HAENERTSBURG

VELD MANAGEMENT

RECOMMENDATIONS

Compiled by:
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SUMMARY

Below follows a summary of the main findings and recommendations. It is imperative that the complete report be read and not the summary only.

Findings

• The study site falls in the so-called Fire Climax Grassland, meaning that the withdrawal of fire from the ecosystem will lead to the destruction of the ecosystem and its biota.
• On a smaller scale the study site falls within the so-called Woodbush Granite Grassland, one of the most threatened vegetation types in South Africa.
• The study site is currently in a good condition and has an exceptionally high botanical diversity. Few exotic plants have been observed.
• The study site is well managed by an actively participating local community.
• Some parts show an increase in taller grasses, tall forbs and woody trees and shrubs, typical early signs of an early pioneer forest state.

Recommendations

• It is recommended that fire, grazing and a combination of the two be used to maintain the grassland and its high botanical diversity. These are the same “disturbances” which are responsible for shaping and maintaining this ecosystem for millions of years.
• A more frequent burning and grazing programme than currently in use is recommended.
1. INTRODUCTION
The natural veld (townlands) surrounding Haenertsburg as well as the Ebenezer peninsula were visited on 22 January 2014 to assess the current condition and to make recommendations for future management. The assessment was requested by Friends of the Haenertsburg Grasslands (FroHG). The aim of the study is to make recommendations for future management in order to preserve and improve the botanical diversity of this highly threatened vegetation type.

1.1. Location
The town of Haenertsburg is located about 50 km (60 km by road) east of Polokwane and about 30 km (40 km by road) west of Tzaneen. The town falls into the Tzaneen municipality of the Mopani district of the Limpopo province. Important landmarks near the town are the Ebenezer dam and the Iron crown mountain peak, which at 2 126 m above sea level is the highest point in the Limpopo province. The highest point in the study area is about 1 550 and the lowest about 1 370 m.a.s.l.

1.2. Previous studies
Various previous environmental studies have been conducted for the Haenertsburg townlands. These are:

<table>
<thead>
<tr>
<th>Year</th>
<th>Author</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>Clayton Cook</td>
<td>Faunal survey of the Haenertsburg common.</td>
</tr>
<tr>
<td>2004</td>
<td>Pieter Winter</td>
<td>Fire management plan for Haenertsburg common.</td>
</tr>
<tr>
<td>2003</td>
<td>Clayton Cook</td>
<td>Initial faunal survey of the Haenertsburg common.</td>
</tr>
<tr>
<td>2005</td>
<td>HEMAG</td>
<td>Environmental management plan for Haenertsburg’s afromontane grassland.</td>
</tr>
<tr>
<td>2006</td>
<td>Sonnette Krynauw</td>
<td>Plants of conservation importance occurring in the grasslands of Haenertsburg.</td>
</tr>
</tbody>
</table>

The aim of this report is not to replace any of the above documents but rather to draw from them in order to come up with some recommendation to improve and maintain the grassland. Knowledge of the above documents will increase the comprehension of this document to the reader.

1.3. Methodology
The assessment was done by visiting as many as possible parts, including each of the various burning blocks, within the study area. This was achieved by being escorted by Sylvie Kremer-Köhne, a Haenertsburg resident who is highly familiar with the area.
During the field visit observations were recorded on aspects regarding botanical diversity and fire related succession. Photographs were taken to substantiate data.

2. STUDY AREA
2.1. Climate
According to the classic Koppen-Geiger world climate classification the study area falls within the so-called Cwb climatic zone (as for most of the eastern escarpment and Highveld region). This coding translates the following parameters:

- C – Temperate climate
- w – Dry winters
- b – Warm summers

![Köppen-Geiger Climate Classification](image)

**Figure 1:** The distribution of general climatic zones (Koppen climates) in South Africa. The study area falls within the so-called Cwb zone, which translates to warm temperate climate with dry winters.
The long-term average rainfall for the study area is about 1050 mm per annum and strongly summer distributed (see graph below). The months of November to March all receives more than 100 mm/month with June to August being the driest. Mist is common and frost occurs infrequent.

