BMM WHS NOMINATION DOSSIER
APPENDIX H:
BIODIVERSITY INVENTORY

BARBERTON – MAKHONJWA MOUNTAIN LANDS WORLD HERITAGE SITE PROJECT

Biodiversity Resource Inventory

by

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Version 1.1

Biodiversity Resource Inventory:

Executive Summary

The Biodiversity Resource Inventory forms one of the base documents for the development of the Barberton Makhonjwa Mountains (BMM) World Heritage Site (WHS) nomination dossier to UNESCO. The aim of the document is to summarise and assess the biodiversity found within the BMM WHS. To achieve this currently known biodiversity data has been collated, summarised and mapped, special emphasis has been placed on the features of the local Centre of Plant Endemism and the functioning of ecosystems. These biodiversity data have been assessed according to their conservation status and main ecological threats and trends. These resources will form the bases of providing the main biodiversity attraction for visitors.

The BMM WHS is located in the mountainous areas surrounding Barberton through to Badplaas. The Core Area of the BMM WHS is made up of four nature reserves located in an arc from Badplaas through the Nkomazi Wilderness, down the Komati River Valley and into the mountains of the Songimvelo Nature Reserve and the Mountainlands Nature Reserve. This area forms an important conservation corridor between the Kruger National Park and the Highveld and conservation areas within Swaziland. The importance of this area has been highlighted in numerous previous conservation and tourism development initiatives such as the Biodiversity Tourism Corridor and the Songimvelo-Malolotja Transfrontier Conservation Area. The area also links with larger development initiatives such as the Maputo Corridor and forms the northern-western boundary of the Lubombo Spatial Development Initiative, linking the South African provinces of Mpumalanga and KwaZulu-Natal to Swaziland and Mozambique.

Although the World Heritage Site is based on its geological importance, the area is also very important from a biodiversity perspective. The BMM WHS is situated within the Barberton Centre of floristic endemism, which is one of 18 centres of floristic endemism in southern Africa identified by Van Wyk and Smith (2001). The BMM WHS is highly heterogeneous in terms of its geology, topography, soils and climatic conditions. This translates in highly diverse vegetation which is illustrated by the fact that three biomes (out of nine found in South Africa) and eight vegetation types (out of 435) occur within this relatively small area. The three biomes and eight vegetation types were used to describe the floristic biodiversity of the World Heritage Site. The Forest Biome, Savanna Biome and the Grassland Biome are the three biomes found within the WHS. The Savanna Biome is generally restricted to areas below 1000m asl and covers an area 44 806ha (40.2.6% of the Property), whilst the Grassland Biome is generally found above the 1000m asl elevation and covers an area of 64 135ha (57.6%) of the Property. The Forest Biome is the smallest biome within the Property and covers an area of 2 431ha (2.2% of the Property). It is comprised of numerous small pockets of forest found in steep valleys or rocky areas that are protected from fires within the grassland biome.

The Savanna Biome is comprised of a mixture of trees, grasses and forbs. The management of fire and herbivory is important in the management of the savanna vegetation. The Savanna Biome is threatened by afforestation, agriculture, mining and urban expansion. Specific species are threatened by over utilisation and consumption for medical purposes, human consumption, building material and animal consumption and

treatment. Alien invasive vegetation poses a future threat to the savanna biome and requires constant monitoring and management.

Four vegetation types were identified within the Savanna Biome namely the Kaalrug Mountain Bushveld, Legogote Sour Bushveld, Swaziland Sour Bushveld, and the Barberton Serpentine Sourveld. The BMM WHS has significant areas of the Barberton Serpentine Sourveld, and Swaziland Sour Bushveld all classified as Vulnerable, and of the Kaalrug Mountain Bushveld classified as Least Threatened. The BMM WHS has a very small area (92ha) of the Endangered Legogote Sour Bushveld within its area.

The Grassland Biome consists predominately of grasslands with some fire adapted tree species. Fire is essential for the maintenance of both the structural and textural patterns within fire prone grasslands. Grazing is an important component within grasslands, but heavy grazing or overgrazing of grasslands can reduce overall species richness and change the composition of palatable species to unpalatable species within the grassland. The Grassland Biome is threatened by afforestation, agriculture cultivation, mining and urban expansion. Specific species are threatened by over utilisation and consumption for medical purposes, human consumption, building material and animal consumption and treatment. Some species such as the cycads (*Encephalartos spp.*) are specifically targeted by plant collectors and their collection may lead to their extinction in the wild.

Two grassland vegetation types were identified within the Grassland Biomes namely the Barberton Montane Grassland and the KaNgwane Montane Grassland. Both of these vegetation types are classified as Vulnerable by Mucina *et.al.*, 2006. The BMM WHS includes a large proportion (43.6%) of the Barberton Montane Grasslands total extent, but only 0.6% of the KaNgwane Montane Grassland's full extent. The Barberton Montane Grassland is also the dominate vegetation type within the Barberton Centre of floristic endemism.

The Forest Biome comprises two vegetation types namely the Northern Mistbelt Forests consisting of tall evergreen afrotemperate mistbelt forests and the Scarp Forests which are multilayered and species-rich.

The Northern Mistbelt Forest is classified as Least Threatened. Within the Property it has been transformed primarily by timber plantations. It is also threatened by firewood collection, subsistence agriculture and selective bark collection.

The Scarp Forest is classified as Least Threatened. It is well conserved within the Property and is relatively untransformed.

The BMM WHS has a high species biodiversity with more than 1500 plant species, over 30 of which are endemic making it a centre of floristic endemism. The area is also rich in fauna species with 27 amphibian, 415 bird, 134 mammal, 23 fish and 106 reptile species.

The high levels of both faunal and floral biodiversity, the scenic beauty of the rugged mountains and the relatively untransformed vegetation, and the wide range of tourism opportunities provide both a magnificent setting and greatly enhance the overall experience of the WHS.

Abbreviations:

BMM	Barberton Makhonjwa Mountains
WHS	World Heritage Site
UNESCO	United Nations Educational, Scientific and Cultural Organisation

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1. Background

The Biodiversity Resource Inventory forms part of the supplementary documentation in support of the BMM WHS nomination dossier to UNESCO. The purpose of the report is to provide a summary and an assessment of the biodiversity within the BMM WHS in terms of an initial inventory and an assessment of its conservation status. To achieve this, currently known biodiversity data have been collated, summarised and mapped. Special emphasis has been placed on the features of the local Centre of Plant Endemism and the functioning of ecosystems. These biodiversity data have been assessed according to their conservation status and main ecological threats. These resources will form the bases of providing the main biodiversity attraction for visitors.

