ASSESSING OPPORTUNITIES FOR PROTECTED AREA EXPANSION AND ECOSYSTEM RESTORATION IN SOUTH AFRICA'S

STRATEGIC WATER SOURCE AREAS

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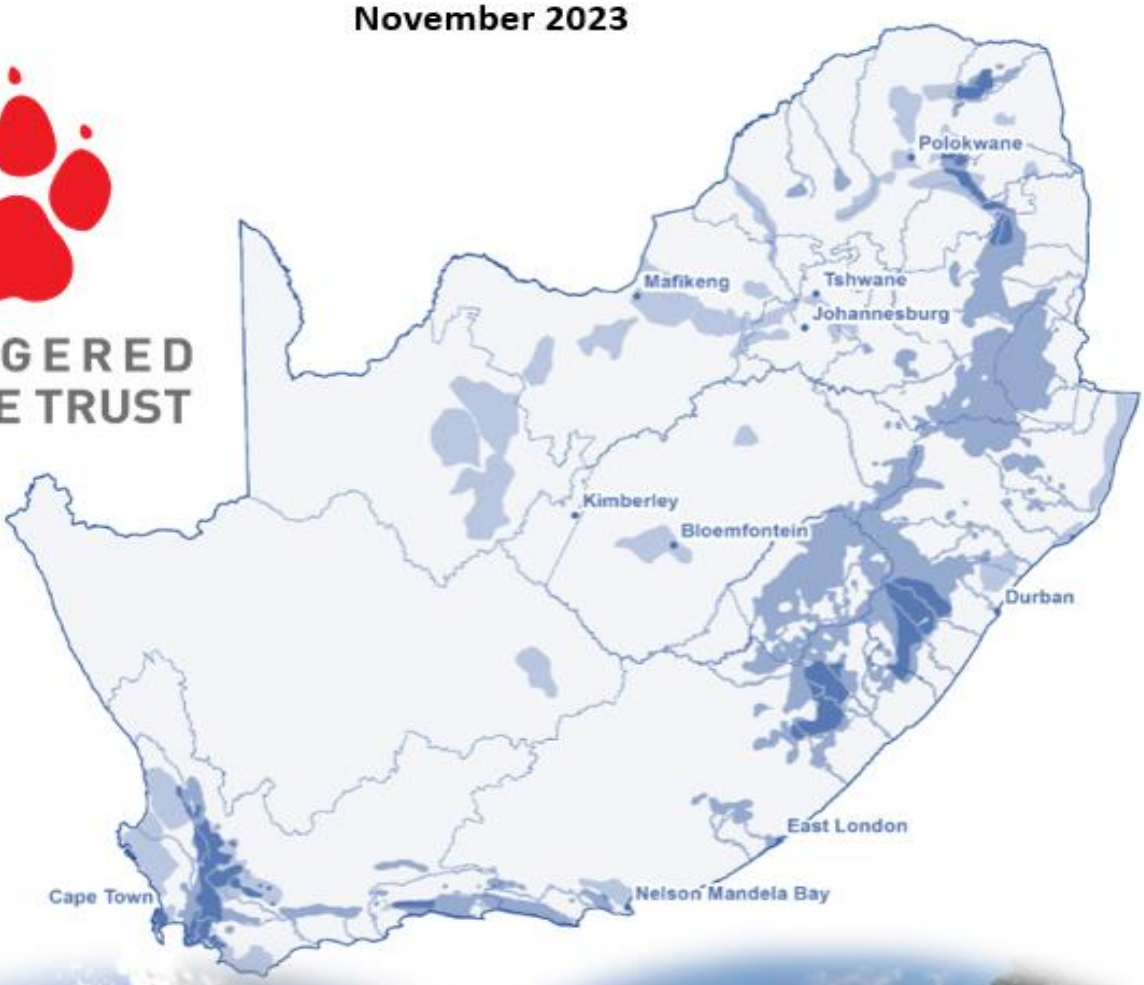



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Aim:

In this document, we present our findings from an analysis of landcover, threatened species and habitats in Strategic Water Source Areas in South Africa. Our aim was to identify areas suitable for conservation and restoration, to be used as a catalyst for action in SWSAs, in promoting the importance of biodiversity protection and habitat restoration initiatives across these priority landscapes, ultimately leading to a reduction in greenhouse gas emissions and biodiversity loss from these sites, and an increase in water security and climate change resilience in the surrounding and downstream communities. We used the national landcover and threatened habitats spatial layers for South Africa, the protected agricultural areas layers and the species distribution models, that were developed for the Environmental Screening Tool, for our analysis. Using these we did fine-scale mapping within the 22 SWSAs to identify contiguous areas of intact natural habitat that might lend themselves to protected area expansion and within these areas, we highlight potential priority sites for restoration and rehabilitation. We also list the threatened species that are either recorded as occurring or likely to occur (based on model outputs) within these priority areas.

The intention was to inform protected area expansion and restoration priorities towards achieving the targets as set out in the Kunming-Montreal Global Biodiversity Framework, specifically the 30x30 target for protected areas.

Background:

South Africa already has a well-established warming trend. Even under more conservative emission scenarios, it is predicted that by mid-century the South African coast will warm by 1–2°C and the interior by around 2–3°C. South Africa is also a water-stressed country and already uses its existing freshwater resources intensively. Notably, in 2018, Cape Town almost suffered the ignominy of becoming the first city globally to run out of water. Climate change forecasts strongly suggest that the West Coast will become more arid with time. The area includes a number of critical water catchments, critical for both human well-being, as well as hosting a number of highly threatened freshwater species – freshwater biodiversity is declining at twice the rate of that in the oceans or forests. In fact, nearly one-third of freshwater fish face extinction globally, including many South African species (the most threatened animal group in South Africa).

Strategic Water Source Areas (SWSAs) are areas of land that supply a disproportionate amount of mean annual surface water runoff in relation to their size. Within South Africa, they are mainly located along the southern and eastern regions of the country (Figure 1). They are vital for water and food security and also provide the water used in generating hydro-electricity. The surface water SWSAs produce just over 50% of the mean annual runoff from less than 10% of the land area. The total area of the SWSAs is 12,410,697 ha, with nearly 81% (10,020,780 ha) falling within South Africa. Only 23% of the surface-water SWSAs (about 2.3 million ha) are under some level of formal protection in terms of the National Environmental Management: Protected Areas Act (Act 57 of 2003). The low proportion of SWSAs that fall within protected areas, and the very uneven distribution of those protected areas, makes them highly vulnerable to unwise development and the adverse effects of existing activities. Formal protection of the remaining natural areas is widely agreed to be the best option for increasing national water security, and improving water quantity and quality in the longer term. This current situation is even more alarming when future pressures on water resources are considered – the demand for water is predicted to escalate exponentially and many parts of the country are expected to become drier due to climate change, threatening our water supplies.

SWSAs contain important headwater streams, wetlands, and rivers. If these ecosystems are not protected, there are knock-on effects downstream, especially in terms of a reduction in water quality, loss of habitat for fish and other biodiversity and impaired ecosystem functioning. Wetlands are now considered the most effective carbon sinks on the planet and, concurrently, the most threatened ecosystems. Their destruction leads to the release of large amounts of CO_2 into the atmosphere. As a result, their protection can assist with climate change mitigation. Unfortunately, more than a third of all wetlands globally were lost in just 45 years, and today, wetlands are disappearing three times faster than forests. Not only will the protection and restoration of wetlands lead to greater carbon sequestration, but wetlands can also help communities with climate mitigation and adaptation, by absorbing excess rainfall and protecting communities from the devastating impacts of flooding, and conversely, they can also supply water in periods of drought. In addition, according to Wetlands International, wetlands cover just 7% of the planet but are home to 40% of the world's biodiversity. South Africa needs targeted conservation and restoration action in our SWSAs, which will simultaneously conserve biodiversity, improve water security and reduce the impacts of climate change. The SWSAs correlate very closely with South Africa's most biodiversity-rich areas and protecting these SWSAs will have significant impacts in terms of the protection of threatened and endemic species in this mega-diverse country.