![Figure 2: Rainfall distribution for the study area. The long-term average rainfall is about 1050 mm/annum (Zucchini & Nenadić, 2006).](image)

2.2. General soil and geology
The general geology of the study area consists of biotite granite. The soils deriving from this geology vary much according to the terrain. Soils on the crest are generally deep red loamy soil from the Hutton form. Soils on the slopes are generally shallow and from the Mispah and Glenrosa forms. Soils in the lower laying areas are high in clay (30 – 40% clay) and of mainly the Oakleaf form.

2.3. Natural vegetation
2.3.1. Vegetation type
The study area is classified, on a broad scale, as being part of the Grassland biome. On a somewhat smaller scale it is classified as the Mesic Highveld Grassland bioregion and on a regional scale as the Woodbush Granite Grassland (code Gm25)(Mucina and Rutherford, 2006).
This vegetation type consists of a mountainous plateau covered by grassland. The grassland has an exceptionally high floral diversity with more than 650 indigenous plant species identified in the townlands of Haenertsburg alone. Although called grassland, the main contributors to this high diversity are the non-grasses. These include the wild flowers, which constitute the annual and perennial herbs, geophytes, climbers, ferns, suffrutex (underground trees) and many more. A total of 107 plants species occurring in the grassland and forest patches are protected by law or are important medicinal plants.

2.3.2. Conservation status
The Woodbush granite grassland vegetation type is currently regarded as being critically endangered and no formal conservation areas have been proclaimed. As the townlands of Haenertsburg is one of the last refuges of this threatened ecosystem, it is vital that it be formally protected by law.
3. MANAGING FOR DIVERSITY
The protection and maintenance of this small but unique and threatened portion of grassland becomes a vital issue. To learn more about protecting its high diversity we need to regard those environmental processes responsible for shaping and maintaining its very nature. These processes include, amongst others, fire and grazing, which are often referred to as ecological “disturbances”.

An ecological disturbance can be defined as an event that disrupts ecosystems, or part of an ecosystem. In relation to veld management, ecological disturbances correspond with the partial or total destruction of biomass. Such disturbances refer to fire, drought, trampling, invasion of alien plants and even grazing. Some of these disturbances, particularly grazing (and trampling) and fire, have been part of grassland and savanna ecosystems for millions of years. These ecosystems, in fact, are dependent on these “disturbances”, at a certain optimum level, to maintain the ecosystem at a certain state.

3.1. Fire
The Woodbush granite grassland is falling in the so-called Fire Climax Grassland, meaning that if fire is to be withdrawn the grassland will develop into a forest state over time. Given the mild climate and lack of severe frost, fire is therefore the main disturbance maintaining this grassland free of most woody species (and full of forbs and grasses).
3.1.1. Burning trials

The long-term grassland burning and mowing trials conducted at Ukulinga, the University of Kwazulu-Natal research farm just outside Pietermaritzburg, are among the longest running field experiments in Africa. The research farm is also situated in the so-called fire climax grassland at a height of 800 m above sea level and with a long-term average rainfall of 800 mm/annum.

These trials, which include burning, mowing and veld fertilisation, were initiated in 1950 by JD Scott and are in the form of plots (18 x 13 m). They are well maintained for more than 6 decades and present an excellent opportunity to study long term results in their respective fields. The different burning trials include a combination of annual burning, bi-annual burning and tri-annual burning during winter, spring and autumn respectively. Control plots, which were not burned for the whole duration of the study, are also included in the trial. The following basic results on species richness of grasses and forbs were obtained (Morris & Fynn, 2001);

- That the long-term protection of the grassland from burning or mowing decrease grass species richness by 55% - 66%.
- Protection from disturbance has a lesser effect on forb species richness. However, taller forbs replace shorter forbs when disturbances are less frequent.
- In higher rainfall regions disturbance plays a more important role in maintaining forb diversity than lower rainfall regions. The higher the productivity (and hence biomass accumulation) in such high rainfall regions the more frequent disturbances (e.g. fire and/or grazing) should occur to maintain grassland open and botanical diversity at optimum levels.

**PRODUCTIVITY**

Productivity, in terms of veld management, refers to the rate of plant biomass production and accumulation. Productivity is mainly influenced by the amount of rainfall received. The rate of biomass accumulation is affected by natural disturbances such as fire, grazing and drought.

**Figure 5:** Long-term annual burning plots resulted in dominance by short grasses and a high proportion of small forbs.
Figure 6: The tri-annual long-term burning plots resulted in a dominance by tall grasses (mainly *Cymbopogon nardus* – Giant turpentine grass) with some tall forbs and woody shrubs present.

