as it helps in redressing the injustices that were created through the top-down approach to governance of land and natural resources by the authorities and structures during colonialism and apartheid. However, almost twenty years into South Africa’s democracy few communities in the communal areas have benefited from this
decentralization approach since it led to conflict, particularly when it involves the transfer of natural resource management and use powers. The reorganisation of local government in SA through the introduction of Municipal Structures Act, 1998 (Act No.117 of 1998) and the Municipal Systems Act, 2000 (Act No. 32 of 2000) introduced municipalities to the fray and this resulted in blurring of responsibilities and general confusion with regard to who holds power and authority of the new commonage and Act 9 areas such as the Leliefontein Communal Area (Rhode et al., 2001).

3.3 Purpose of Study

This study highlights the implication of decentralisation on the use and management of wetlands in the Leliefontein Communal Area. In addressing this issue, this study taps into the historical management of natural resources in the Leliefontein Area. The focus of use and management also expands beyond wetlands since wetland governance is undertaken within the broader realm of land and natural resources governance in and around Leliefontein (i.e. wetlands are part of a wider system and are managed as such). Furthermore, this study explores the challenges fostering hybridic forms between formal and informal or bureaucratic and socially embedded institutions blend.

3.4 The objectives of the study were as follows:

a) To assess how to incorporate informal/ local institutions into a formal wetland management plan for the Kamiesberg Uplands

b) The role of third parties and identifying strategies to strengthen the local farmers union/s or organisations within the community

c) To identify strategies to assist the Leliefontein Management Committee (interim committee) to fulfil their objectives to re-vegetate the rehabilitated wetlands in the communal area from 2016 onwards
3.5 Methodology

This research forms part of an MPhil in which a case study approach was adopted. A case study rarely focuses on one result and relies on multiple data sources selected on the basis of a predefined theoretical framework. Data collection for this research is mainly based on ethnographic interviews, semi and structured. During 2012 we made use of the WET-EffectiveManagement framework to determine whether or not the interventions by Working for Wetlands in Hoorngaat, Blokkdrift and Skaapriviwer had resulted in more effective management. In 2013 we expanded this research to include the following wetlands, Witsand, Xharras, Vissentersplaats, Die Tuin, Baileysvlakte, Natpad en Bakleikraal. Interviews were conducted firstly with communal farmers/community members who made use of these wetlands and officials from the local municipality who are responsible for regulation of the communal area. Interviews were also held with third parties as they are evermore becoming noticeable role players in the management of wetlands, for example, NGOs’s and Parastatals that had an interested in the wetlands. During these rounds of field periods, I also collected data by means of observations and literature research. In addition to the above, I was also able to engage in informal chats. For example, there were numerous occasions on which I talked to other members of the communities. These encounters can be best defined as impromptu and unstructured. I considered these informal chats as important in building rapport and validating information already collected.

3.6 Addressing the study objectives

3.6.1 How best to incorporate informal/local institutions in a formal management plan?

During interviews with the different stakeholders, an overwhelming majority of the interviewees indicated deep dissatisfaction with how wetlands and the rangelands as a whole are being managed under the authority of the municipality. The municipality however is not the only role players that are involved in the management of the natural resources in the area. In 2003, a co-management relationship with the Kamiesberg Municipality was formalised, when a newly elected Commonage Committee was converted to a Municipal Service Entity, which is to
officially manage the commons on behalf of the municipality (Lebert, 2004). According to Behnke and Kerven (1994), the promotion of co-management, which recognises both the legitimate interest of the State and local communities in natural resource management, creates the environment for the establishing of a hybridic relationship between formal and informal institutions. More than a decade ago Marinus (1998) stated that there is a blend of formal and informal resource related institutions/organisations present in the Leliefontein Communal Area. The author however stressed that the relationship between these two institutions were “uneasy and disconcerting” (1998: 205). During 1998, the Leliefontein Communal Area was still under the administration of the Transitional Local Council (TLC), and the municipality only took over in 2000.