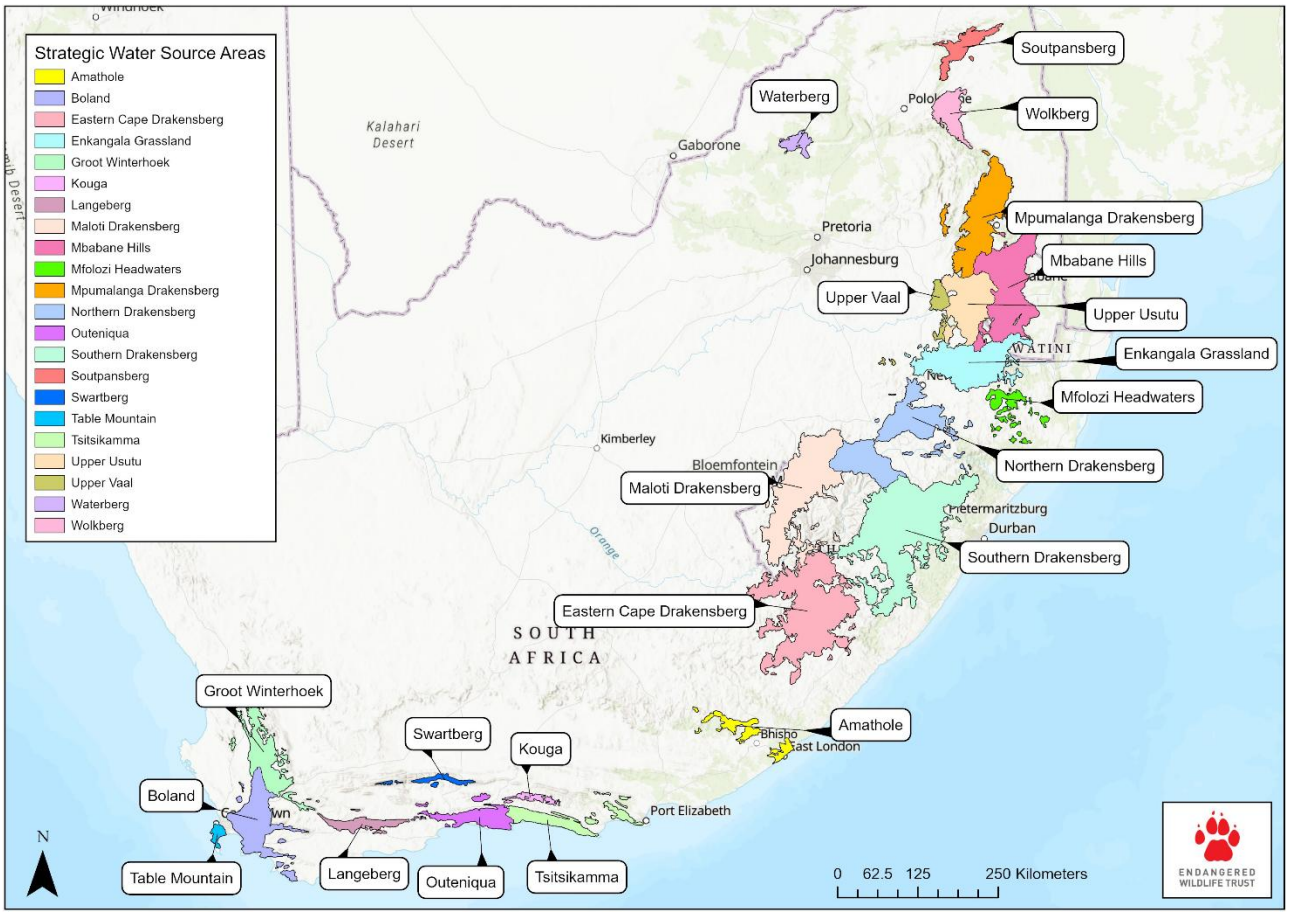


Figure 1: The distribution of South Africa's Strategic Water Source Areas

In this project, with funding from the Federal Republic of Germany, through the German Embassy Pretoria, we aimed to engage with key stakeholder groups on the biodiversity-climate change nexus, both locally and nationally in order to leverage and catalyse increased resilience of nature, as well as people, through the protection and restoration of key SWSAs. By promoting an upscaling of conservation work on SWSAs – and guiding appropriate Sustainable Land Management (SLM) and Ecosystem-based Adaptation (EbA) measures on degraded lands – this project will support achieving South Africa's inclusive green economy and environmental targets, the Rio conventions, the UN Decade on Ecosystem Restoration, the UN Framework Convention on Climate Change and the Global Biodiversity Framework. A critical outcome of this work is promoting the importance of biodiversity protection and habitat restoration initiatives across these priority landscapes and leveraging collaboration between key stakeholders, including government, private sector, NGOs and local communities, to work together to achieve these ambitious targets in an efficient and effective way.

In this document, we outline the results of our desktop spatial analysis, in particular, we determined:

a) What proportion of SWSAs fall within existing protected areas?
b) What proportion of SWSAs fall within protected agricultural areas, and are thus unavailable for formal protected area expansion?
c) How many threatened species occur within each SWSAs potential protected area zones?
d) What large contiguous blocks of relatively untransformed natural habitat are available for future protected area expansion?
e) Where do opportunities exist for habitat restoration and ecosystem-based adaptation approaches within SWSAs?

Methodology:

The following spatial layers were used:

- Strategic Water Source Areas: Mpumalanga Tourism and Parks Agency. 2021 Strategic Water Source Areas for surface water [Vector] 2021. Available from the Biodiversity GIS website, downloaded on 13 July 2023.
- South Africa National Land Cover: Department of Forestry, Fisheries and the Environment. 2020. South African National Land-cover 2020. Downloaded from https://egis.environment.gov.za/data_egis/data_download/current on 13 July 2023.
- South African Protected Areas: Department of Forestry, Fisheries and the Environment. 2023. South Africa Protected Areas Database (SAPAD_OR_2023_Q1). Downloaded from https://egis.environment.gov.za/data_egis/data_download/current on 13 July 2023.
- SANBI (2024) Protected Areas 2022 for time series assessment and accounting [geodatabase]. Source data: Based on DFFE's SAPAD_OR_2022_Q4.
- National Vegetation map: South African National Biodiversity Institute (2006-2018). The Vegetation Map of South Africa, Lesotho and Swaziland, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors), Online, http://bgis.sanbi.org/Projects/Detail/186, Version 2018.
- South African Protected Agricultural Areas: Department of Agriculture, Land Reform and Rural Development. 2020. Protected agricultural areas – Spatial data layer. 2020. Pretoria.

- South African Threatened Species Distributions: EWT & SANBI, 2023. Land-Use Decision Support Tool for Species of Conservation Concern. These distribution models will be publicly available on http://bgis.sanbi.org/LUDS/Home in 2024. The same distribution models were used in the national Environmental Screening Tool.
- Alien Invasive Plants: For this project, we aimed to assess the presence of alien invasive plants in the "Recoverable" and "Natural" areas in order to get a sense of the potential for restoration. Multiple organisations have worked on AIS mapping. However, the age of the spatial data currently available as well as the resolution of the mapping has meant that it was either too out of date, too coarse or not available for the areas we are working in. Towards the end of the year, the South African Department of Forestry, Fisheries and the Environment (DFFE) will be releasing the National IAP Survey, which we will then use to assess restoration opportunities in more detail.

Methods used:

1. All analyses were done in ArcGIS Pro version 3.1.
2. All layers were projected to Africa Albers Equal Area projection.
3. The area of "Transformed", "Natural" or "Recoverable" landcover types were calculated using the National Land Cover layer. The landcover types that were included in each class were:
    a. "Natural" areas were defined as: Forested Land (Natural Wooded Land), Shrubland, Grassland, Waterbodies, Wetlands and Barren Land (Natural Rock Surfaces, Dry Pans, Sand Dunes, Coastal Sand & Dunes and Bare Riverbed Material)
    b. "Recoverable" areas were defined as: Barren Land (Eroded Lands and Other degraded areas), previously Cultivated Areas (Fallow Lands and Old Fields)
    c. "Transformed" areas were defined as: Forested Land (Planted Forests), Artificial Waterbodies, Cultivated Lands (Permanent Crops and Temporary Crops), Built-up Areas (Residential, Villages, Smallholdings, Urban Vegetation, Commercial Areas, Industrial Areas and Transport) and Mines and Quarries
4. The area of each land cover class ("Transformed", "Natural" or "Recoverable") in each SWSA was then calculated.
5. The area of the "Natural" and "Recoverable" land outside of the Protected Areas and Protected Agricultural Areas was then calculated.
6. The hectares and % of each SWSA that fell within protected areas (PA) was calculated.
7. The threatened species distributions were clipped to each SWSA in order to get an indication of the number of threatened species present per SWSA. The full list of threatened species found in each SWSA can be found in tables listed in alphabetical order of the SWSA title in the supplementary material. We categorized the threatened species models as ones where there was a high likelihood of species presence, and ones where there was a lower likelihood of species presence. The high likelihood species are those that had very high sensitivity distribution models from the Environmental Screening Tool (EST). This indicates critical habitat for range-restricted species of conservation concern that have a global range of less than 10 km^2. The lower confidence estimates included the high and medium sensitivity models from the EST. High sensitivity means that this is confirmed habitat for species of conservation concern from verified occurrence records (post-2002) and medium sensitivity means that this is suspected habitat for species of conservation concern based on habitat suitability model for the species or, when a species has

insufficient occurrence records to perform a model and no recent occurrence records, historical records (pre-2002) intersected with a natural habitat segment.

8. The threatened vegetation for each SWSA was extracted from the National Vegetation layer. The full list of threatened vegetation types found in each SWSA can be found in tables listed in the chronological order of the SWSA title in the supplementary materials.
9. Polygons that represent large contiguous blocks of mostly natural areas were delineated based on the 3 main landcover types within each SWSA. These polygons were large contiguous blocks of mostly Natural and Recoverable areas that are not currently protected, and are also outside of protected agricultural areas. These have potential for future conservation and restoration, and we will refer to these as PCRAs (potential conservation and restoration areas). Within the PCRAs, the sizes of "Natural", "Recoverable" and "Transformed" area were calculated, as well as the number of threatened species and threatened vegetation types, available in Appendix 2. Maps of these PCRAs are shown in the relevant SWSAs section below and the shapefiles are available online. However, a detailed assessment and ground-truthing of these areas have not yet been done.
10. DFFE's protected areas database (SAPAD 2023) was compared to the SANBI protected areas database (2022). Some discrepancies arose as the SANBI layer contains some protected areas that are not formally gazetted yet, however it does not contain some of the newer reserves that have been declared in 2022 and 2023, thus providing a lower estimate of the protection levels within the majority of the SWSAs. The results of this comparison can be seen in the summary table at the end of the report.



Results:

Amathole Strategic Water Source Area

Protection status:

- Total area of SWSA within South Africa: 200,162 Ha.
- Percentage within existing formally protected areas: only 3%.
- Protected Agricultural Areas: 40,129 Ha, or 20% of the total SWSA.

Landuse:

A total of 6,060 Ha (3%) are possibly "Recoverable" after removing Protected Agricultural Areas and Protected Areas, and 141,698 Ha (71%) are "Natural" and not currently protected.

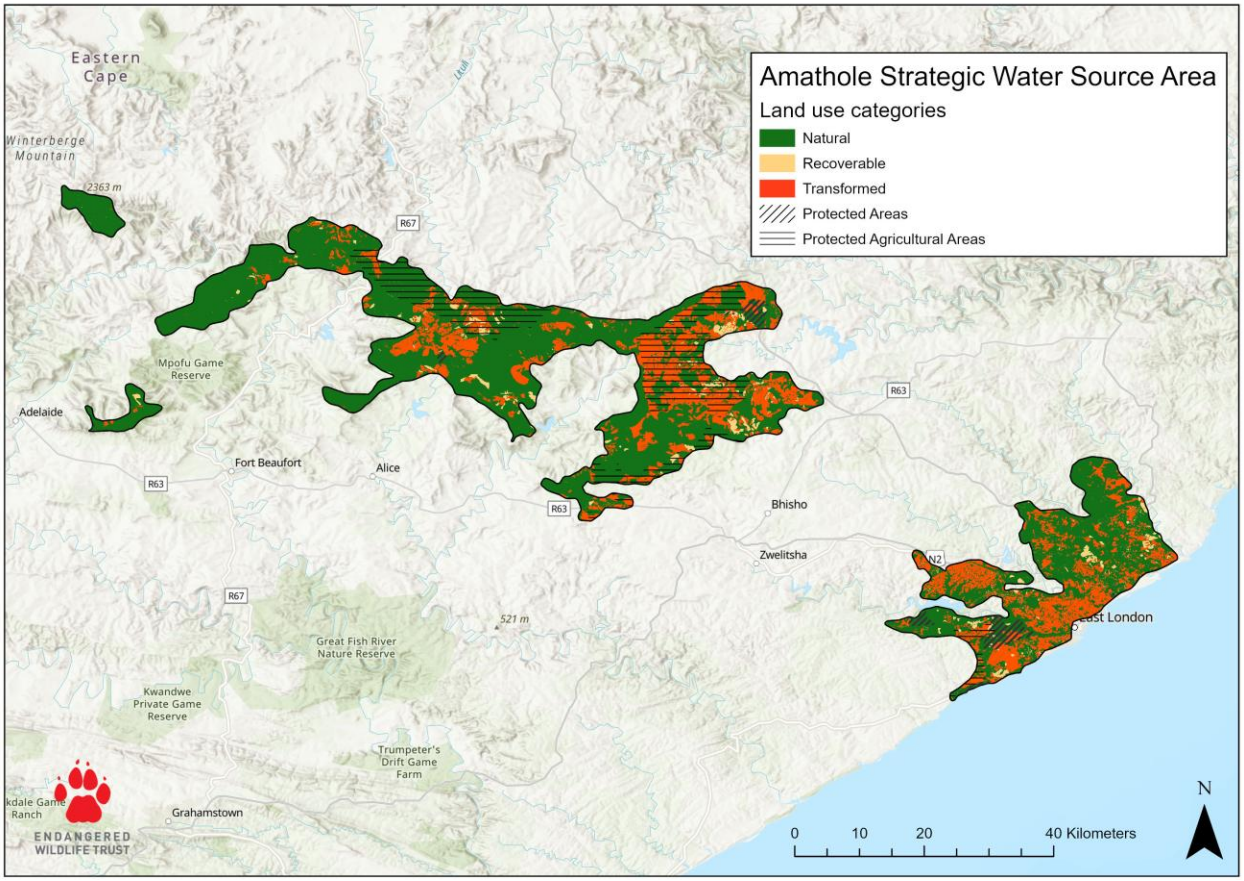


Figure 2: The Amathole Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". The hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- There are 88 threatened species (57 animals and 31 plants) in the SWSA, of which two species are Critically Endangered (all threatened species listed in Supplementary Table 1a).
- The SWSA lies within the Grassland, Albany Thicket, Forest and Savanna biomes and contains 17 different vegetation types.