2. Introduction

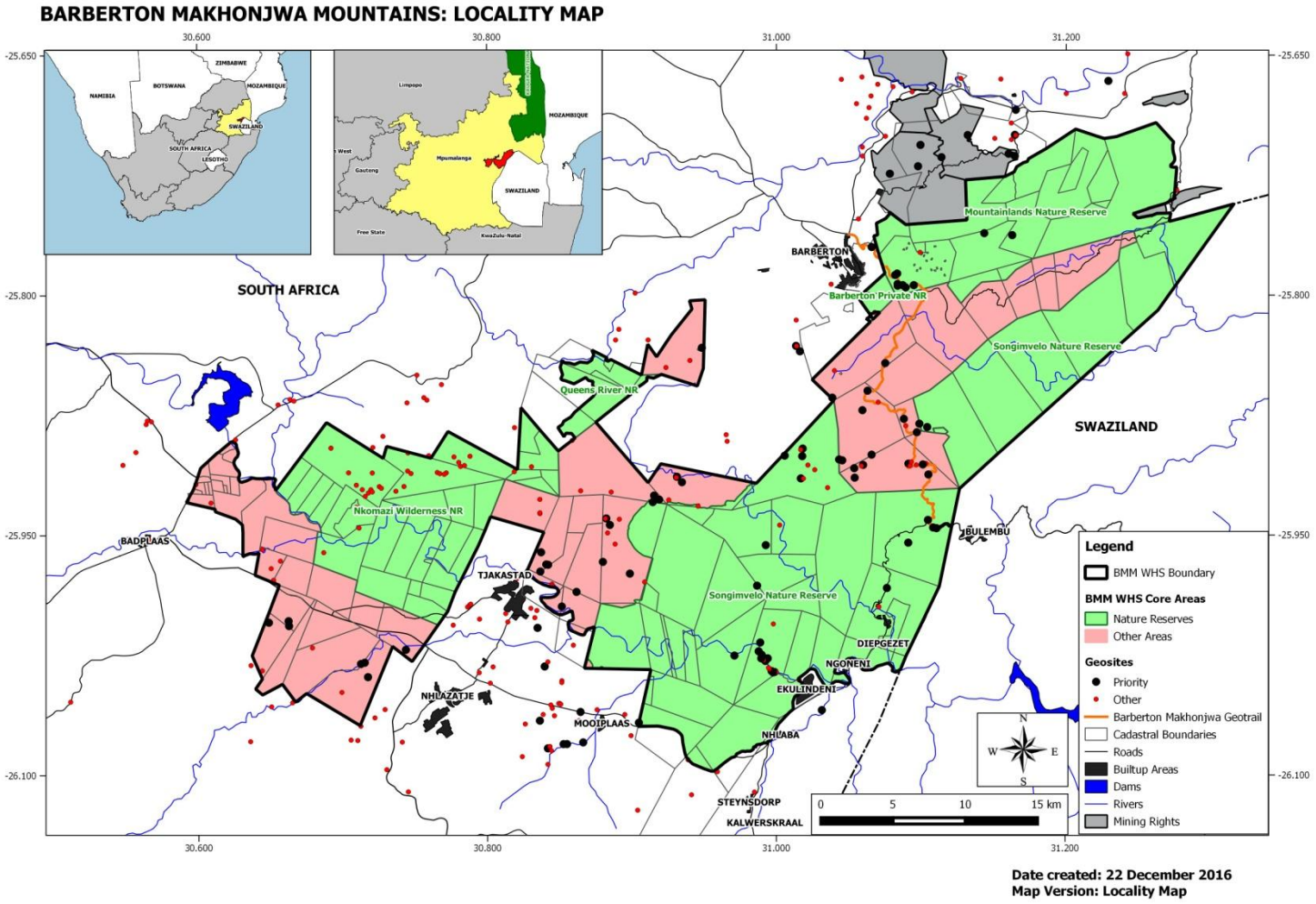
The Barberton Makhonjwa Mountains (BMM) World Heritage Site (WHS) is situated in the mountainous area surrounding the town of Barberton, stretching from the Barberton Nature Reserve, through the Mountainlands Nature Reserve into the Songimvelo Nature Reserve and through to the Nkomazi Wilderness near Badplaas (Map 1: Locality Map). The Barberton Makhonjwa Mountains World Heritage Site is not only situated in an area of geological interest, with some of the oldest rocks on earth aged at almost 3 500 million years (SACS 1980; Hurley *et al.* 1972), but is also situated in an area of biodiversity importance as it has been identified as a centre of plant endemism within southern Africa (Van Wyk and Smith, 2001), an important Bird Area (Barnes K., 1998) and has some areas identified as "Irreplaceable" according to the Mpumalanga Biodiversity Conservation Plan (Ferrar and Lötter, 2007).

Southern Africa (the area south of the Cunene, Okavango and Zambezi Rivers) has a rich floristic biodiversity with more than 30 000 plant species (Van Wyk and Smith, 2001). The area holds more than 10% of the world's vascular plant flora on less than 2.5% of the earth's land-surface area. Its species richness is only beaten by 4 of the 12 'megadiversity countries' identified by McNeely *et al.* (1990) namely Brazil, China, Colombia and Mexico. It is estimated that more than 60% of southern Africa's species are endemic to the region (Van Wyk and Smith, 2001). What is more important is the fact that this floristic diversity and endemism is concentrated in a few restricted areas within southern Africa. Van Wyk and Smith (2001), identified 18 Centres of floristic endemism in southern Africa including the Barberton Centre, within which the BMM WHS is situated.

The BMM WHS is highly heterogeneous in terms of its geology, topography, soils and climatic conditions. This translates in highly diverse vegetation which is illustrated by the fact that three biomes (out of 9 found in South Africa) and eight vegetation types (out of 435) occur within this relatively small area. The high biodiversity of the area is however not only associated with the heterogeneity of the area but, as in the rest of southern Africa, it is likely that unique historical processes have also contributed to its phenomenal biodiversity (Cowling *et al.* 1989, 1992).

The BMM WHS has a very mountainous and rugged topography rising sharply from an elevation of 580m in the foothills of the Mountainlands Nature Reserve to some of the

peaks on the Makhonjwa Mountains reaching heights of 1900m. The area is also interspersed with deep valleys such as the Lomati River Valley. Gradients are steep. A difference of a 1000m in elevation is experienced across only 12km from Barberton town to the highlands of Songimvelo Nature Reserve. The BMM WHS falls within a summer rainfall region with dry winters, the annual rainfall ranging from 600mm in the low lying savanna and reaching 1470mm in the high-elevation grasslands. Fog frequently occurs at high elevations. It has a temperate climate with hot summers and mild to cool winters. Frost is infrequent in the savanna biomes and variable in the grassland biomes with a maximum of 3-20 days per year in the KaNgwane Montane Grassland. Light snowfalls occur only sporadically. The area is characterised by many and frequent fires that occur throughout the year with a peak in size and intensity towards August and September. Fire is a natural ecological process in both the savanna and grassland biomes and is responsible for maintaining the vegetation structure and its species diversity.

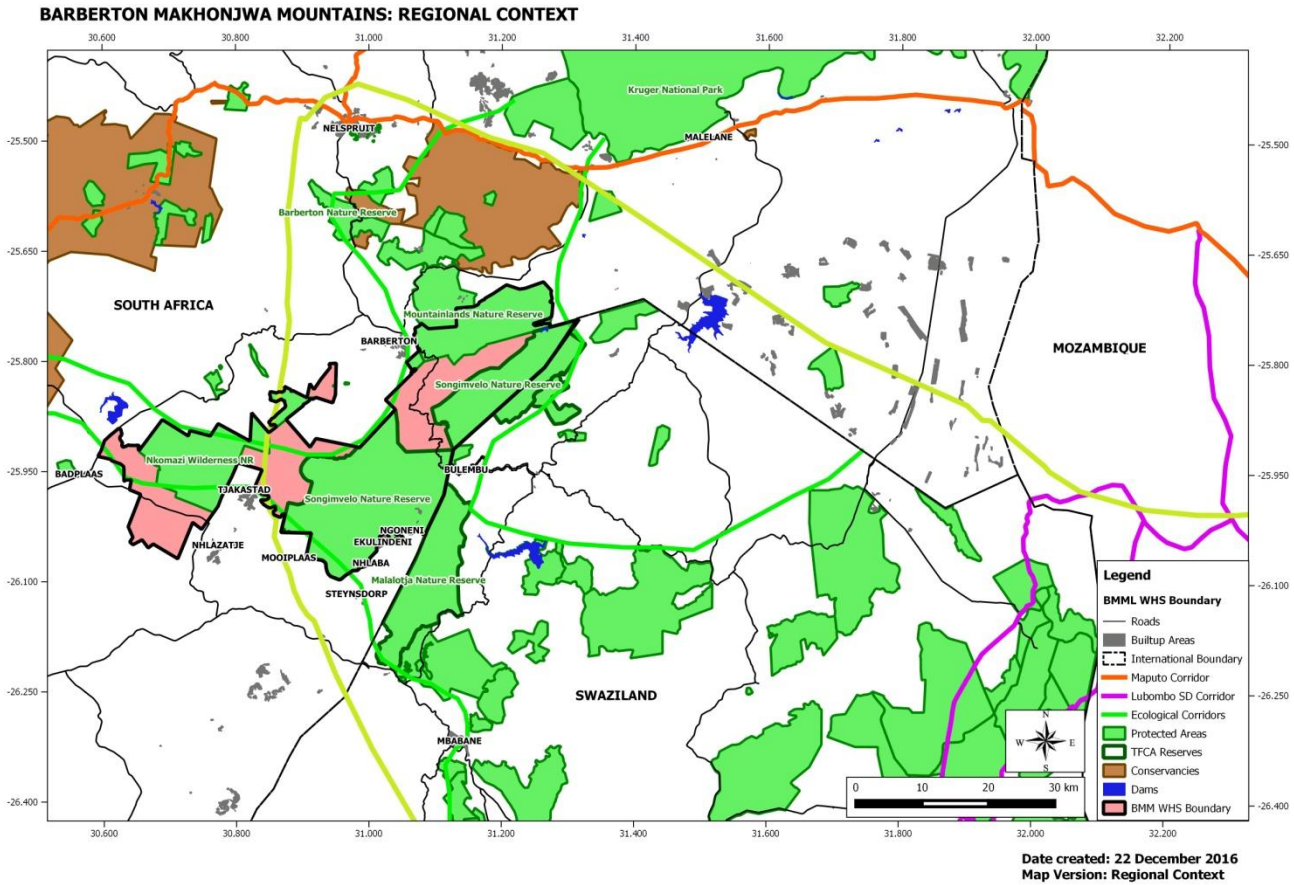


Map 1: Locality Map

3. Regional Context

The BMM WHS is strategically well positioned from both conservation and a tourism perspective as it forms an important ecological and conservation corridor linking the Kruger National Park, in the Lowveld, to Conservancies in the Highveld and Nature Reserves in Swaziland (Map 2: Regional Context). These ecological corridors are important for migratory species, altitudinal migrants and for species requiring large home ranges of areas of untransformed land.