3.6.1.1 Management of natural resources under the Transitional Local Council

In the interim period prior to democracy, the Local Government Transition Act 209 of 1993 was passed and it stipulated that the Management Boards\(^1\) would be replaced by the Transitional Local Councils (TLC). During interviews with the community they were full of praise about how the TLC managed the natural resources in the area. Although the TLC played more of a political transitional role, they had a strong bond with the community. The democratic election of the Local Council took place in November 1995, and they administered the Coloured reserves till 2000. Their functions remained similar to the Boards but with a change in composition and interaction with the local community. The TLC consisted of nine ward members representing each of the nine settlements in Leliefontein Communal Area. The TLC was more people orientated as oppose to the top-down approach which was so prominent of the Management Boards during the union of South Africa and Apartheid. The Local Transitional Council had *de jure* power but *de facto* power came from the people, thus the council always had to make decisions in conjunction with the community (Marinus, 1998). If at any point the council made decisions without the consent of the community they were in a position to object and raise their concerns through the Local Community Forums as well as civic organisation. The Transitional Council...\(^{1}\)

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1 The main functions of the board were to enforce all the laws, control land and grazing and collect taxes. The Management Board consisted of 10 people and the majority of them were appointed by the State. The board was under the chairmanship of the resident magistrate and three officials were elected by the Governor, of whom one was a representative from the missionary society. The reserve registered occupiers were also allowed to elect six community-elected councillors known as korporale (corporals).
Local Council (TLC) also had to administer a Municipal Commonage Grant that was provided by the Department of Land Affairs (DLA) to extend or create commonage for the benefit of poor and disadvantaged residents (Rhode et al. 2001). Commonage Committees (*Meentkomitees*) were thus created to serve as democratically based advisory panels to the Local Authorities (i.e. TLC). In the Leliefontein Communal Area the Commonage Committee consisted of nine community members, one from each of the villages, plus one member from the Department of Agriculture. Three of the members were elected Councilors; the other 3 were members of the land committee which was set up in 1995 to identify willing sellers of commercial farm land, and the other 3 were members of village farmers associations (Rhode et al. 2001). Essentially the underlying goal of the Commonage committee was to help,

“..transform commonage management (for both the old Act 9 Areas and the newly acquired commonage) from a system based on top down remote control and unilateral enforcement...to a system based on participative rule making, for management to be guided by a five year management plan and for users to be held accountable for the payment of the management and maintenance costs of the commonage” (Pienaar 2000:334)

Thus it is quite evident that the community preferred working with the TLC, as they promoted democratic participation which leads to the broadening of the amount of knowledge that influences the decisions. Furthermore decisions were not made in isolation and the Commonage Committee played an important role as they ensured that community was kept in the loop with regards with decisions.

Great strides were made under the TLC to secure tenure for the community. In 1998 The Transformation of Certain Rural Areas Act 94 (TRANCRAA) of 1998, was passed to provide for tenure reform in twenty-three former “coloured rural areas” in SA. TRANCRAA was passed by Parliament in 1998 to repeal Act No. 9 of 1987, since the latter Act was in contradiction with the Constitution of South Africa. TRANCRAA is the first comprehensive legislation to reform communal land tenure in South Africa and so far referenda over ownership of land was only done in five of the 23 former coloured reserves, all which occurred in Namaqualand. In Namaqualand there are six “coloured rural areas” and referenda only took place in these rural areas so far. The communities of these coloured rural areas had three ownership alternatives, namely, Common Property Associations (CPA) in terms of the CPA Act, 1996 (Act No. 28 of
1996), a municipality or a choice that may include trust ownership and individual title. In addition to resolving the ownership issue, the Act also requires that issues of land management to be addressed (RSA 1998). However the demarcation of new municipal boundaries in the run-up to the local government elections of 2000 was a blow to the TRANCRAA process in Namaqualand and also spelled the end of the TLC (Wisborg and Rhode, 2003). The transitional phase of TRANCRAA was implemented in the six rural areas of Namaqualand from January 2001 to January 2003. In November 2002 to January 2003, referenda over land and ownership were held and the majority of the people who participated in the poll voted that the Leliefontein Communal Area should form part of the newly enlarged municipality, that is, the Kamiesberg Local Municipality (Wisborg and Rohde, 2005).

3.6.1.2 Municipality and co-management of natural resources

At present there exists a stalemate between the municipality and the communal farmers, which means the situation has severely deteriorated since the time of the TLC. One of the main reason for this deterioration in the relationship could be ascribe to the change of role players (e.g. Commonage Committee) in the co-management and the shift of power. The decision of the community that the Leliefontein Communal Area should form part of the Kamiesberg Local Municipality meant that the municipality retains the legal responsibility for administering the commonage but the Minister of Land Affairs still owns the land.