- Two vegetation types, Buffels Valley Thicket and Umtiza Forest Thicket, are listed as Critically Endangered on the IUCN Red List (Figure 2; Supplementary Table 1b).
- This SWSA is the most diverse in terms of biomes and contains the second highest proportion of the Forest biome (Stats SA, 2023).

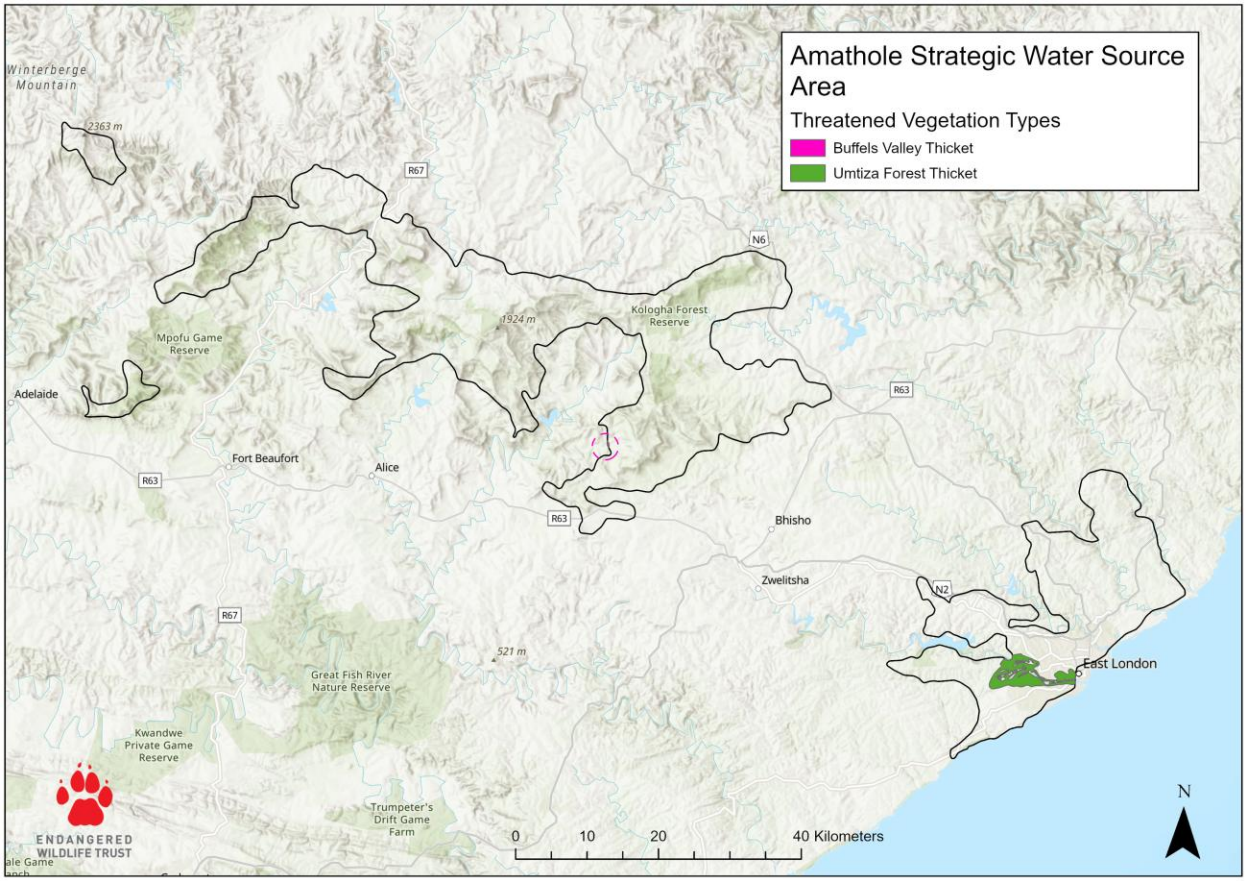


Figure 3: The threatened vegetation found in the Amathole Strategic Water Source Area.

Summary Table for the Amathole SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	5,378	3
Natural – total	14,1719	71
Recoverable – total	6,060	3
Transformed - total	52,384	26
Protected (Agricultural)	40,129	20
Recoverable, outside of Protected Areas and Protected Agricultural areas	6,060	3
Natural, outside of Protected Areas and Protected Agricultural Areas	141,698	71
Total (within SA)	**200,162**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 97,838 Ha, covering 49% of the total SWSA (Figure 4).

“Natural”: 84%; “Recoverable”: 2%; “Transformed”: 14%.

The PRCAs also potentially have up to 70 threatened species (51 animals and 19 plants), of which two are Critically Endangered.

Within these PCRAs, we have an area of 2,107 Ha (1%) classified as “Recoverable”.

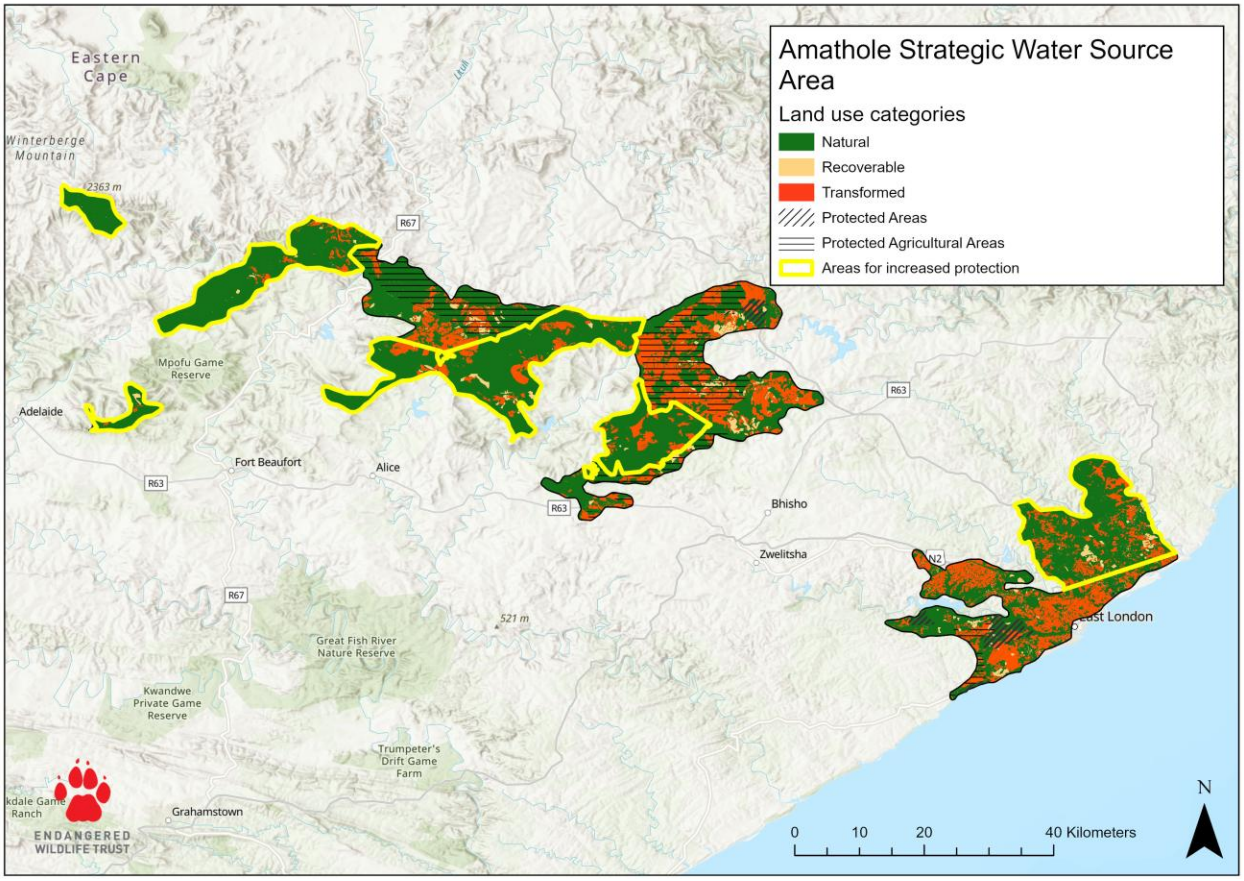


Figure 4: The Amathole Strategic Water Source Area, showing PCRAs in yellow.



Boland Strategic Water Source Area

Protection status:

- Total area of SWSA within South Africa: 608,040 Ha.
- Percentage within existing formally protected areas: 52%.
- Protected Agricultural Areas: 231,672 Ha (38%).

Landuse:

A total of 68% was listed as “Natural”, 3% “Recoverable” and 29% “Transformed” (Figure 4). This SWSA contains the highest proportion of orchards and vineyards in South Africa (Stats SA, 2023). Further calculations (from step 7 above) showed that 21,118 Ha (3%) are possibly “Recoverable” after removing Protected Agricultural Areas, and 166,483 Ha (27%) are “Natural” and not currently within South Africa’s protected areas.