From a tourism and development perspective the BMM WHS is situated on a development node of the Maputo Corridor, a development initiative linking Gauteng to Maputo and encouraging associated business and tourism development along the corridor (Map 2: Regional Context). It also forms part of the Biodiversity and Tourism Corridor which is a private and public tourism initiative linking the Barberton Makhonjwa Mountains to conservation areas within Swaziland through to Mozambique and northern KwaZulu-Natal. The recent upgrading of the R40 from Nelspruit to Barberton and the surfacing of the Bulembu Road from Barberton to Swaziland have removed critical constraints to the development of these areas. These roads and the Biodiversity and Tourism Corridor also link the BMM WHS to the Lubombo Spatial Development Initiative, which includes the iSimangaliso World Heritage Site (Map 2: Regional Context). The Songimvelo Nature Reserve (in South Africa) and the Malolotja Nature Reserves (in Swaziland) have been identified by the Peace Parks Foundation as a Transfrontier Conservation Area, which also includes the Ebhutsini Community in South Africa and the Maguga Dam, Phophonyane Nature Reserve and Makhonjwa in Swaziland (Map 2: Regional Context).



Map 2: Regional Context

4. Floristic Biodiversity

The floristic biodiversity of the BMM WHS is described on the basis of its constituent biomes and vegetation types. Biomes provide a high-level concept that has broad-scale applicability for the development of conservation and management strategies over large areas (Rutherford *et al.* 2006). Within each of the three biomes found in the BMM WHS, a number of vegetation types have been recognised and mapped. These vegetation types represent the most recent as well as the finest and most accurate classification available to date of the vegetation of all of South Africa (Mucina and Rutherford 2006).

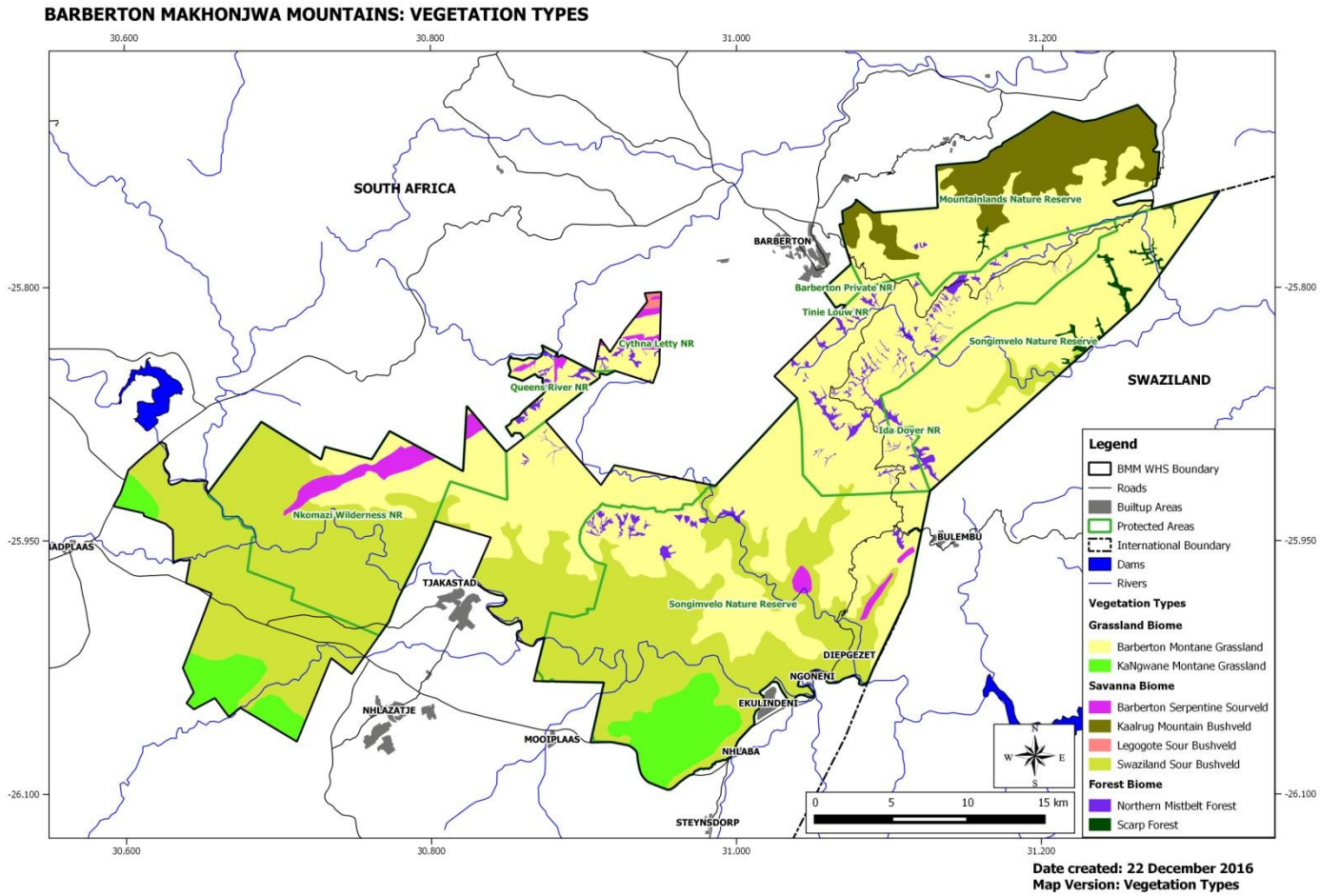
A finer-scale vegetation map that identifies individual plant communities would obviously further enhance the state of knowledge of the BMM WHS and would assist in fine-scale conservation planning. A number of such plant communities were identified following a long and detailed study of a portion only of the BMM WHS (Stalmans *et al.* 1999). However, these communities could not be explicitly mapped due to the complexity of their pattern of occurrence in the Songimvelo Nature Reserve and because of the size of the reserve. Therefore, an explicit mapping of vegetation communities across the much larger area of the BMM WHS would require a very substantial effort that is not proportional to the relative importance of biodiversity in the Nomination Dossier as compared to the importance of the underlying geology.

The plant communities are thus 'implicit' or 'embedded' in the vegetation units that are 'explicitly' mapped by Mucina and Rutherford (2006). This vegetation map was tested in the field during September 2009. It was found to represent a most useful and applicable representation that adequately captures the landscape and vegetation pattern of the BMM WHS at a scale that is commensurate with the planning and management needs of the proposed World Heritage Site.

The Barberton Makhonjwa Mountains World Heritage Site has three distinct biomes, the Forest Biome, Savanna Biome and the Grassland Biome (Map 3. Biomes and Vegetation Types). The Savanna Biome is generally restricted to below the 1000m asl and covers an area of 47 502 ha (42.0%) of the Property, whilst the Grassland Biome is generally found above the 1000m asl elevation and covers an area of 63 205 ha (55.9%) of the Property (Table 4.1). The Forest Biome covers an area of only 2 431 ha (2.1%) of the Property and is comprised of numerous small pockets of forest found in steep valleys or rocky areas that are protected from fires within the grassland biome (Table 4.1).