The Municipal Structures Act, 1998 (Act No.117 of 1998) and the Municipal Systems Act, 2000 (Act No. 32 of 2000) makes provision for communal grazing land to be controlled by the Kamiesberg Local Municipality. Through these two Acts, the municipality promulgated grazing regulations in 2002 (Notice 18 of 2002), cropping regulations in 2003 (Notice 34 of 2003) and skutregulasies (impounding regulations) in 2003 (Notice 68 of 2003). Grazing regulations take into account community rules and sets of regulations that had been in use since the application of Act No 29 of 1909 (Samuels, 2013). However the Municipality is grappling to enforce any of these regulations as they have limited resources for the vast area it needs to administer. Whereas the TLC only administered/ governed the Act 9 areas and newly acquired land through the commonage grant with the assistance of the Commonage Committee, the municipality’s jurisdiction also includes land reform farms, private farms as well as 15 towns and villages. It
was only after referenda in 2003 that a co-management relationship with the Kamiesberg Municipality was formalised (see Diagram 1), when a newly elected Commonage Committee was converted to a Municipal Service Entity, which is to officially manage the commons on behalf of the municipality (Lebert, 2004). Section 82 (2) (a) of the Municipal Systems Act of 2000 makes provision for the Leliefontein Commonage Committee to be converted into a municipal entity. In the newly elected Commonage Committee each village has two representatives which get elected by the community. The Department of Agriculture also has one representative on the commonage committee and one representative is from the municipality, i.e. the Municipal Development Officer. The Committee, together with the municipality is responsible for developing land use management plans and enforcing rules and regulations to ensure efficient and effective use of the commons (DLA, 2000:26-27). Prior to the signing of the Service Delivery Agreement of Commonage Committee, the committee only had advisory power and therefore did not have any legal authority to enforce the Management Plan and Grazing Regulations (Smith, 2005). However, since these the inception of this new role, the Commonage Committee and the co-management structure in general has been largely ineffective and do not ably discharge its responsibilities.

**Diagram 1:** Composition of the Leliefontein Commonage Committee (Lebert, 2004)

Decentralizations can lead to conflict, particularly when they involve the transfer of natural resource management and use powers. It is therefore important to know who should receive
powers and who benefits from these shifts in rights and powers. Vollan (2012) argued that a major impediment is that the municipality together with the responsible ministry often prefers to work with a new established user committee instead of the elected ward committee. The Kamiesberg Local Municipality consists of four wards and is governed by a council that is based in the district capital Garies. The council approves policies and by-laws, has to pass a budget for the municipality each year, charge service fees, and must also decide on development plans and service delivery for their municipal area. Each of the four wards directly elects a councilor. The other four members are elected through a proportional representation ballot, where voters vote for a party. The direct elected councilor of each ward is also the chairperson of the village ward committee. Other ward committee members (up to 10) are elected by the residents of the respective ward and their job is to represent the various interests in the community. The ward committees’ main tasks are to communicate and consult with the community in respect of development and service plans and to play a role in developing local projects. The ward committee has, however, no formal power to force the municipal council to do anything. Under this set up the municipality/ responsible ministry is in a position where they can influence and control the composition and decisions more easily (Vollan 2012). Thus when comparing the ward committees and the commonage committee, they seem to have a similar role than the in that both have an important role in communicating the needs of the community to the municipality. The only difference is that now the Commonage Committee has legal authority to enforce the management plans and grazing regulations (Smith, 2005) but during election for the commonage committee this year, there was not a quorum to proceed with the election of members in the Leliefontein village.

Seeing that the Commonage Committee has legal authority to enforce the management plans and grazing regulations, it therefore made sense that when we asked the community members who should manage the wetlands in the area, the interviewees stated that the commonage committee is supposed to manage the wetlands and rangelands as a whole. But they all raised concerns that the newly elected commonage committee does not operate the same as the commonage committee under the TLC and thus they are not in favour to vote for the Commonage Committee as they do not see the role they are fulfilling. The situation is so bad in the Leliefontein that the previously elected members resigned. Interviewees that served on the commonage committee during the first four years indicated that when they were serving on the Commonage Committee,
they were obliged to have monthly meetings and emergency/ special meetings with the community members so they were in a position to communicate the needs and concerns of the community to the municipality via their ward councilor in their monthly reports. Since 2006 however there was a decline in regular meetings with the community, so their inputs are not taken into consideration. This is in stark contrast with how the commonage committee functioned under the TLC, where participation was the norm. Not only was it participation a key of this set up, but power sharing was a key component as the principal actors (e.g. commonage committee) who were involved had a degree of influence.