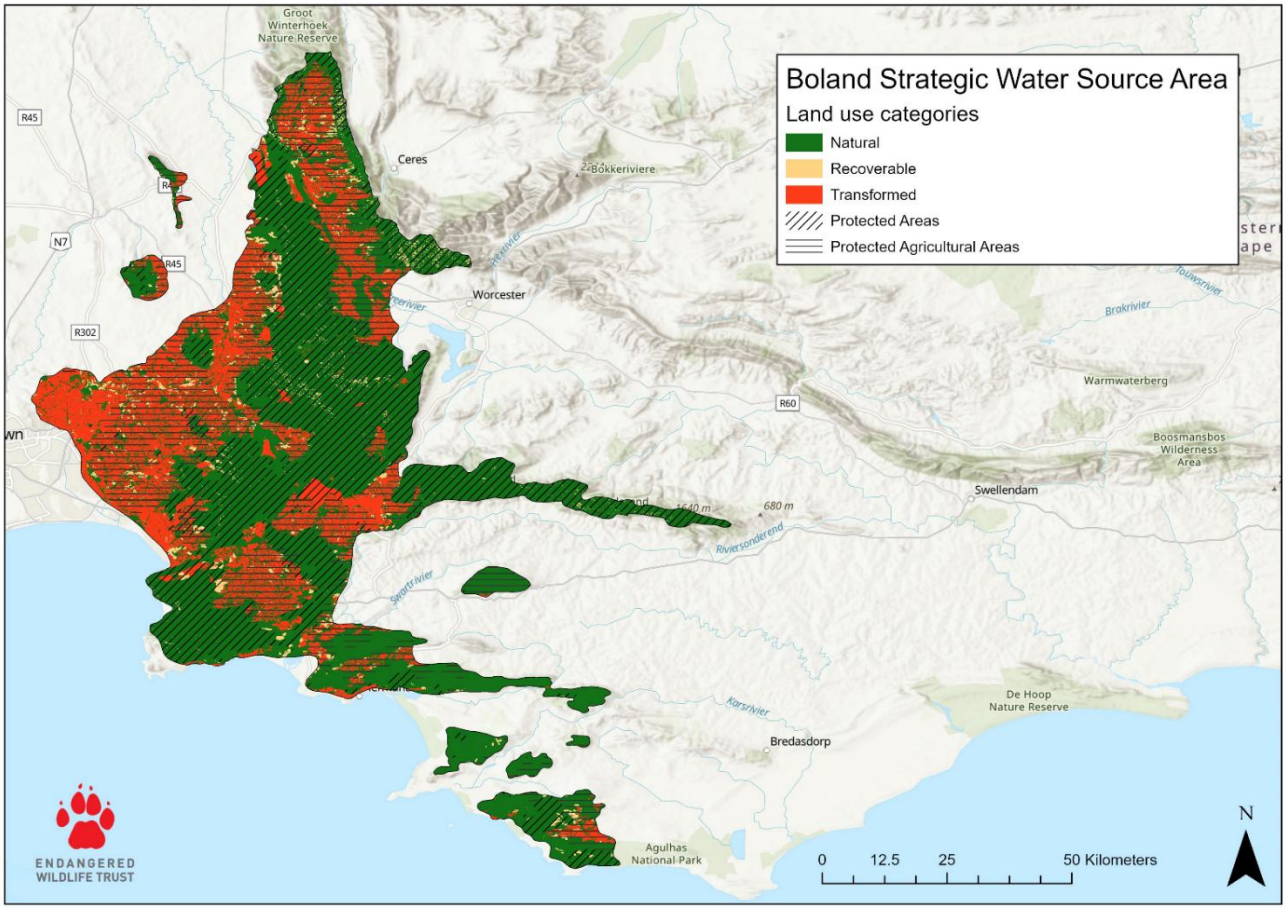


Figure 5: The Boland Strategic Water Source Area indicating the various National Land Cover classes that have been classified into “Natural”, “Recoverable” and “Transformed”. Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of 124 threatened species (7 animals and 117 plants) being found in this SWSA, and a lower confidence estimate of 1,113 threatened species (82 animals and

1,031 plants). Of the high confidence estimate, 40 species are Critically Endangered (species listed in Supplementary Table 2a).

- The SWSA lies within the Fynbos biome of South Africa and contains 40 different vegetation types. Of the 40 vegetation types, 28 are threatened (Figure 6; Supplementary Table 2b).

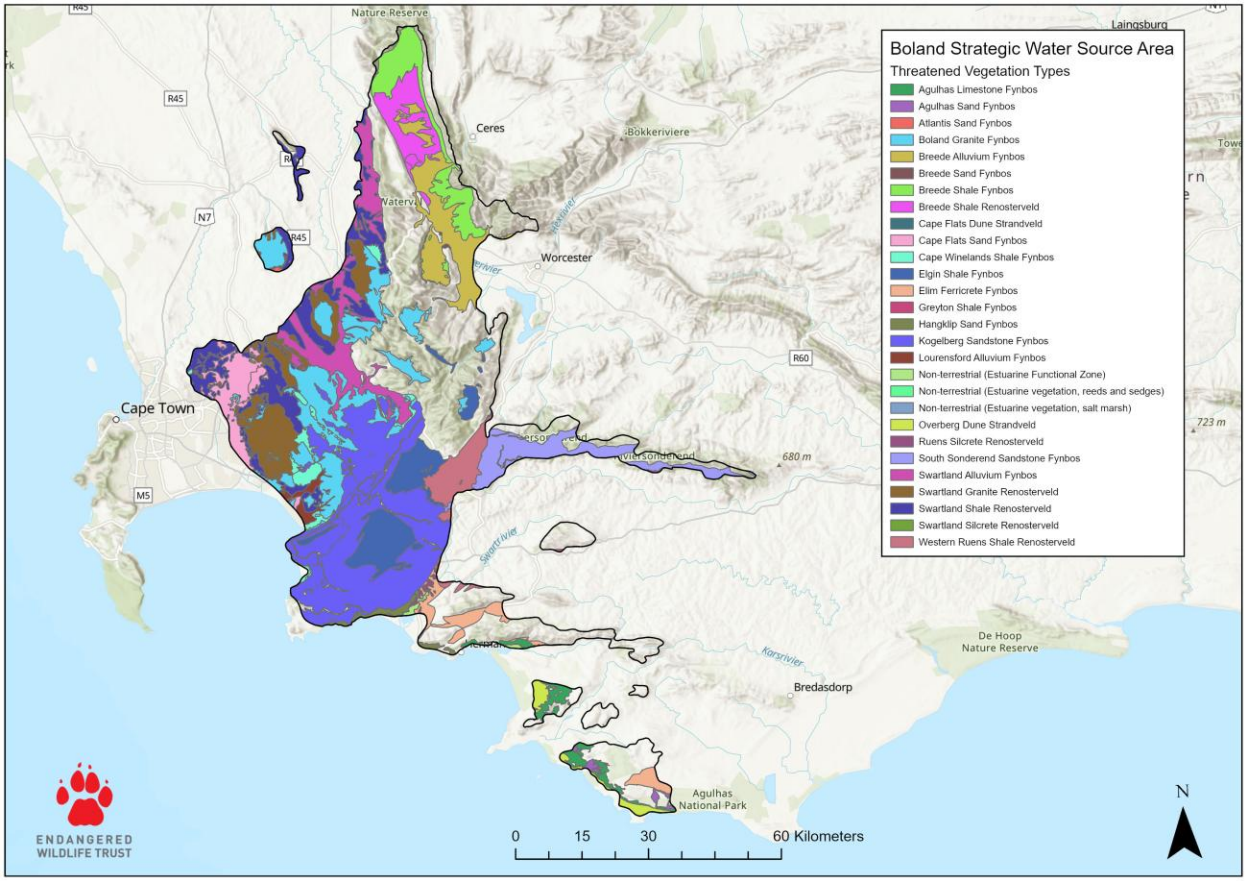


Figure 6: The threatened vegetation found in the Boland Strategic Water Source Area.

Summary Table for the Boland SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	317,399	52
Natural – total	413,169	68
Recoverable – total	21,120	3
Transformed - total	173,753	29
Protected (Agricultural)	231,672	38
Recoverable, outside of Protected Areas and Protected Agricultural Areas	6,195	1
Natural, outside of Protected Areas and Protected Agricultural Areas	78,382	13
Total (within SA)	**608,040**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 21,699 Ha, covering 4% of the total SWSA (Figure 7).

“Natural”: 98%; “Recoverable”: 1%; “Transformed”: 1%.

We have a high confidence estimate of six threatened plant species and a lower confidence estimate of up to 292 threatened species (32 animals and 260 plants).

Within the PCRAs, we have an area of 207 Ha (1%) listed as “Recoverable”.

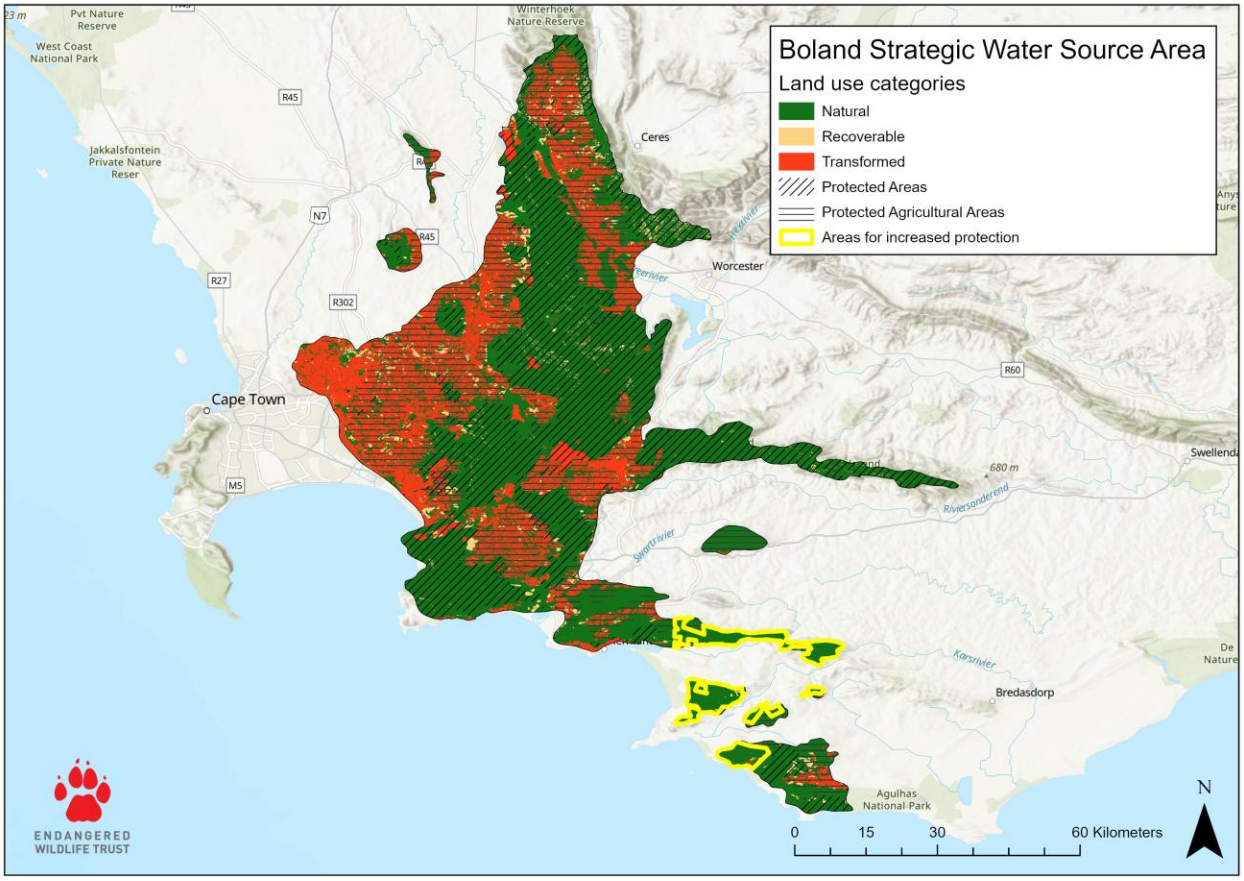


Figure 7: The Boland Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.