Figure 7: The long-term exclusion of fire (control plots) resulted in a dense woody vegetation structure which includes indigenous trees (mainly *Acacia karoo*) and various exotic invasive species.
3.2. Herbivore impact
In grasslands herbivores have an impact on the plant species composition as well as the structural properties of the vegetation. The species composition of plants will change over time in favour of those best adapted to the current level of disturbance, whether it is over-utilisation, under utilisation or optimal utilisation. Likewise can the effect of trampling, part of the so-called herd effect, have an impact on vegetation composition and structure. This short term but intense trampling plays a major role in maintaining grasslands and savanna open, in combination with fire. In addition to controlling woody species trampling also increase germination, feed organic material to soil microbes, increase soil fertility and breaks the hard soil crust where necessary. This form of disturbance, with its many benefits, is largely lost through human expansion and development which restricts the movements of herbivores.

Only in very few ecosystems can the effect of migrating and constantly moving herds of animals be witnessed. Examples are the Serengeti/Masai Mara ecosystem, where heavy but short term trampling and grazing/browsing maintains the vegetation structure relatively open (in combination with fire). The same happens in parts of the Okavango delta, where large herds of grazers still roam free and are grazing in dense herds due to predator pressure. The impact on woody species and larger forbs, which are less well adapted to trampling, is significant. Grasses and some forbs (particularly creeping legumes), on the other hand, are better adapted to trampling and would increase in number and diversity over time.

Figure 8: The impact of trampling on woody species has a significant effect on maintaining grassland and savanna open, as with fire. This photo shows a part in the Okavango delta with a large herd of Buffalo in the background and a heavily trampled Sickle bush (inset photo). Photos by Richard Finn.
4. CURRENT MANAGEMENT

The study site is currently well managed by the Friends of the Haenertsburg Grasslands (FROHG), successor of the Haenertsburg Environmental Monitoring and Action Group (HEMAG). This document is not intended to revise the current EMP but to refine some management practices, particularly the burning programme and grazing activities, where necessary.

The study site is currently divided into various management blocks (see map below). Most of these blocks include all the terrain units (crest, slope and valley bottom), which is favourable for increasing beta diversity. It is recommended that these blocks continued to be used for management purposes. It is also recommended that the proposals made in this report be incorporated into the current management plan for the area in order to have the minimum impact on the current plan. The map below shows the current blocks with some new recommended subdivisions.

![Map of townlands showing current management blocks and some new subdivisions.](image)

**Figure 9:** A map of the townlands showing the current management blocks and some new subdivisions. The blue lines represent drainage lines and the red lines represent crest lines.

Most of the study area seems to be in a good condition regarding alpha and beta diversity. Some areas, particularly those with short vegetation, show an exceptionally high number of species. Below are some photographs that show different parts of the townlands.

**DIVERSITY**

The term “alpha diversity” refers to the botanical diversity of a specific habitat or vegetation unit, while “beta diversity” refers to the differentiation in diversity between habitats.
Figure 10: Some parts of the townlands, particularly those often burned (and grazed) show a high botanical diversity.

Figure 11: Most parts of the Peninsula are in a good condition regarding species diversity.
It would appear that at least some parts of the townlands are experiencing an increase in woody vegetation. This is evident by the presence of large forbs, tall grasses and woody shrubs and trees (see photo below). The main reason for this condition is a lack of disturbance, which indicates that some parts are not burned frequent enough.

![Photo of vegetation](image)

**Figure 12:** Some parts shows gradual increase in taller forbs and grasses as well as some presence of woody species.

5. RECOMMENDATIONS FOR MANAGEMENT

Below follows management recommendations for sustained and/or improved grassland botanical diversity. The aim of the recommendations is to provide a list of options which will hopefully lead to the highest possible alpha and beta diversity. The practical application of these measures was not considered at this stage. These recommendations therefore need to be considered by a panel before it is incorporated into the current EMP. The recommendations in this report are not necessarily the only options and other proposals would be gladly accepted.