It must be stated that it is quite a daunting task for the newly elected Commonage Committee to fulfil the same function in terms of management of land as the Municipality without the necessary resources. The municipality itself does not have the funds or the capacity to manage the agricultural tasks on the commonages (Benseler, 2004). As a result regulations and payments are not adhered to and enforcement of rules lack in the Communal Area. The Municipal officer, explained that as a result of this lack of capacity, they included a representative from the Department of Agriculture (i.e. extension officer) in the co-management structure. However, the municipal officer indicated that since taking power, the extension officer have not fulfilled their duty on the co-management structure and only attended meetings in the beginning. The Municipality is in a process reviving the commonage committee but the community is concerned that whoever gets elected will only be in the position nominally. One of the community members succinctly summarised their current frustrations and concerns when she stated that

“The biggest problem in the community is that structures and authorities either do not communicate with us or there is no feedback after having discussions with us. Most times we do not know what is happening around us. Our current Commonage Committee only exists in name. They are nominal candidates and we will not elect new commonage committee’s because we do not know what they are doing, but we need people who can communicate to us what is happening. That was the role of the commonage committee”

During interviews there was a cry from the community that the municipality and those in the co-management structure would take time to listen to them and keep them informed. For many this is the basis for respect and trust. The community members that were interviewed stated that the TLC and their partners respected them through asking for consent from the community before
making decisions and as a result they earned the trust of the community. Building trust is essential for co-management. An important observation by one of the former ward councilors was that

“The municipality is not reacting to any of the concerns of the community, so the community members no longer trust anything that comes from them or those who presently form part of the co-management structure”

Apart from building institutions, trust between the parties is extremely important. In fact Berkes (2009) sees it as a universal detriment and prelude to developing working relationships in co-management. According to Pretty and Ward (2001), trust lubricates collaboration and is thus an essential part of social capital as it needs to develop among a group of people trying to solve a problem. Furthermore the existence of social networks has been identified as a common and important denominator in cases where different stakeholders have come together to effectively deal with natural resource problems and dilemmas (e.g. Folke et al., 2005; Pretty and Ward, 2001;).

3.6.1.3 Does co-management really create the environment for the establishing of a hybridic relationship between formal and informal institution?

It remains a challenge to find a way in how to incorporate the local people’s knowledge into the management of the wetlands, seeing that they do not have a representative body that is willing to raise their issues. One of the interviewees noticing this challenge indicated that

“All the stakeholders who have an interest in the wetlands need to meet up first to discuss their vision with regards to the wetlands and then uniformly approach us with regards to the plans they have with the wetlands, ideally this approach should be led by the Municipality but any of the stakeholders who seriously want the buy in from the community can take the lead. In that way we could all work out a plan how to include the other guys who are not BRI members to help in conserving our wetlands”.

This quote indicates that there are still community members who are still willing to give the municipality an opportunity to make a concerted effort to take the lead in the co-management structure. When examining the earlier definitions of co-management, a hallmark of the concept is to have at least one strong vertical linkage involving the government and a user group, and
some formalized arrangement for sharing power and responsibility (Pinkerton, 1989; Berkes, 2002; Borrini-Feyerabend et al., 2004). But the dualistic power sharing between the state and local (or indigenous) resource users and range of possible arrangements have been attributed to earlier definitions or conceptualisations of co-management (Plummer, 2009). More recently Carlsson & Berkes (2005) argued that co-management is more complex and multi-dimensional and can hardly just be understood as the interaction of a unitary State and a homogeneous community. Research undertaken over the last three decades indicates that ‘co-management has become more complex and dynamic than might be concluded from this earlier literature and evolved in diverse directions’ (Plummer & Armitage, 2007). One of the first aspects of the evolutionary route taken by co-management is to regard power sharing as the result and not the starting point of co-management. Examining co-management as a process highlights that the concept should be viewed as path dependent as it involves extensive deliberation and negotiation (Berkes, 2009). The views expressed by interviewees, thus captures this notion of extensive deliberation and negotiation that needs to take place in the co-management structure. During these deliberations focus is given to deliberately developing institutional building. This reflects the evolution of co-management where emphasis is placed on the interplay between government policies/ management plans (i.e. formal institutions) and local/ informal institutions.