Eastern Cape Drakensberg Strategic Water Source Area

Protection status:

- Total area within South Africa: 1,452,839 Ha.
- Percentage within existing formally protected areas: only 1%. This SWSA has the lowest level of protected areas of all the SWSAs (Stats SA, 2023). However, this area is the focus for the new Grasslands National Park, which is in development.
- Protected Agricultural Areas: 574,425 Ha (40%).

Landuse:

The Eastern Cape Drakensberg SWSA is the second largest in South Africa (Stats SA, 2023). A total of 75% was listed as "Natural", 4% "Recoverable" and 21% "Transformed" (Figure 6). Further calculations (from step 7 above) showed that 56,560 Ha (4%) are possibly "Recoverable" after removing Protected Agricultural Areas, and 1,088,057 Ha (75%) are "Natural" and not currently within South Africa's protected areas. A portion of this SWSA crosses over into Lesotho.

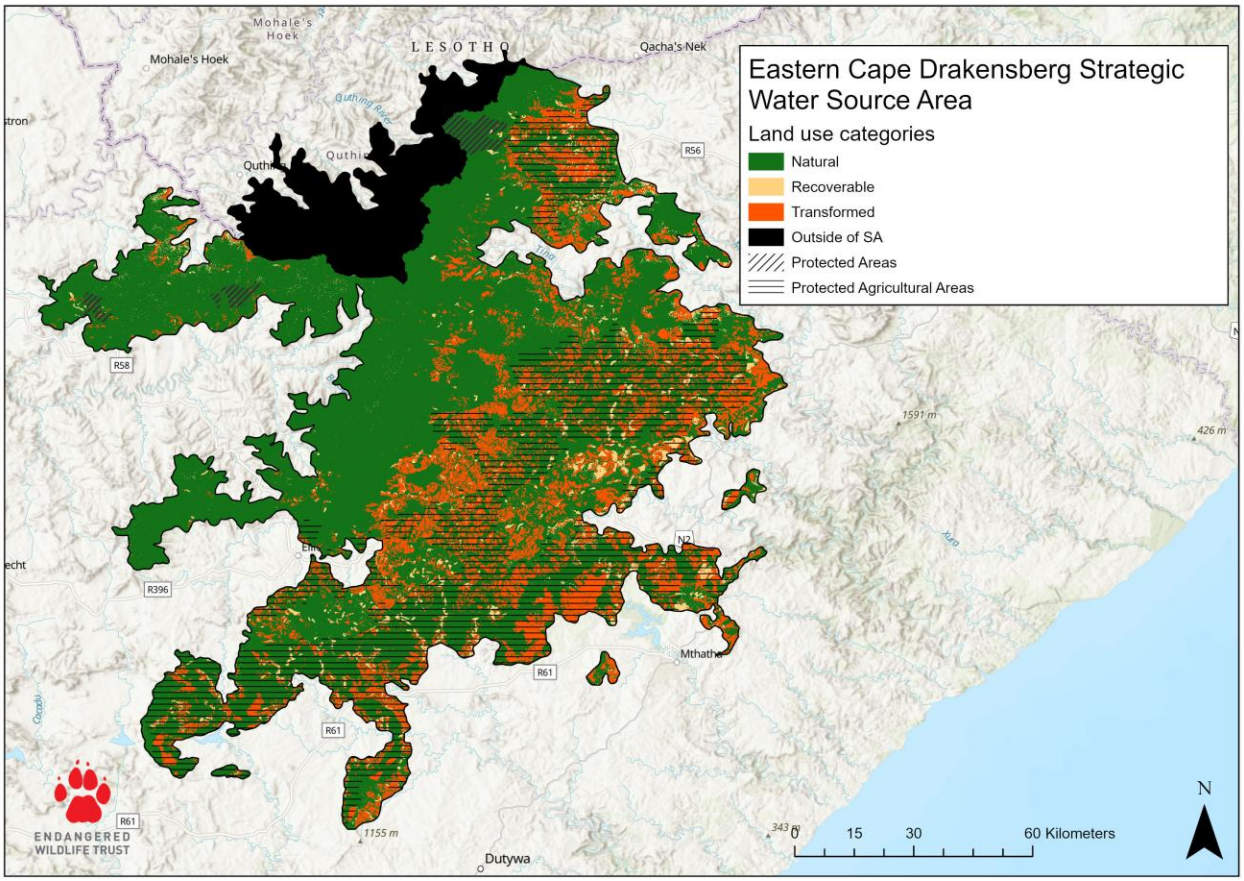


Figure 8: The Eastern Cape Drakensberg Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA. The area in black indicates where the SWSA extends into Lesotho.

Threatened species and vegetation:

- We have a high confidence estimate of one Critically Endangered plant species (*Erica hillburttii*) being found in this SWSA, and a lower confidence estimate of 68 threatened species (48 animals and 20 plants) being found in the SWSA. All threatened species are listed in Supplementary Table 3a.
- This SWSA lies within the Forest Grassland and Savanna biomes of South Africa and contains 12 different vegetation types. Of the 12 vegetation types, two are threatened (Figure 9; Supplementary Table 3b).

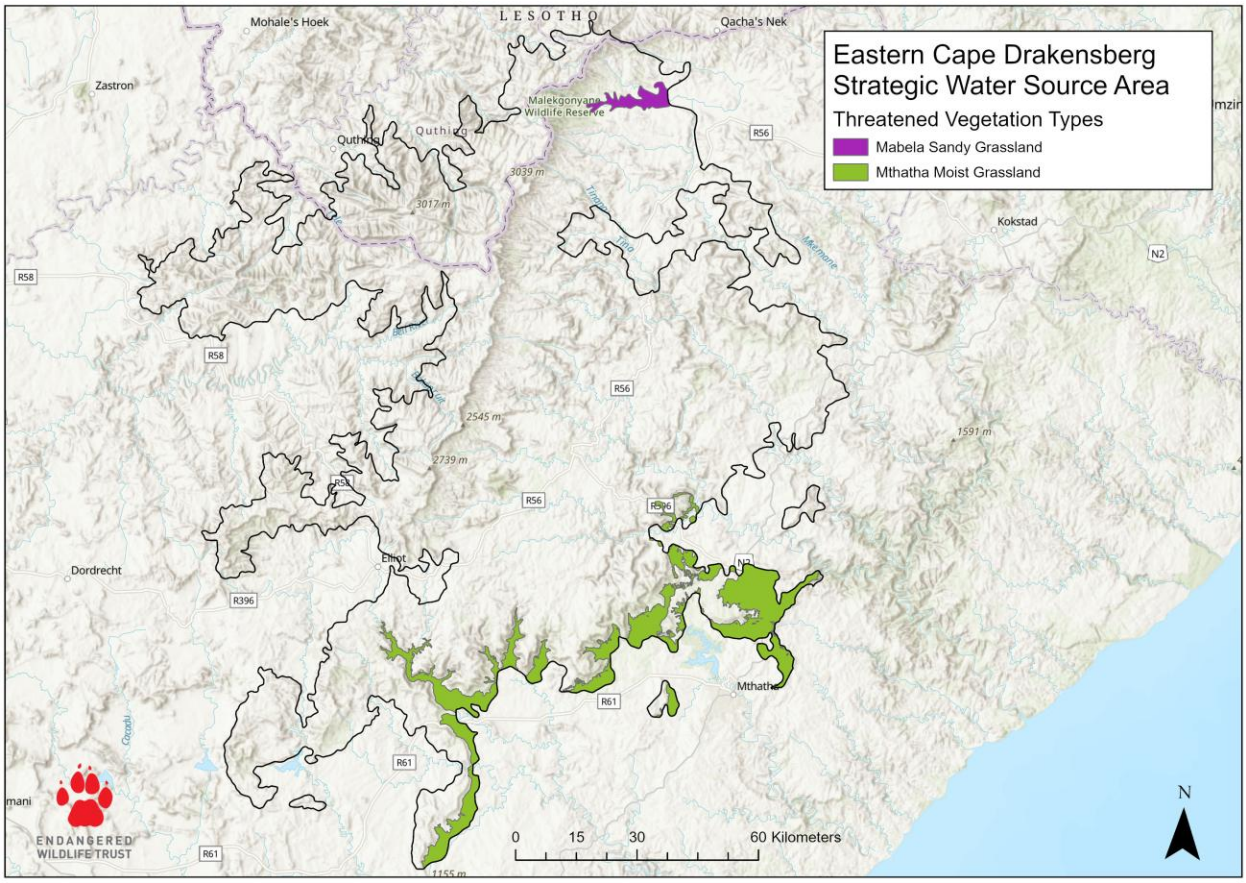


Figure 9: The threatened vegetation found in the Eastern Cape Drakensberg Strategic Water Source Area.

Summary Table for the Eastern Cape Drakensberg SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	17,448	1
Natural – total	1,088,136	75
Recoverable – total	56,565	4
Transformed - total	309,719	21
Protected (Agricultural)	574,358	40
Recoverable, outside of Protected Areas and Protected Agricultural Areas	56,560	4

Natural, outside of Protected Areas and Protected Agricultural Areas	1,088,045	75
Total (within SA)	**1,452,839**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 509,592 Ha, covering 35% of the total SWSA within South Africa (Figure 10).

Within it, 94% of the area is “Natural”, 1% is “Recoverable” and 5% is “Transformed”.

We have a high confidence estimate of one Critically Endangered plant species and a lower confidence estimate of up to 43 threatened species (27 animals and 16 plants).

Within the PCRAs, there is an area of 7,214 Ha (1%) classified as “Recoverable”.