These recommendations should be considered as guidelines only and adaptive management should always be applied in the case of drought or when accidental fires occur. It is highly recommended that these recommendations, and possible others, be part of a study with the aim of identifying best practices to improve and maintain grassland diversity in this threatened vegetation type.
Due to the high rate of biomass production, associated with the high local rainfall, frequent disturbance (annual and bi-annual) is needed to maintain the grassland and its diversity. Due to the historic occurrence of both fire and grazing it is recommended that both these “disturbances” be incorporated (separate and in combination) into the management plan. Incorporating these treatments into the annual program will ensure maximum alpha and beta diversity for grass and forb species.

**Table 1**: The recommended treatments and hypothetical outcome (plant group to increase and decrease in number) of each treatment (or disturbance).

<table>
<thead>
<tr>
<th>No.</th>
<th>Treatment</th>
<th>Frequency</th>
<th>Plants to benefit</th>
<th>Plants to decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fire</td>
<td>Annual</td>
<td>Small forbs and medium to small grasses</td>
<td>Woody species</td>
</tr>
<tr>
<td>2</td>
<td>Fire</td>
<td>Bi-annual</td>
<td>Large forbs and large grasses</td>
<td>Small forbs</td>
</tr>
<tr>
<td>3</td>
<td>Grazing/trampling</td>
<td>Annual</td>
<td>Small to medium grasses and some forbs (e.g. trailing species)</td>
<td>Woody species and forbs</td>
</tr>
<tr>
<td>4</td>
<td>Grazing/trampling</td>
<td>Bi-annual</td>
<td>Medium to large grasses</td>
<td>Woody species, small forbs</td>
</tr>
<tr>
<td>5</td>
<td>Fire/grazing</td>
<td>Annual alternate</td>
<td>Small to medium grasses and forbs</td>
<td>Woody species</td>
</tr>
<tr>
<td>6</td>
<td>Fire/grazing</td>
<td>Bi-annual alternate</td>
<td>Medium to large grasses and forbs</td>
<td>Woody species, small forbs</td>
</tr>
</tbody>
</table>

5.1. Fire
The preferred season for burning is just after the first spring rains or as close as possible to this date. This is the most likely time when it would burn under natural conditions. Burning later when grasses have greened up and forbs are flowering should be avoided. Likewise, burning too early (early to mid winter), when re-growing plants would be exposed to winter climate and winds for too long, should preferably be avoided.

5.2. Grazing
The use of non-selective grazing is preferred for the grazing treatments. This grazing approach is recommended due to its similarity to the historic grazing patterns. Non-selective grazing is obtained by using high density stocking rates in a small camp for a short period before animals are moved to the next camp. Non-selective grazing is however management intensive due to the frequent handling of animals and expanded infrastructure needed.

If the management capabilities needed for non-selective grazing are not at hand, the controlled selective grazing system can be used. This grazing system uses 4 – 6 camps per groups of animals. Animals remain about 1 to 2 weeks in a camp before they are moved to the next camp. A stocking rate of 5 ha/animal unit (one cow) (governmental norm for area)
should be followed for controlled selective grazing. The following grazing and grazing combined with burning treatments are recommended;

Table 2: Annual schedule for the grazing and grazing and burning treatments for 5 consecutive years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Growing season 1</th>
<th>Growing season 2</th>
<th>Growing season 3</th>
<th>Growing season 4</th>
<th>Growing season 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dormant season</td>
<td>Rotational grazing</td>
<td>Full season rest</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
</tr>
<tr>
<td>1</td>
<td>Grazing</td>
<td>Grazing</td>
<td>Grazing</td>
<td>Grazing</td>
<td>Grazing</td>
</tr>
<tr>
<td>2</td>
<td>Grazing</td>
<td>Burning</td>
<td>Burning</td>
<td>Burning</td>
<td>no-burn</td>
</tr>
<tr>
<td>3</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
</tr>
<tr>
<td>4</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
</tr>
<tr>
<td>5</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
<td>Rotational grazing</td>
</tr>
</tbody>
</table>

5.3. Peninsula
For the Peninsula only burning treatments are recommended due to the unavailability of grazing animals. It is recommended that the Peninsula be divided into two blocks of equal size and that one portion be burned annually (Block A) and the other bi-annually (Block B) (see figure 13). A block which is burned tri-annually can also be considered. Ideally the division should be across the area so that both treatments include west and east aspects.
Figure 13: It is recommended that the peninsula be divided into two blocks, which are then burned annually (block A) and bi-annually (Block B) respectively. A third block which is burned tri-annually can also be considered.

References

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