3.6.2 The role of third parties and identifying strategies to strengthen the local farmers union/s or organisations in the community

In principle co-management arrangements are between individual or collective users of resources and government institutions. However, in many cases third parties (e.g. NGO’s or Research Agencies) play a crucial role in the creation and facilitation of such arrangements. By their presence and actions they become important actors in the social and political context. In the Leliefontein Communal Area, Conservation South Africa (CSA) and the Agricultural Research Council (ARC) are playing an instrumental role through their ties to committees/ associations and other institutional hierarchies. In many cases, rural communities in Sub Saharan Africa have respected the institutions that are attached to their historical and cultural lives more than those introduced by external bodies, such as governments. But in the case of the Leliefontein Communal Area, third parties, especially CSA has been able to introduce contracts with BRI
members around the management of wetlands and rangelands resources. According to one of the BRI members in the community

“...CSA and the BRI have done more for the farmers in the area than our own Municipality...and it is not that we only want hand outs, we just need to be assisted, and they have helped where they can...”

In discussing aspects relating to the management of wetlands in the contracts, some of community members, especially those who are BRI members indicated that

“The BRI contract is nothing new, it states that for a few months the wetlands needs to be rested, this happened for years now, it is our culture, from May to October, most of us are forced to move our livestock to warmer places. You must remember that seasonal movement is not just institutional it is also natures call, before it starts snowing we need to move and our forefathers did the same”

There was a general consensus among the interviewees that they would rather follow the rules or contract by the third parties because they have earned the trust the community. There is however still problems expressed in terms of enforcement of the rules and contracts. Some community members indicated that to be a BRI member, you have to attend all workshops and meetings and if you do not attend these on a regular basis you are no longer seen as a member. When there is a relatively weak governmental representation in the area and third parties believe they can play a constructive role in bringing about positive changes either in the field of nature conservation or the protection of rights and interest of local people. But this immediate role brings about a delicate position because of the complex interest at stake. Firstly, the organisation is tied up with the regulations of the government and the available legal instruments. There is also pressure in always having to ensure the confidence of the local people or users. Lastly, these organisations also have to satisfy the specific constituency of the organisation (e.g. donor agency). Constituencies of the organisations tend to require clear visibility in the local context and successes within relatively short periods of time in order to ensure continued support for the activities and this might conflict with the required instrumental nature of the performance of the organisation. Various organisations are tempted to assume a stronger role if the governmental performance is weak but this could lead to susceptibility to criticism and further tension from
both communities and municipalities. This at best it is advised that third parties assist in institutional and capacity building.

The ARC has also assisted the Municipality in drawing up a management plan that contains the informal grazing arrangement of the communities. However, the municipality is still struggling to enforce these informal rules that are present in the management plan. Enforcement thus still remains a challenge and although the third parties do not have the authority to enforce rules, they can assist with developing strategies that can best be executed by the communities. Moreover, the evolution of co-management has made way for a wider array of actors to be involved and the concept itself is more and more being advanced as a continuous problem-solving process (Plummer and FitzGibbon 2004b, Carlsson and Berkes 2005, Plummer 2006). In this regards third parties introduce themselves as or integrate into the co-management arrangement as actors who pursue the essential goal of co-management, namely to build/establish ‘working relationships’. In analysing and describing a variety of theoretical schemes that have been used to explain particular aspects of co-management, Plummer and Fennel (2006) reached the conclusion that a theoretical underlying assumption of co-management is co-operation. Co-operation can be defined as ‘working together to same end’ (Sykes, 1976). Effective co-operation however develops through time and relies on learning as participation (Napier et al., 2005). Learning as participation forms part of the social learning theories that is one of latest or newly developed aspects of co-management. At the heart of social learning is the iterated round of problems solving or ‘learning-by-doing’ which responds to social, cultural, economic and ecological feedback and provides management flexibility (Berkes 2009). The adaptive nature of co-management (i.e. flexible, dynamic, incorporates social learning) has been hailed as an appropriate resource strategy to deal with complexity (e.g., Ruitenbeek & Catier, 2001; Olsson et al., 2004).

3.6.2.1 Co-management incorporating Adaptive management

‘Learning by doing’ through iterative practice, evaluation and action modification is also regarded as a key feature of adaptive management (Berkes, 2009). Adaptive management is a cyclic, learning-oriented approach to the management of complex environmental systems that are characterized by high levels of uncertainty about system processes and the potential ecological,
social and economic impacts of different management options (Jacobson, 2003) . The Adaptive management process is often portrayed as a six step cycle which involves: (1) assessing the problem, (2) designing a potential solution, (3) implementing action, very careful monitoring (4) of the outcomes that would lead to evaluation (5) and adjustment (6) of the management strategy based upon the evaluation (Berkes & Folke 1998).