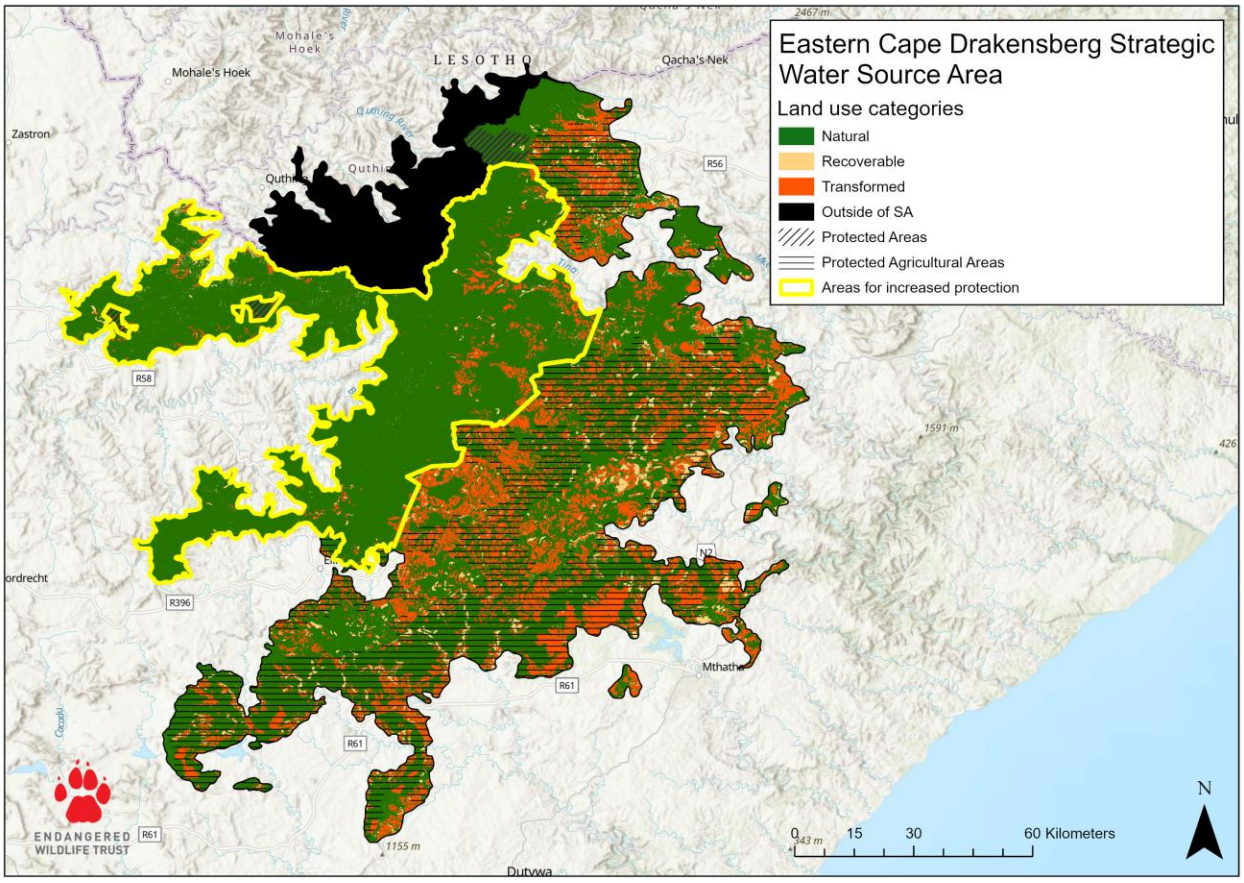


Figure 10: The Eastern Cape Drakensberg Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.

Enkangala Grassland Strategic Water Source Area

Protection status:

- Total area within South Africa: 788,131 Ha.
- Percentage within existing formally protected areas: only 9%.
- Protected Agricultural Areas: 283,384 Ha (36%).

Landuse:

A total of 70% was listed as “Natural”, 5% “Recoverable” and 25% “Transformed” (Figure 8). A portion of this SWSA crosses over into eSwatini. Further calculations (from step 7 above) showed that 27,409 Ha (3%) are possibly “Recoverable” after removing Protected Agricultural Areas, and 551,491 Ha (46%) are “Natural” and not currently within South Africa’s protected areas.

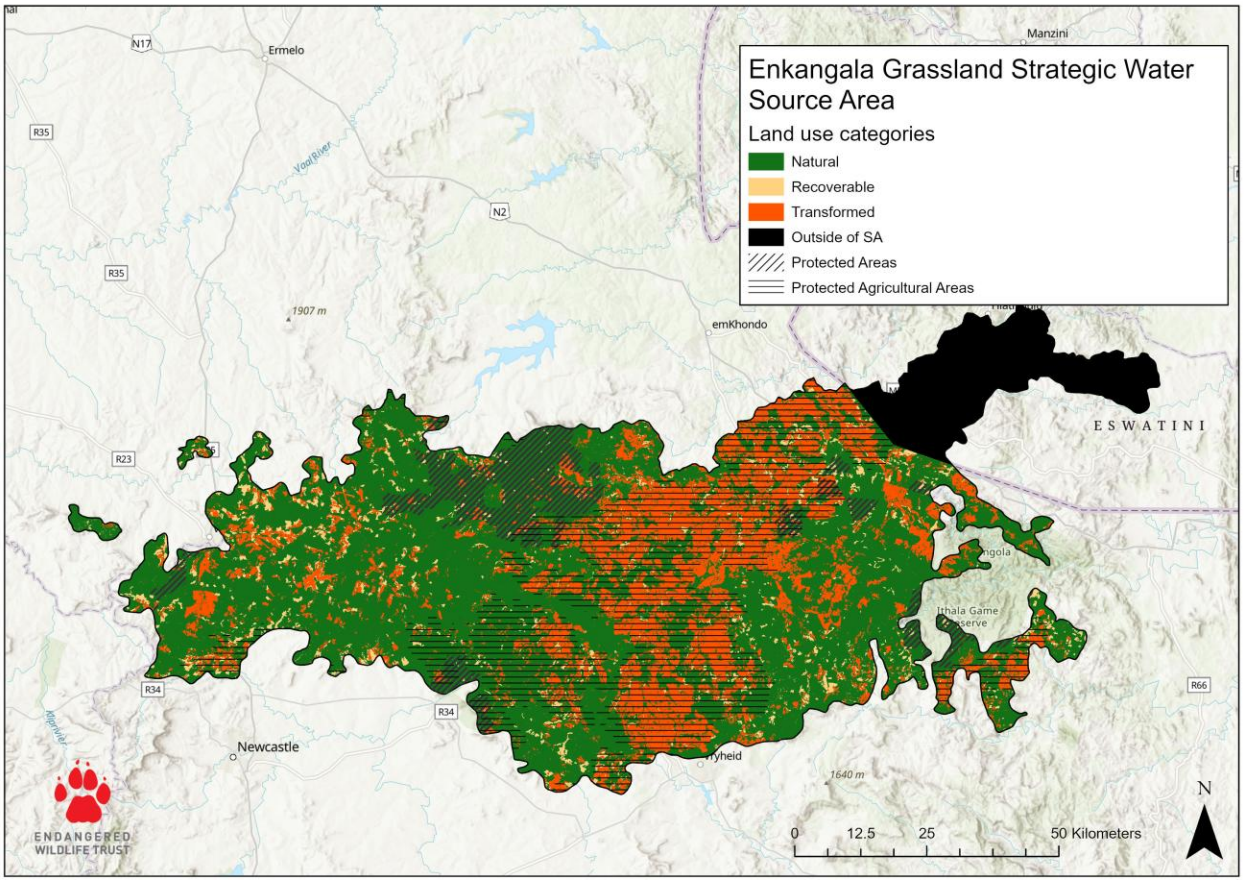


Figure 11: The Enkangala Grassland Strategic Water Source Area indicating the various National Land Cover classes that have been classified into “Natural”, “Recoverable” and “Transformed”. Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA. The area in black indicates where the SWSA extends into Eswatini.

Threatened species and vegetation:

- We have a high confidence estimate of one Endangered plant species (*Senecio villifructus*) being found in this SWSA, and a lower confidence estimate of 93 threatened species (65 animals and 28 plants) being found in the SWSA. All threatened species are listed in Supplementary Table 4a.

- This SWSA lies within the Grassland, Savanna and Forest biomes of South Africa and contains 18 different vegetation types. Of the 18 vegetation types, four are threatened (Figure 12; Supplementary Table 4b).

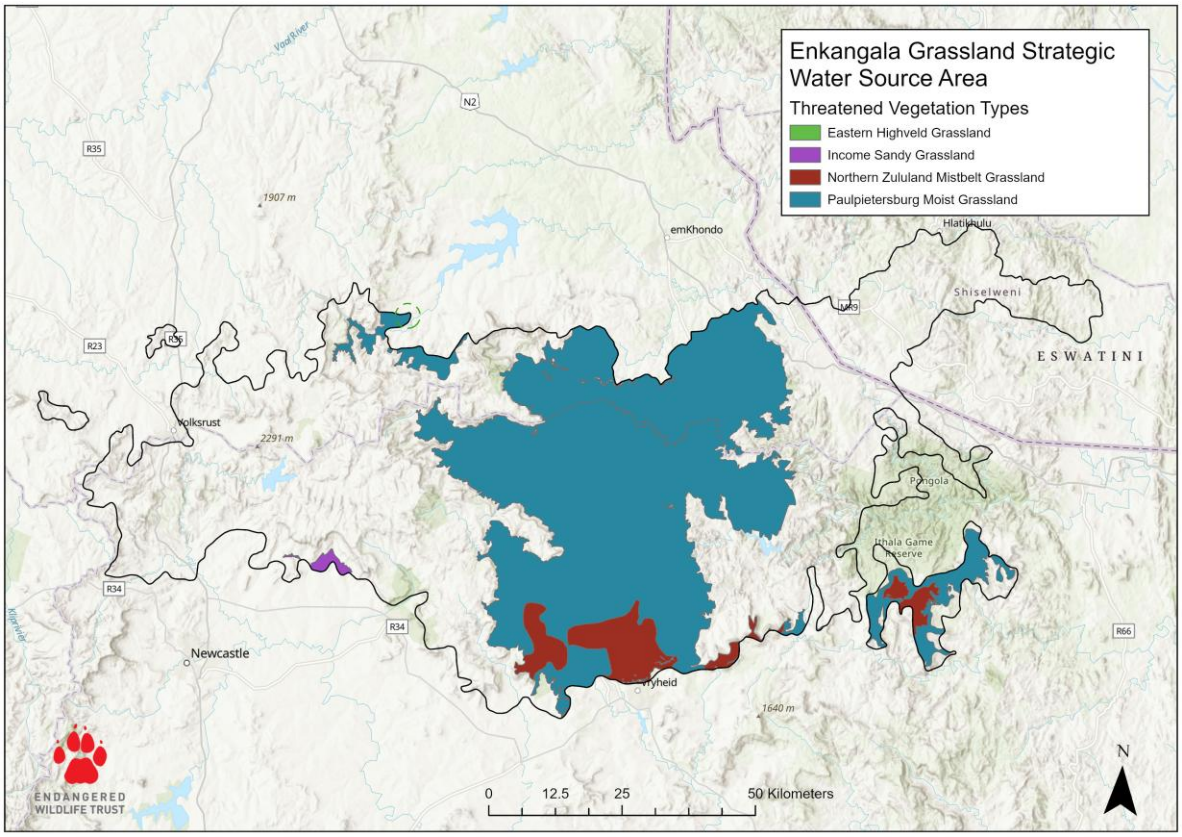


Figure 12: The threatened vegetation found in the Enkangala Grassland Strategic Water Source Area.