Table 4.1 Biomes within the Property

BIOME	Total Area within Project (ha)	Percentage (%)
Forest	2 431	2.1
Grassland Biome	63 205	55.9
Savanna Biome	47 502	42.0
Total Area	113 138	100.0



Map 3: Vegetation Types

4.1 Savanna Biome

The origins, diversity patterns, classification, climate, soils, geology and vegetation structure and dynamics are well documented and discussed within the Savanna Biome, Chapter 9 by Rutherford *et al.*, 2006. Points of interest and relevance have been highlighted below.

Savanna Geology
The geology of the savanna biome within the BMM WHS is dominated by the Kaapvaal Craton, a very stable and ancient block of continental crust that began to form through a process of accretion over 3.5 billion years ago. The ancient geology of the Barberton mountain lands preserves the first evidence of the assembly of the Kaapvaal Craton (Poujol *et al.* 2003). The geology of this area includes the Barberton Greenstone Belt, a volcano-sedimentary sequence, as well as granitoid and gneissose rocks.

Plant Interaction
The savanna biome is comprised of a mixture of trees and grasses or forbs. Within the savanna's found in BMM WHS with a mean annual precipitation above 650mm, there is sufficient rainfall for the woody component to dominate and for the canopy to close. Disturbance in the form of fire and herbivory are required to maintain the mixture of trees and grasses. An increase in grazing will reduce the grass fuel load, reducing the intensity of the fire, and the resultant damage to the trees and consequently leads to a build up of woody vegetation. The system changes from a tree grass mixture to a tree dominated system. Browsers however decrease the woody biomass, indirectly stimulating grass growth and thus grass fuel load. This leads to more intense fires and further decrease in woody cover. The system then changes from a tree dominated system to a grass dominated system (Rutherford *et al.*, 2006).

Other factors which may influence bush encroachment include increasing CO_2 Concentrations, soil substrates, soil nutrient richness, and the above and below-ground herbaceous layer (Rutherford *et al.*, 2006). However, the exact understanding of the factors governing grass-tree coexistence in savannas and the exclusion of trees and grasslands remains elusive (Mills *et al.* 2006).

Fire Management
The strong seasonality in rainfall allows plant growth to accumulate during the wet season and to dry and be burned during the dry season. Fire management can be used to manage the woody component of the moist savanna (Trollope, 1980).

Within the Kruger National Park three fire management options have been proposed, namely: letting lightning strikes or natural fires take their course; creating a patch mosaic of burning creating a mosaic of vegetation structure and age; and an approach based on assessing grass fuel loads and species composition. The patch mosaic approach of burning is based on the premise that the mosaic pattern is a surrogate for diversity, producing a range of different patches with varying vegetation structure and fire histories (Parr and Brockett, 1999).

4.1.1 Savanna Vegetation Types

The following vegetation types are found within the Savanna biome: Kaalrug Mountain Bushveld, Legogote Sour Bushveld, Swaziland Sour Bushveld and the Barberton Serpentine Sourveld (Map 3. Biomes and Vegetation Types).

4.1.1.1 Kaalrug Mountain Bushveld:

It is distributed within an altitudinal range of 440m – 950m on steep or very broken mountain slopes, from Barberton in the west along the lower slopes of the Mountainlands Nature Reserve and south of the Kaaps River to the eastern boundary of the Property. This vegetation type covers an area of 6 054 ha (5.4%) of the BMM WHS planning area (Table 4.1.1).

It forms open to dense, short mountain savanna or thickets. The grassy layer becomes denser at higher elevations. Mean annual precipitation ranges from 650mm on footslopes of the mountains to 1200mm at higher elevations bordering onto grasslands.

Table 4.1.1: Vegetation types extent (ha) and percentage coverage within the BMM WHS.

NAME	Total Area within Project (ha)	Percentage of Property (%)
Savanna Biome		
Barberton Serpentine Sourveld	1 867	1.7
Kaalrug Mountain Bushveld	6 054	5.4
Legogote Sour Bushveld	92	0.1
Swaziland Sour Bushveld	39 489	34.9
Grassland Biome		
Barberton Montane Grassland	57 355	50.7
KaNgwane Montane Grassland	5 850	5.2
Forest Biome		
Northern Mistbelt Forest	1 959	1.7
Scarp Forest	472	0.4
Totals	**113 138**	**100.0**

Conservation Status

The Kaalrug Mountain Bushveld is listed as Least Threatened by Rutherford *et al.*, 2006, as it has 12% transformed and is well conserved with 16% of its total area conserved within proclaimed nature reserves and an additional 9% conserved in private nature reserves (Rutherford *et al.*, 2006). The BMM WHS Property incorporates 12.7% (6,054 ha) of the vegetation types full extent of 47,845 ha (Table 4.1.3). Within the planning area 6,053 ha (100%) is conserved within proclaimed nature reserves. Transformation by cultivation and plantations is limited (39.4 ha, 1%, Table 4.1.2) within the Property (Map 4. Transformation).

Table 4.1.2: Transformed areas per Vegetation types within the BMM WHS

NAME	Transformed Area (ha)	Percentage Transformed (%)
Savanna Biome		
Barberton Serpentine Sourveld	125	7
Kaalrug Mountain Bushveld	39	1
Legogote Sour Bushveld	1.6	2
Swaziland Sour Bushveld	3762	10
Grassland Biome		
Barberton Montane Grassland	11917	21
KaNgwane Montane Grassland	260	5
Forest Biome		
Northern Mistbelt Forest	673	34
Scarp Forest	1	0
Totals	**16779**	**15**

Table 4.1.3: Conservation Status per vegetation type within the BMM WHS.

NAME	Total Vegetation Type Area with WHS (ha)	Percentage of Vegetation Type Total Area within BMM WHS	Area within Protected Areas	Percentage Conserved
Savanna Biome				
Barberton Serpentine Sourveld	1,867	17.0	1,597	85.5
Kaalrug Mountain Bushveld	6,054	12.7	6,054	100.0
Legogote Sour Bushveld	92	0.0	0	0.0
Swaziland Sour Bushveld	39,489	9.2	26,431	67.0
Grassland Biome				
Barberton Montane Grassland	57,355	43.6	37,256	65.0
KaNgwane Montane Grassland	5,850	0.6	3,334	57.0
Forest Biome				
Northern Mistbelt Forest	1,959	3.2	827	42.2
Scarp Forest	472	0.5	471	100.0
Totals	**113,138**		75,970	67.2

4.1.1.2 Barberton Serpentine Sourveld

Barberton Serpentine Sourveld is distributed in fragmented patches on exposed ultramafic substrates from the privately-owned Nkomazi Wilderness to Barberton and within the Songimvelo Nature Reserve and along the Noodkaap River into the Barberton Nature Reserve. This vegetation type covers an area of 1,867ha (1.6%) of the total BMM WHS planning area (Table 4.1.1).

The Barberton Serpentine Sourveld occurs in various landscapes from hilly to low lying terrain. The serpentine outcrops on the higher lying areas of the Nkomazi Wilderness and the Barberton Makonjwa Mountains support predominately herbaceous grasslands

with stunted woody vegetation, whilst the low-lying areas support more woody vegetation.

This vegetation type is restricted to soils derived from ultramafic larvas (komatiites and serpentinites) manly from the Onverwacht Group of the Barberton Supergroup (Barberton Greenstone Belt) (Mucina and Rutherford, 2006). The soils have unusually high magnesium: calcium ratios and high concentrations of heavy metals such as Nickel and Chromium. These heavy metals are usually toxic to plants.

This vegetation unit has a high number of endemic species as a result of the heterogeneous nature of location of the serpentine outcrops in terms of elevation, slope and aspect and due to the specialised soil conditions resulting in numerous edaphic specialists.

The linkages between individual plant species occurrence and their life strategy on the one hand and the underlying geology on the other hand are fascinating within the context of the BMM WHS. It exemplifies the overriding importance of the unique geology in shaping the landscape and the life forms it supports. The best example is probably the occurrence of the forb *Berkheya coddii* that is endemic to serpentinite patches. This species hyperaccumulates the heavy metal element nickel into its tissues at levels 10 to 50 times higher than the levels originally found in the soil (Mesjasz-Prybylowicz *et al.* 2004). This has led to this species being used for phytoremediation of lightly polluted soils and tailings in several areas around the world, including New Caledonia and California. Phytomining of tailings, in which the nickel is commercially harvested, is potentially economically viable (Brooks *et al.* 2001).