![Figure 9: Adaptive management cycle (Jones, 2005)](image)

Although co-management and adaptive management do not share a common history, they have both evolved toward a common ground because “adaptive management without collaboration lacks legitimacy, and co-management without learning-by-doing does not develop the ability to address emerging problems” (Berkes 2009: 1698). The net result of combining co-management and adaptive management is adaptive co-management, which combines the dynamic learning process that is characteristic of adaptive management and the linkage characteristic of co-management (Folke et al., 2005:448; Olsson et al., 2004:75).

3.6.3 To identify strategies to assist the Leliefontein interim management committee to re-vegetate the rehabilitated wetlands in the communal area

In 2016 it will be 200 years since the missionary Barnabas Shaw, established the Methodist Church in the Leliefontein Community. Last year the community members started working on a vision for the wetland, which was to
“Inspire the community of Leliefontein to rehabilitate the wetland to an A grade standard in terms of biodiversity, water, tourism attraction and to also conserve the cultural and historical heritage to the advantage of the inhabitants and the wetland material”

The objective was that by 2016 the wetland will have enough plants so that the community will be able to re-vegetate some other wetlands in the communal area (See Appendix G for the community’s vision and objectives of for the wetland nursery and re-vegetation of ephemeral wetland in Leliefontein). There has been a major change in terms of this plan as Working for Wetlands (SANPARKS) have made money available to employ 2 people to work in the wetlands in the church yard for 2 years. As a result community who divided themselves into working groups to help with maintaining and cleaning the wetlands, have subsided. One of the champions of these working groups and individuals who have been trained in wetlands management was side-lined from the entire project. Taking into consideration that agency is central to understandings of collective action it is rather worrisome why effort was not made to capacitate the community more and building their social capital. Interaction between institutional groups (social capital) and the capacity of individuals (agency) is related to the level of adaptive capacity. Moreover, Working for Wetlands has proceeded to fence off large parts of three wetlands where they made cut of alien poplar trees but the process followed thus has been haphazard. If one takes into consideration the adaptive management cycle to see how Working for Wetlands has gone about their work, there are some concerns that need to be raised.

It is important to plan before you do. Three fences have been erected, and yet there is no re-vegetation taking place. It is also unclear for how long these fences will be there and thus it is unclear what the desired outcomes are. One of the community members had the following to say,

“I am especially concerned about the way Working for Wetlands went about doing their work, they do things and later inform us about the vision or plan they have. They do not ask for the communities buy in first and did not assess how we were using our wetlands...for me it seemed that they had no future plan, so after they cut of the tree I continued to do what I did in the wetlands. But now you hear that they want to fence of wetlands in order to re-vegetate or rehabilitate them. Again this raises issues as we are not kept in the loop”
Figure 10: Wetlands fenced off in Blokdrift and Hoomgat

It would have been better if Working for Wetlands could have developed management strategies and actions with the community and then reconcile it with their vision of 2016. The lack to engage with a larger spectrum of community is of real concern and during interviews with Working for Wetlands staff in the Kamiesberg, they did say that they engaged with the municipality and the immediate farmers who made use of the wetlands, but farmers are still not entirely sure about certain aspects of the fencing of the wetlands. Furthermore, Working for Wetlands to a large degree depended on the municipality to inform the community about the future plans, but this has not been forthcoming.

In a TRANCRAA Consultative Workshop by the Department of Rural Development and Land Reform (DRDLR) in December 2012, the department stated that many of the Municipalities have no idea of what is the requirement of Act 9 areas and this influences how stakeholders or government departments interact with communities in these areas. To make a typical example, in an interview with Working for Wetlands staff in the Kamiesberg, they indicated that they regard the municipality as the owners of the land and community or communal farmers as renting land. This is not entirely correct, as the municipalities are not allowed to charge tariffs to the communities in Act 9 areas. Moreover, the TRANCRAA process is not finalised, therefore land is still held in trust by the Minister of DRDLR.

Working for Wetlands is in the progress of advertising two posts for monitoring of wetlands and CSA is helping with the establishing of monitoring programs for the rangelands. Thus, identifying what needs to be monitored in the wetlands still need to be finalised.
Figure 11: Objectives of Working for Wetlands and all their partners

The last phase of the adaptive management cycle speaks of the importance of evaluating and learning from management, so as to proceed with making the necessary adjustments to the management actions and arrangements for effective management. This report feeds into this latter phase and we hope that some of the report findings and recommendations will help inform all role players in the decision making of the wetlands.
References