Summary Table for the Enkangala Grassland SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	72,111	9
Natural – total	551,583	70
Recoverable – total	37,686	5
Transformed – total	199,111	25
Protected (Agricultural)	283,384	36
Recoverable, outside of Protected Areas and Protected Agricultural Areas	24,992	3
Natural, outside of Protected Areas and Protected Agricultural Areas	359,050	46
Total (within SA)	**788,131**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 165,529 Ha, covering 21% of the total SWSA (Figure 13).

Within it, 85% of the area is “Natural”, 4% is “Recoverable” and 10% is “Transformed”.

The PCRAs may also potentially house up to 80 threatened species (55 animals and 25 plants), of which one was Critically Endangered. The PCRAs also house three threatened vegetation types.

Within the PCRAs, we have an area of 7,266 Ha (4%) listed as “Recoverable”.

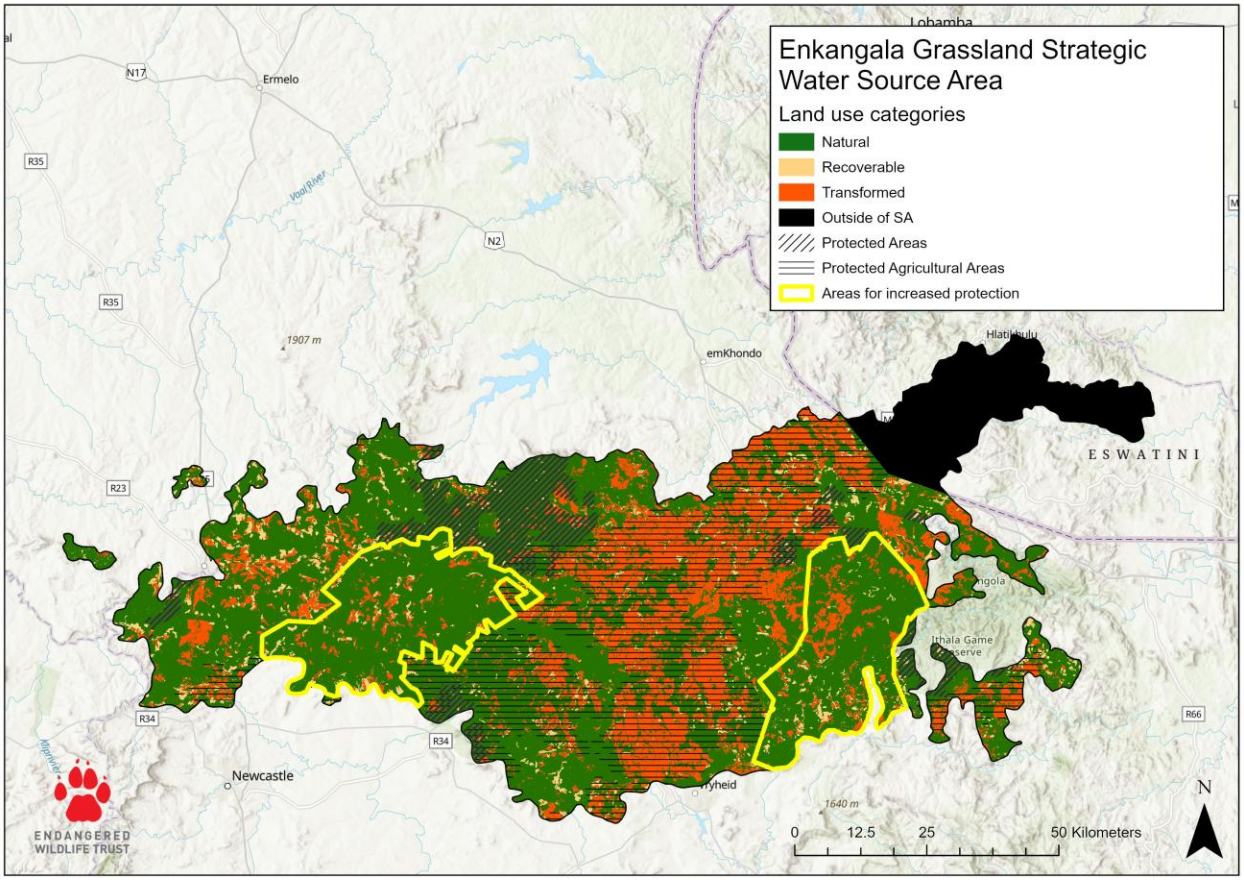


Figure 13: The Enkangala Grassland Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.



Groot Winterhoek Strategic Water Source Area

Protection status:

- Total area within South Africa: 518,277 Ha.
- Percentage within existing formally protected areas: 82%.
- Protected Agricultural Areas: 168,217 Ha (32%).

Landuse:

A total of 80% was listed as “Natural”, 8% “Recoverable” and 12% “Transformed” (Figure 10). The Groot Winterhoek SWSA has the second largest proportion of orchards and vineyards (Stats SA, 2023). Further calculations (from step 7 above) showed that 27,432 Ha (5%) are possibly “Recoverable” after removing Protected Agricultural Areas, and 115,885 Ha (22%) are “Natural” and not currently within South Africa’s protected areas.

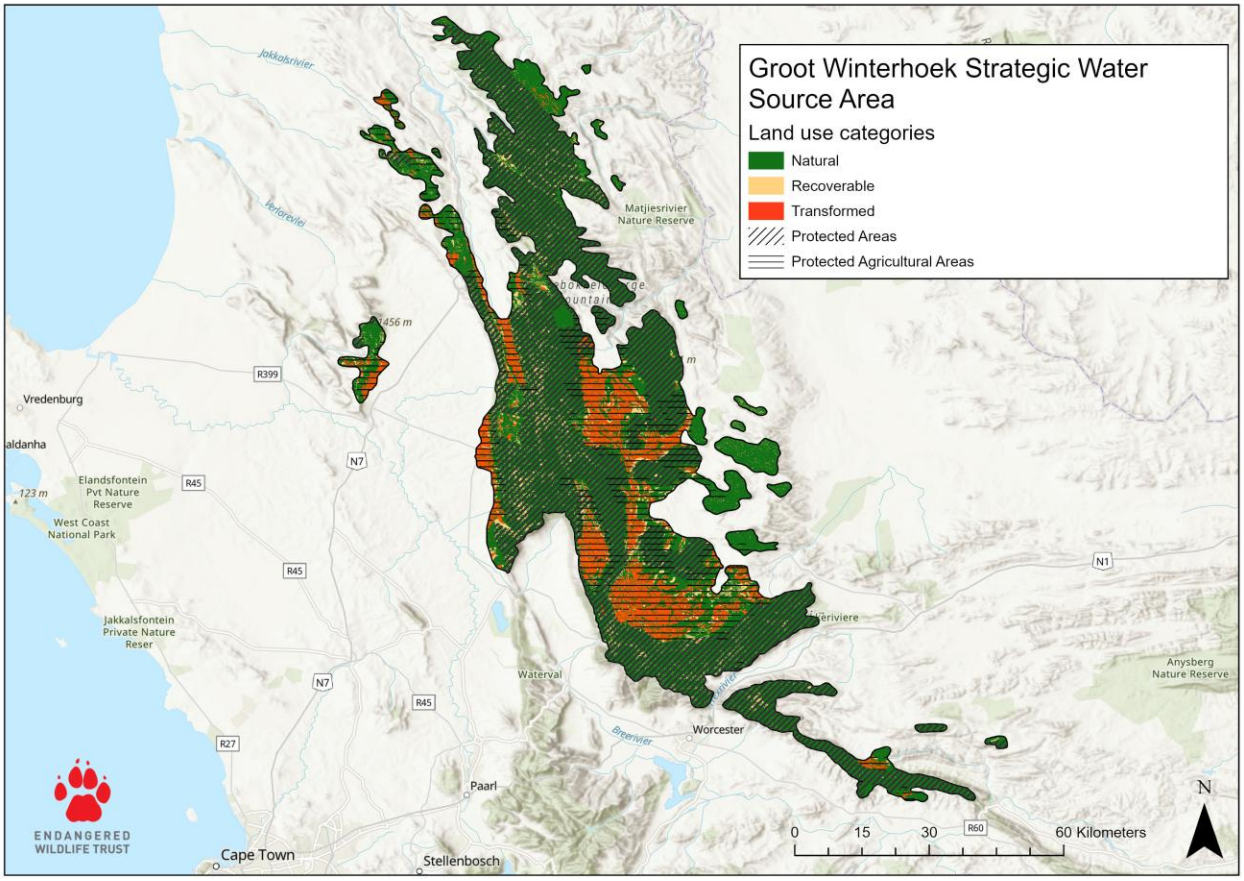


Figure 14: The Groot Winterhoek Strategic Water Source Area indicating the various National Land Cover classes that have been classified into “Natural”, “Recoverable” and “Transformed”. Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of 49 threatened species (eight animals and 41 plants) being found in this SWSA, and a lower confidence estimate of 674 threatened species (67 animals and

607 plants) being found in the SWSA. Of the high confidence estimate, seven species are Critically Endangered. All threatened species are listed in Supplementary Table 5a.

- This SWSA lies within the Fynbos and Succulent Karoo biomes of South Africa and contains 32 different vegetation types. Of the 32 vegetation types, 11 are threatened (Figure 15; Supplementary Table 5b).