Conservation Status
The Barberton Serpentine Sourveld is classified as Vulnerable by Rutherford *et al.*, 2006, as more than 25% has been transformed and it is poorly protected with 6% conserved in proclaimed reserves and less than 2% conserved in private reserves (Rutherford *et al.*, 2006). Less than 20% (17%, 1,867 ha) of this vegetation type's full extent (10,962 ha) occurs within the BMM WHS Property (Table 4.1.3). Within the Property 7 % (125 ha) is transformed mainly by plantations and cultivation. This vegetation type is well conserved within the Property with 85.5 % (1,597 ha) (Table 4.1.3) conserved mainly within the Nkomazi Wilderness, Songimvelo Nature Reserve and the Queens River, Cythna Letty and Tinie Louw Reserves.

4.1.1.3 Swaziland Sour Bushveld

The Swaziland Sour Bushveld is distributed along the Komati River Valley and its tributaries from the Swaziland Border in the east to Badplaas in the west at an elevation of 400 – 1100m. It has an open to closed medium to tall tree layer with a closed well-developed grass layer (Rutherford *et al.*, 2006). This vegetation type is the second most dominant vegetation type covering an area of 39,489 ha or 34.9 % of the Property (Table 4.1.1).

Conservation Status
The Swaziland Sour Bushveld is classified as Vulnerable by Rutherford *et al.*, 2006, as it has had 21% transformed and has 6% of its area conserved within proclaimed reserves (Rutherford *et al.*, 2006). The BMM WHS incorporates 9.2% (39,489ha) of the vegetation type's full extent within the Property. (Table 4.1.3). Within the Property 11%

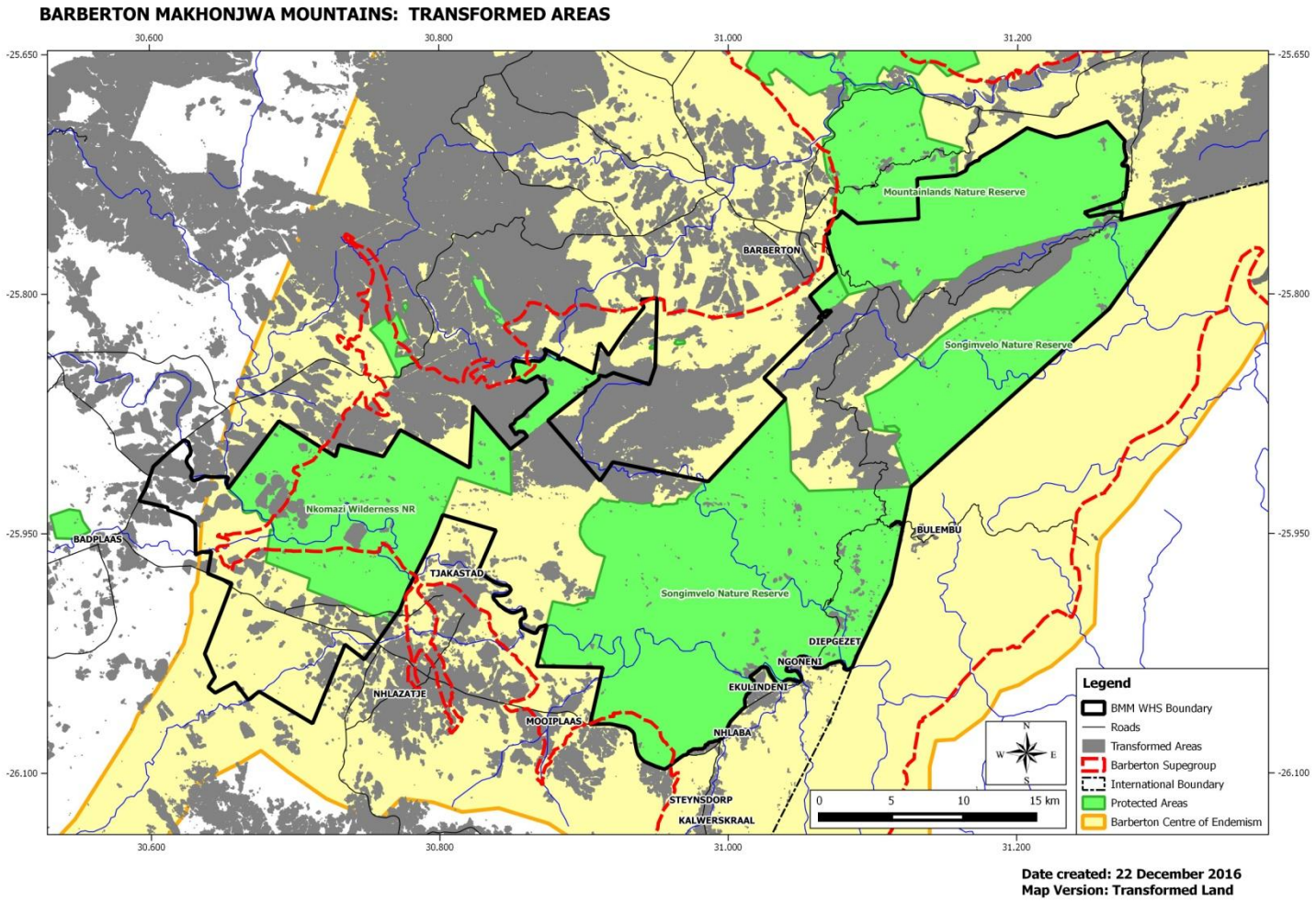
(3,762ha) (Table 4.1.2) of this vegetation type has been transformed by cultivation, plantations and urban development (Map 4. Transformation). Approximately 67% (Table 4.1.3) of this vegetation type is protected within the Property, mainly within the Songimvelo Nature Reserve and the Nkomazi Wilderness.

4.1.1.4 Legogote Sour Bushveld

The Legogote Sour Bushveld is distributed along the Queens River valley. It is generally found on the lower eastern slopes and hills of the northeastern escarpment at an elevation of 600 – over 1000m. It forms dense woodland with many medium to large shrubs predominately *Parinari curatellifolia* and *Bauhinia galpinii*, with a grass under story dominated by *Hyperthelia dissoluta* and *Panicum maximum* (Rutherford *et al.*, 2006). This vegetation type is the smallest within the Property covering an area of 92 ha or 0.1% of the Property (Table 4.1.1).

Conservation Status

The Legogote Sour Bushveld is classified as Endangered by Rutherford *et al.*, 2006, as its full extent is poorly protected, only about 2% is statutorily conserved and has been heavily transformed (50%) predominately by plantations (Rutherford *et al.*, 2006). The BMM WHS incorporates less than 1% of the vegetation type's full extent of 353,814 ha within the Property. Within the Property, only 2% (Table 4.1.2) has been transformed (Map 4. Transformation).



Map 4: Transformed Areas

4.2 Grassland Biome

The origins, diversity patterns, classification, climate, soils, geology and vegetation structure and dynamics are well documents and discussed within the Grassland Biome, Chapter 8, in Mucina and Rutherford eds., 2006. Points of interest and relevance have been highlighted below.

Mucina *et al.*, 2006 define the grassland biome as "the warm-temperate and cool-temperate grasslands (and shrublands embedded within these) of the Highveld, Drakensberg and its northern continuation in the form of the Northern Escarpment, a whole suite of sub-escarpment grasslands, and small pockets of (most) summit sourveld composed of grassland and savannoid bushveld make up the Grassland Biome"

An important distinction can be made between the highveld grasslands and those of the high-elevation, cool-temperate grasslands. The highveld grasslands are dominated by grasses with a C_4 photosynthetic strategy. This strategy assists plants to bind CO_2 more effectively in dry tropical and subtropical conditions without excessive water loss and in low CO_2 atmospheric conditions. These grasses expanded their range rapidly during the Late Miocene (8-4 mya). The extent of these grasses was limited at higher latitudes and elevations, except in the dry southern Kalahari region. Endemics within the highveld grasslands are quite rare and generally show links to the flora of the Escarpment. The high-elevation, cool-temperate grasslands are dominated by C_3 grasses and are rich in endemics. The endemics either have links to the post-Gondwonan flora of the Cape or northern links to the East African mountains.

Fire is essential for the maintenance of both the structural and textural patterns within the fire prone grasslands. Without fire most of the grasslands with a rainfall of more than 650mm would follow a successional pattern towards savannas and forests. Tree species found within grasslands are fire adapted by either having thick, fire-resistant bark, which allows them to withstand low-intensity fires and a high frequency of fires. The members of the Protea family resprout after fires and their seeds are serotinous, only germinating after fires. Geophytes are stimulated by fires to flower after a fire.

Grazing Pressure
Grassland plants are adapted to grazing in various ways. Grazing does however influence the species composition and the canopy structure of grasslands. Heavy grazing or overgrazing of grasslands can reduce overall species richness and change the composition of palatable species to unpalatable species within the grassland.

4.2.1 Grassland Vegetation Types

The Grassland Biome comprises of the following vegetation types: Barberton Montane Grassland and the KaNgwane Montane Grassland. Each of these vegetation types will be discussed in more detail in the following section (Map 3. Biomes and Vegetation Types).

4.2.1.1 Barberton Montane Grassland

The Barberton Montane Grasslands is the dominant vegetation type covering 49.1% (57,355 ha) of the Property (Table 4.1.1). It is distributed in the high elevation (760 – 1640m) mountainous areas surrounding Barberton into the Mountainlands Nature

Reserve, Songimvelo Nature Reserve and the Nkomazi Wilderness. The vegetation is characterised by short rocky grassland which gradually becomes woodland along the lower slopes.

Conservation Status
The Barberton Montane Grasslands is classified as Vulnerable by Mucina *et al.*, 2006, as although it is relatively well conserved (26%) it has been heavily transformed by timber plantations (40%) (Mucina, *et al.*, 2006). The Property incorporates a large proportion (43.6%) of this vegetation type's full extent of 131,700 ha (Table 4.1.3). Within the Property approximately 21% of this vegetation type been transformed through the development of timber plantations (Table 4.1.2) (Map 4. Transformation). It is however well conserved (65%) in the Property within the Mountainlands Nature Reserve, Songimvelo Nature Reserve and the Nkomazi Wilderness (Table 4.1.3).

4.2.1.2 KaNgwane Montane Grassland

It is distributed along the southern boundary of the Property along the gentle slopes of the escarpment. It occurs at an elevation of 880m to 1740m. It is characterised by short closed grassland layer with many forbs and a few scattered shrubs on the rocky outcrops. This vegetation type is the third most dominant vegetation type in the Property covering 5,850 ha or 5.2% of the Property (Table 4.1.1).

Conservation Status
KaNgwane Montane Grassland is classified as Vulnerable by Mucina *et al.*, 2006, as it is very poorly conserved (0.4%) and has 36% of its total area transformed mainly by timber plantations (30%) and cultivation (6%) (Mucina *et al.*, 2006). A relatively small percentage (0.6%) of the vegetation type's full extent (965,488 ha) occurs within the Property (Table 4.1.3). Within the Property approximately 5% (Table 4.1.2) of this vegetation has been transformed through the development of timber plantations (Map 4. Transformation). Within the Property 57% is conserved within the Songimvelo Nature Reserve and the Nkomazi Wilderness (Table 4.1.2).

4.3 Forest Biome

"Indigenous forest within South Africa is defined as 'a generally multilayered vegetation unit dominated by trees (largely evergreen or semi-deciduous), whose combined strata have overlapping crowns (i.e. the crown cover is 75% or more), and where graminoids in the herbaceous stratum (if present) are generally rare (Bailey *et al.* 1999, Shackleton *et al.* 1999)" (Mucina and Geldenhuys, 2006)

The forests in South Africa are dominated by fire sensitive species occurring in patches within fire prone ecosystems. The forest patches are confined to fire refugia namely areas sheltered by topographic or wind shadows from berg wind driven fires. Other factors that may influence the occurrence of forest patches are sharp contrasts in substrate properties such as boulder screes on steep slopes in deep kloofs.

The forests within the BMM WHS occur in areas with rainfall greater than 725mm and have orographic precipitation. Mist precipitation supplements the rainfall considerably.

4.3.1 Forest Vegetation Types

The Forest Biome comprises two vegetation types namely the Northern Mistbelt Forests and the Scarp Forests (Map 3. Biomes and Vegetation Types).

4.3.1.1 Northern Mistbelt Forest

It is distributed in small fragmented patches in fire refugia and cooler sheltered areas in high elevation (1050 -1650m) areas, primarily in the Barberton Montane Grassland. It is characterised by tall evergreen afrotemperate mistbelt forests. This vegetation type is the third smallest in its extent within the Property, covering an area of 1,959 ha or 1.7 % of the Property (Table 4.1.1).

Conservation Status

This vegetation type is classified as Least Threatened by Mucina and Geldenhuys, 2006, as it is well protected within proclaimed nature reserves (10%) and privately owned nature reserves (25%). It is also expanding into former grassland areas due to the protection of fire from timber plantations fire management. The Property incorporates a relatively small percentage (3.2%) of this vegetation type's full extent of 61.338ha (Table 4.1.3). Within the Property it has been 34% transformed primarily by timber plantations (Table 4.1.2) (Map 4. Transformation). It is also threatened by firewood collection, subsistence agriculture and selective bark collection. In the Property it is well conserved with 42.2 % (827ha) conserved within the Songimvelo Game Reserve and Mountainlands Nature Reserve.

4.3.1.2 Scarp Forest

A few isolated patches of scarp forest occur within the deep gorges in the Mountainlands Nature Reserve and the Songimvelo Game Reserve. These are "tall (15-20m) species-rich and structurally diverse, multilayered forests with a well developed canopy and understorey tree layers, but a poorly developed herb layer vegetation type" (Mucina and Geldenhuys, 2006). This vegetation type is the second smallest in its extent within the Property, covering an area of 472 ha or 0.4 % of the Property (Table 4.1.1).

Conservation Status

This vegetation type is classified as Least Threatened by Mucina and Geldenhuys, 2006, as it is well conserved (20%) in proclaimed nature reserves and is relatively untransformed with less than 5% transformation (Mucina and Geldenhuys, 2006). The Property incorporates a very small percentage (0.5%) of the vegetation type's full extent of 86,718ha (Table 4.1.3). Within the Property less than 1% is transformed (Table 4.1.2) (Map 4. Transformation), whilst 100% is conserved within the Songimvelo Nature Reserve and the Mountainlands Nature Reserve (Table 4.1.3).

5 Tourism Attractions

The scenic beauty of the seemingly inaccessible rugged mountains covered in grasslands and its patches of forests and deep kloofs is the most dramatic tourist attraction of the BMM WHS. The sense of wilderness and isolation are important characteristics of this

area that will attract both local and foreign tourists wishing to seek peace, solitude and explore the origins of life.

Other key tourism areas are the four main protected areas forming the core area, providing wilderness and nature experiences. The important peripheral areas provide more specialised experiences, such as botanising in the special plant reserves and within the Barberton Serpentine Sourveld patches and indigenous forests, and birding in the indigenous forests and grasslands.

These tourist attractions can currently be experienced through packaged tourism experiences, game drives, day drives, day walks, overnight hikes and mountain biking.

The large game component which underpins much of the tourism attraction has mostly been re-introduced over the last 15 to 20 years. Prior to these re-introductions the remaining game in the Property consisted mostly of kudu, bushbuck, mountain reedbuck and red and grey duiker. These species play an important role in creating heterogeneity that is important to the overall biodiversity of the area. In this regard, the appropriate management of the wildlife populations become important, as excessive numbers could have a similar detrimental effect on biodiversity as that experienced from overgrazing by domestic livestock.

6 Species Diversity

The highly heterogeneous topography, geology, climate and vegetation provide a wide range of different habitats for both fauna and flora species to occur in. Popular field guides, red data species books and unpublished articles were consulted to estimate the number of potential species occurring within the BMM WHS within each of the major taxa groups, and to determine which species are listed as Red Data species. It is estimated that the BMM WHS holds more than 1500 plant species, 27 amphibian species, 415 bird species, 134 mammal species, 23 fish species and 106 reptile species. This does not include the invertebrate and fungal species which occur within the BMM WHS. The following sections provide a list of the Red Data species found within each of the major taxonomic groups within the BMM WHS.

Amphibians
From the species distribution maps published in the "Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland" it is estimated that the BMM WHS contains approximately 27 amphibian species (Minter *et al.*, 2004). Of these two, namely the Natal Ghost Frog (*Heleophryne natalensis*) and the Yellow-striped Reed Frog (*Hyperolius semidiscus*) have been listed as Vulnerable (VU A2c D2) by the MTPA (Emery *et al.*, 2002). They are not however listed as a conservation priority by Minter et.al. (2004).

Birds
It is estimated from the species distribution maps found in the "The Atlas of Southern African Birds" Vol 1 and 2 (Harrison *et al.*, 1997) that more than 415 bird species can be found within the BMM WHS. Of these 34 are Red Data species, one is listed as Critically Endangered, two as Endangered, 18 as Vulnerable and 13 as Near Threatened (Barnes, 2000) (Table 7.1).

Table 6.1: Red Data Bird Species found within the BMM WHS

Common Name	Scientific Name	Conservation Status
Blue Swallow	*Hirundo atrocaerulea*	Critically Endangered
Saddle-billed Stork	Ephippiorhynchus senegalensis	Endangered
Black-rumped Buttonquail	*Turnix nanus*	Endangered
White-backed Night-Heron	*Gorsachius leuconotus*	Vulnerable
Southern Bald Ibis	Geronticus calvus	Vulnerable
Cape Vulture	*Gyps coprotheres*	Vulnerable
White-backed Vulture	*Gyps africanus*	Vulnerable
Lappet-faced Vulture	*Aegypius tracheliotos*	Vulnerable
White-headed Vulture	*Aegypius* occipitalis	Vulnerable
Tawny Eagle	*Aquila rapax*	Vulnerable
Martial Eagle	*Polemaetus bellicosus*	Vulnerable
Bateleur	*Terathopius ecaudatus*	Vulnerable
African Marsh-Harrier	*Circus ranivorus*	Vulnerable
Lesser Kestrel	*Falco naumanni*	Vulnerable
Blue Crane	*Anthropoides paradiseus*	Vulnerable
African Finfoot	*Podica senegalensis*	Vulnerable
Denham's Bustard	*Neotis denhami*	Vulnerable
White-bellied Korhaan	*Eupodotis senegalensis*	Vulnerable
African Grass-Owl	*Tyto capensis*	Vulnerable
Southern Ground-Hornbill	*Bucorvus leadbeateri*	Vulnerable
Yellow-breasted Pipit	*Anthus chloris*	Vulnerable
Black Stork	*Ciconia nigra*	Near Threatened
Yellowbilled Stork	*Mycteria ibis*	Near Threatened
Secretarybird	*Sagittarius serpentarius*	Near Threatened
Ayres's Hawk-Eagle	*Aquila ayresii*	Near Threatened
Half-collared Kingfisher	*Alcedo semitorquata*	Near Threatened
Bat Hawk	Macheiramphus alcinus	Near Threatened
Peregrine Falcon	*Falco peregrinus minor*	Near Threatened
Lanner Falcon	*Falco biarmicus*	Near Threatened
Black-bellied Bustard	*Lissotis melanogaster*	Near Threatened
Bush Blackcap	*Lioptilus nigricapillus*	Near Threatened
Orange Ground-Thrush	*Zoothera gurneyi*	Near Threatened
Broadtailed Warbler	*Schoenicola brevirostris*	Near Threatened
Red-billed Oxpecker	*Buphagus erythrorhynchus*	Near Threatened

Mammals

From the distribution maps published in the "Red Data book of the Mammals of South Africa: Conservation Assessment" (Friedmann and Daly, 2004) it was estimated that there are approximately 134 mammal species that may occur within the BMM WHS. Of these one is listed as Critically Endangered, three as Endangered, one as Vulnerable, 15 as Near Threatened and 20 as Data Deficient. Table 7.2 lists the Red Data species with distributions that may occur within the BMM WHS:

Table 6.2: Red Data Mammal species within the BMM WHS.

Common Name	Scientific Name	Conservation Status
Short-eared Trident Bat	*Cloetis percivali*	Critically Endangered
Tsessebe	*Damaliscus lunatus lunatus*	Endangered
Oribi	*Ourebia ourebi*	Endangered
Samango Monkey	*Cercopithecus mitis labiatus*	Endangered
Pangolin	*Manis temminckii*	Vulnerable
Serval	*Felis serval*	Near Threatened
Brown Hyaena	*Parahyaena brunnea*	Near Threatened
Highveld Golden Mole	*Amblysomus septentrionalis*	Near Threatened

Common Name	Scientific Name	Conservation Status
Lesser Long-fingered Bat	*Miniopterus fraterculus*	Near Threatened
Schreibers' Long-fingered Bat	*Minopterus schreibersii*	Near Threatened
Temminck's Hairy Bat	*Myotis tricolor*	Near Threatened
Rusty Bat	*Pipistrellus rusticus*	Near Threatened
Peak-saddle Horseshoe Bat	*Rhinolophus blasii*	Near Threatened
Geoffroy's Horseshoe Bat	*Rhinolophus clivosus*	Near Threatened
Darling's Horseshoe Bat	*Rhinolophus darlingi*	Near Threatened
Lander's Horseshoe Bat	*Rhinolophus landeri*	Near Threatened
Water Rat	*Dasymys incomtus*	Near Threatened
Side-striped Jackal	*Canis adustus*	Near Threatened
Spotted-necked Otter	*Lutra maculicollis*	Near Threatened
Honey Badger	*Mellivora capensis*	Near Threatened
Gambian Epauletted Fruit Bat	*Epomophorus gambianus crypturus*	Data Deficient
Sundevall's Leaf-nosed Bat	*Hipposideros caffer*	Data Deficient
Hottentot's Golden Mole	*Amblysomus hottertotus*	Data Deficient
Woodland Mouse	*Grammomys dolichurus*	Data Deficient
Rock Dormouse	*Graphiurus platyops*	Data Deficient
Single-striped Mouse	*Lemniscomys rosalia*	Data Deficient
Bushveld Gerbil	*Tatera leucogaster*	Data Deficient
African weasel	*Poecilogale albinucha*	Data Deficient
Meller's Mongoose	*Rhynchogale melleri*	Data Deficient
Reddish-grey Musk Shrew	*Crocidura cyanea*	Data Deficient
Greater Musk Shrew	*Crocidura flavescens*	Data Deficient
Tiny Musk Shrew	*Crocidura fuscomurina*	Data Deficient
Lesser Red Musk Shrew	*Crocidura hirta*	Data Deficient
Swamp Musk Shrew	*Crocidura mariquensis*	Data Deficient
Lesser Grey-brown Musk Shrew	*Crocidura silacea*	Data Deficient
Dark-footed Forest Shrew	*Myosorex cafer*	Data Deficient
Forest Shrew	*Myosorex varius*	Data Deficient
Least Dwarf Shrew	*Suncus infinitesimus*	Data Deficient
Greater Dwarf Shrew	*Suncus lixus*	Data Deficient
Lesser Dwarf Shrew	*Suncus varilla*	Data Deficient

Fish

A total of 23 fish species have been recorded within the Songimvelo Nature Reserve within the BMM WHS. Four of the fish species known to occur within the BMM WHS are listed as Red Data species by the MTPA, one as Critically Endangered, one as Vulnerable and two as Near Threatened (Table 7.3). The known Red Data fish species are provided in Table 7.3.

Table 6.3: Red Data fish species within the BMM WHS.

Common Name	Scientific Name	Conservation Status
Rosefin Barb	*Barbus argenteus*	Near Threatened
Barred minnow	Opsaridium peringeuyi	Near Threatened
Incomati Rock Catlet	*Chiloglanis bifurcus*	Critically Endangered
Pongolo Suckermouth	*Chiloglanis emarginatus*	Vulnerable

Reptiles

From the distribution maps in the "Field Guide to Snakes and other Reptiles of Southern Africa" (Branch, 1998) it was estimated that approximately 106 reptile species have potential distributions within the BMM WHS. Five of these species are listed as Vulnerable by the MTPA (Emery *et al.*, 2002) (Table 7.4)

Table 6.4: Red Data reptile species within the BMM WHS

Common Name	Scientific Name	Conservation Status
Natal purple-glossed snake	*Amblyodipsas concolor*	Vulnerable
Transvaal Dwarf Chameleon	*Bradypodion transvaalense*	Vulnerable
Swazi Rock Snake	*Lamprophis swazicus*	Vulnerable
Wilhelm's Flat Lizard	*Platysaurus wilhelmi*	Vulnerable
Barberton Girdled Lizard	*Cordylus warreni barbertonensis*	Vulnerable

Invertebrates

There are three known Red Data invertebrate species within the BMM WHS. All three are listed as Endangered by the MTPA (Emery, 2002).

- *Aloeides barbarae* (Endangered) found in the Barberton Montane Grassland within the Mountainlands Nature Reserve.
- *Lepidochrysops jefferyi* (Endangered) found in the Barberton Montane Grassland and Legogote Sour Bushveld within the Mountainlands Nature Reserve and surrounding areas
- *Lepidochrysops swanepoeli* (Endangered) found in the Barberton Montane Grassland and Legogote Sour Bushveld within the Mountainlands Nature Reserve and surrounding areas

Flora

It is estimated that there are over 1500 plant species within the BMM WHS, of these seven have been classified as Critically Endangered, 4 Endangered, 27 Vulnerable, 11 Near Threatened and 1 as Data Deficient by the MTPA Plant Red Data Database (Table 7.5). A further 18 have been preliminarily classified as Rare, 13 as Declining, 1 as medicinal and 2 as muthi ('magic') plants by the MTPA (Table 7.5). Table 7.5 lists the known Red Data plant species within the BMM WHS.

Table 6.5: Red Data plant species within the BMM WHS

TAXON	MTPA Status
Acacia ebutsiniorum	EN D
Acridocarpus natalitius var. natalitius	Declining
Adenia gummifera var. gummifera	Declining
Alepidea amatymbica	VU A2d
Aloe albida	NT B1ab(i,ii,iii,iv,v)+2ab(i,
Aloe chortolirioides var. chortolirioides	VU A2ce
Aloe craibii	CR C2a(i)
Aloe integra	VU B1ab(ii,iii,iv,v)
Aloe kniphofioides	VU A2c
Aloe modesta	VU B2ab(ii,iii,iv,v)
Aloe reitzii var. reitzii	NT B1ab(iii)
Aloe reitzii var. vernalis	CR B1ab(v)+2ab(v)
Aloe simii	CR
Aloe thorncroftii	NT D2
Aloe vryheidensis	VU D2
Ansellia africana	Declining
Argyrolobium campicola	NT A2c?
Asclepias velutina	VU D2
Aspidonepsis shebae	VU D2
Berkheya coddii	Rare

TAXON	MTPA Status
Boophane disticha	Declining
Brachystelma chlorozonum	NT B1ab(iii,v)
Brachystelma dyeri	VU D2
Calanthe sylvatica	Rare
Callilepis leptophylla	Declining
Clivia miniata	VU A2abcd
Cryptocarya transvaalensis	Declining
Curtisia dentata	NT A2d
Cyathea capensis	Declining
Cyphia bolusii	VU D2
Cyrtanthus eucallus	VU D2
Cyrtanthus thorncroftii	Rare
Dioscorea sylvatica	VU A2cd
Disa extinctoria	NT B1ab(iii,iv,v)
Drimia altissima (=Urginea altissima)	Declining
Drimia delagoensis (was Urginea delagoensis)	Medicinal
Drimia robusta (now Drimia elata)	Muthi
Encephalartos heenanii	CR B2ab(ii,iv,v)
Encephalartos laevifolius	CR A2acde
Encephalartos paucidentatus	VU A2acd
Eucomis autumnalis	Declining
Eucomis montana	Declining
Eulophia cooperi	Rare
Eulophia parvilabris	Rare
Eulophia speciosa	Declining
Faurea macnaughtonii	Rare
Gerbera aurantiaca	EN A2ac
Gerbera aurantiaca (new subspecies)	VU?
Gladiolus appendiculatus (Barberton form)	VU B
Gladiolus calcaratus	Rare
Gladiolus serpenticola	Rare
Gunnera perpense	Declining
Haworthia limifolia var. limifolia	VU A2d
Helichrysum calocephalum	Rare
Kniphofia triangularis subsp. obtusiloba	Rare
Leucospermum gerrardii	NT A2c
Merwilla plumbea (=Scilla natalensis)	NT A2bd
Moraea robusta	Rare
Nervilia kotschyi var. purpurata	Rare
Ocotea bullata	EN A2bd
Ocotea kenyensis	VU D1
Ozoroa barbertonensis	VU D2
Polygala nodiflora	DD T
Protea comptonii	NT A2c
Protea curvata	VU D2
Protea parvula	NT A2c
Protea roupelliae subsp. hamiltonii	CR A2ac; B1ab+2ab; C2a
Prunus africana	VU A4acd; C1+2a(i)
Rapanea melanophloeos (may be removed)	Declining
Rhynchosia rogersii	VU D2
Schizobasis intricata now Drimia intricata)	Muthi

TAXON	MTPA Status
Schizochilus cecilii subsp. culveri	Rare
Sclerochiton triacanthus	VU D2
Searsia pygmaea (was Rhus)	VU D2
Senecio triodontiphyllus	VU D2
Siphonochilus aethiopicus	CR A4acd
Streptocarpus cyaneus subsp. long-tommi	VU D2
Streptocarpus pogonites	Rare
Syncolostemon stalmansii (=Hemizygia stalmansii)	Rare
Thorncroftia longiflora	Rare
Thorncroftia thorncroftii	VU D2
Warburgia salutaris	EN A2acd
Watsonia latifolia	Rare
Watsonia occulta	Rare

Endemic and near-endemic species:
Within the Barberton Centre the vast majority of the endemic species are confined to the grassland biome and predominately occur in the Iridaceae, Lamiaceae and Liliaceae families. The serpentine areas are particularly rich in endemics with 30 taxa being reported by Balkwill and Balkwill (1999), many of which are still to be described. The following species have been listed as endemic or near-endemic by Van Wyk and Smith 2001.

Non-succulent endemics and near-endemics:
Asystasia subbiflora
Berkheya coddii
Berkheya nivea,
Blepharis fenestralis,
Cyphia bolusii
Disa intermedia,
Encephalartos heenanii,
Encephalartos laevifolius
Encephalartos paucidentatus
Eulophia chlorantha,
Gladiolus serpenticola
Helichrysum monticola (form),
Hemizygia modesta,
Hemizygia persmilis
Hemizygia punctata
Hemizygia thorncroftii,
Holothrix culveri
Indigofera creba,
Lotononis spicata,
Ozoroa barbetonensis,
Protea comptonii
Protea curvata
Sartidia dewinteri
Rhus pygmaea,
Salpinctium hirsutum,
Sclerochiton triacanthus,
Selago stewartiae

Selago villosa,
Siphonoglossa linifolia,
Streptocarpus pogonites,
Syncolostemon comptonii,
Tetraselago longituba s. str.,
Tinnea barbata,
Watsonia watsonioides.

Succulents:
Adenium swazicum
Brachystelma dyeri
Kleinia galpinii
Crassula alba var. pallida
Crassula sarcocaulis subsp. sarcocaulis (form)
Kalanchoe alticola
Kalanchoe luciae subsp. montana
Euphobia complexa
Plectranthus purpuratus subsp. montanus
Thorncroftia longiflora
Thorncroftia thorncroftii
Aloe albida
Aloe barbertoniae
Aloe chortolirioides
Aloe dyeri
Aloe integra
Aloe marlothii var. bicolor
Aloe thorncroftii
Bulbine coetzeei
Gasteria batesiana (form)
Haworthia limifolia (form)
Haworthia limifolia var. arcana

7 Conclusion

The BMM WHS is not only important from a geological perspective but also from a biodiversity perspective. It is ideally situated in conjunction with some of its neighbouring conservancies as a biodiversity corridor, linking the Kruger National Park to conservancies on the Highveld and reserves in Swaziland. The BMM WHS incorporates 3 biomes and eight vegetation types. It includes a large proportion of one of 18 southern African centres of plant endemism and holds over 1500 plant species and 705 vertebrate species. Its heterogeneous landscape and large wilderness areas provide a multitude of tourism opportunities from packaged tourism experiences through to self drive game viewing and birding, hiking and mountain biking, all of which can be linked to various geological and cultural experiences within the BMM WHS.

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