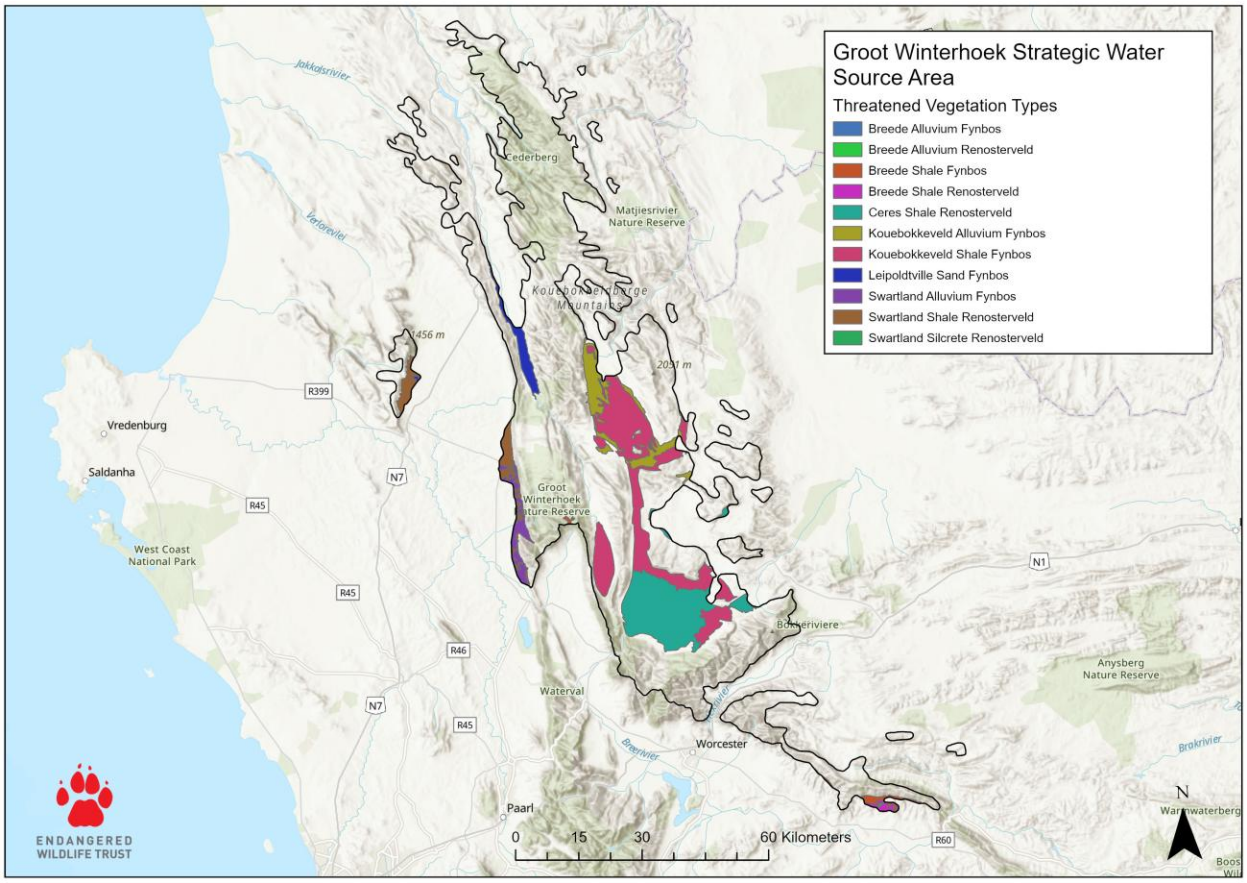


Figure 15: The threatened vegetation found in the Groot Winterhoek Strategic Water Source Area.

Summary Table for the Groot Winterhoek SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	425,814	82
Natural – total	415,430	80
Recoverable – total	41,420	8
Transformed – total	61,424	12
Protected (Agricultural)	168,217	32
Recoverable, outside of Protected Areas and Protected Agricultural Areas	4,675	1
Natural, outside of Protected Areas and Protected Agricultural Areas	56,777	11
Total (within SA)	**518,277**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 20,197 Ha, covering 4% of the total SWSA (Figure 16).

Within the PCRAs, 96% of the area is “Natural”, 4% is “Recoverable” and less than 1% is “Transformed”.

The PCRAs may also potentially house up to 75 threatened species (14 animals and 61 plants), of which three species are Critically Endangered. The PCRAs also house three threatened vegetation types.

Within the PCRAs, an area of 821 Ha (less than 1%) was classified as “Recoverable”.

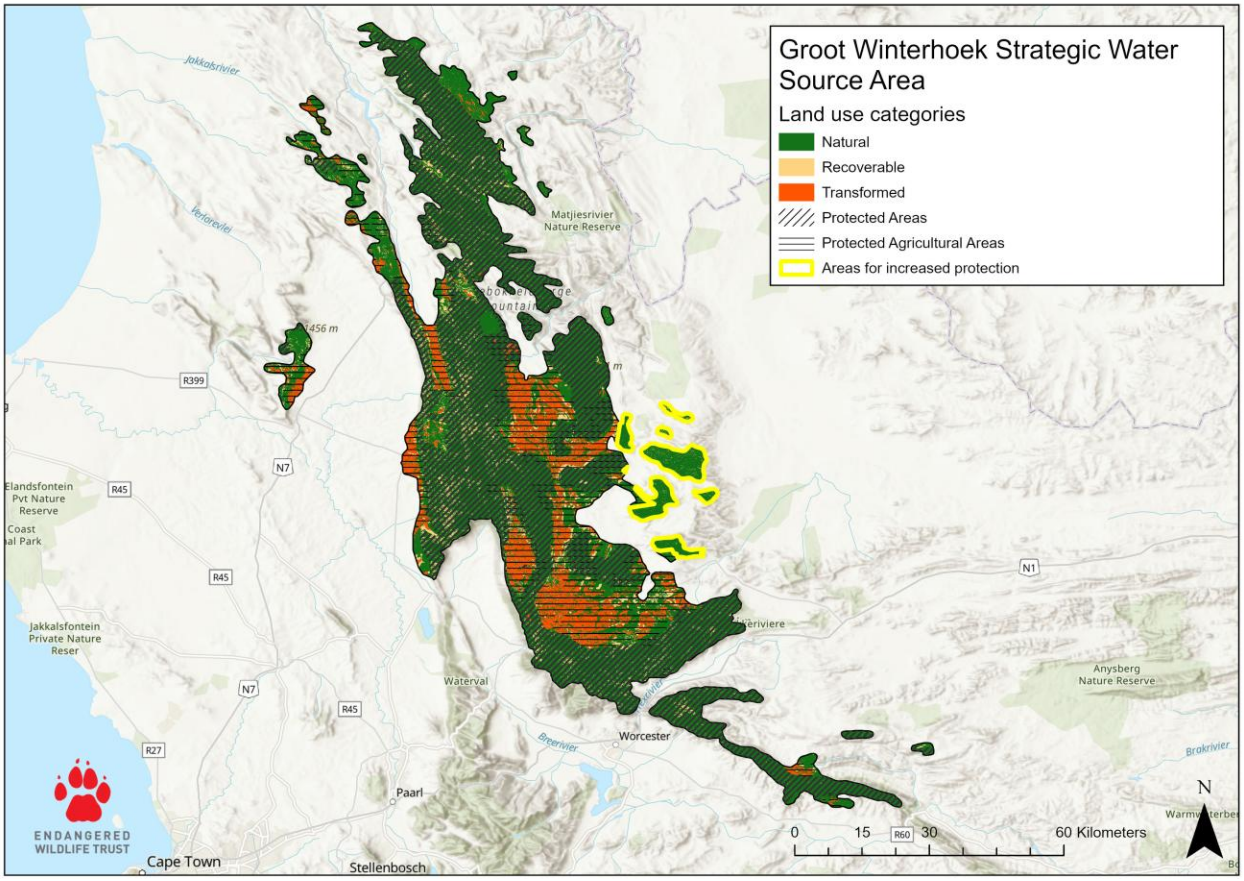


Figure 16: The Groot Winterhoek Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.

Kouga Strategic Water Source Area

Protection status:

- Total area within South Africa: 63,099 Ha.
- The Kouga SWSA is the second smallest SWSA in South Africa (Stats SA, 2023).
- Percentage within existing formally protected areas: 73%. This is the second highest proportion of protected areas of all the SWSAs (Stats SA, 2023).
- Protected Agricultural Areas: 304 Ha (less than 1%).

Landuse:

This SWSA is one of the least modified areas (Stats SA, 2023), with 99.6% listed as "Natural", with less than 1% "Recoverable" and less than 1% "Transformed" (Figure 12). Further calculations (from step 7 above) showed that 224 Ha (less than 1%) are possibly "Recoverable" after removing Protected Agricultural Areas, and 17,412 Ha (28%) are "Natural" and not currently within South Africa's protected areas.

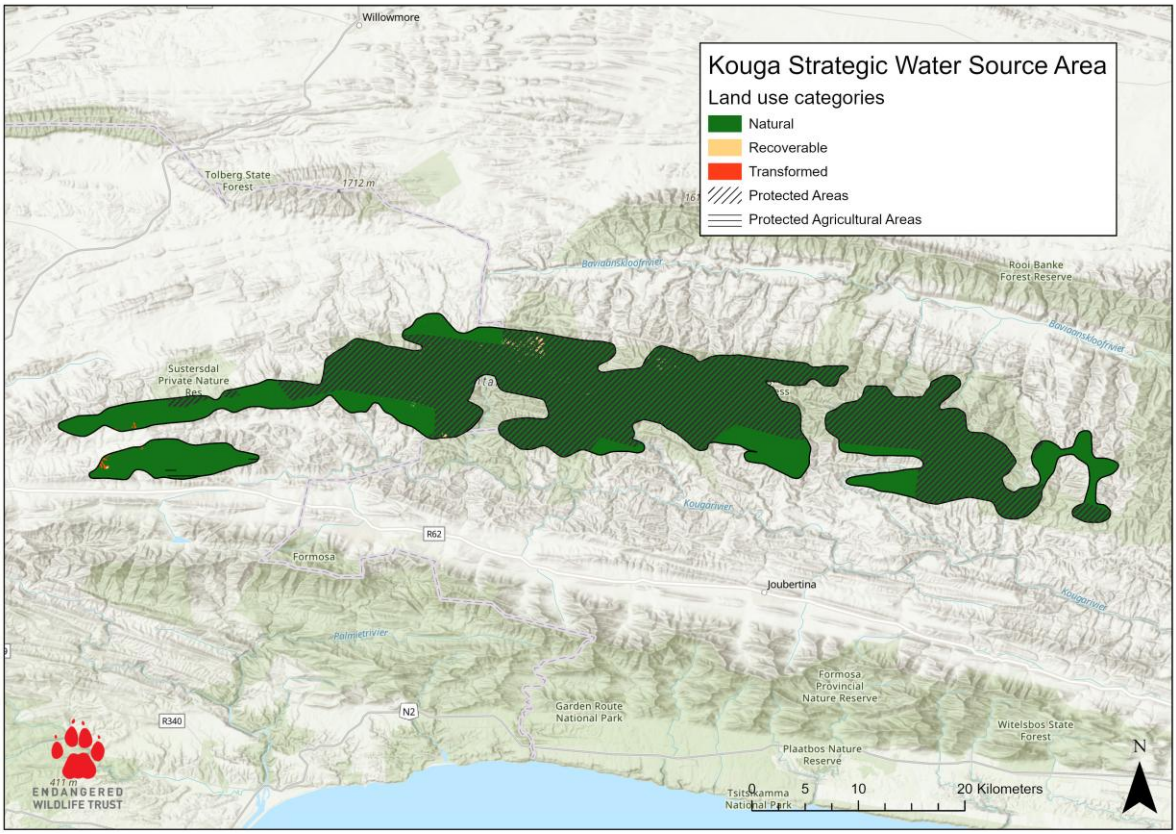


Figure 17: The Kouga Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- There are 44 threatened species (18 animals and 26 plants) found in the SWSA (all threatened species listed in Supplementary Table 6a).
- This SWSA lies within the Fynbos biome of South Africa and contains 3 different vegetation types, of which there are no threatened vegetation types.

Summary Table for the Kouga SWSA:

Type	Hectares	Percentage
Protected (Conservation)	46,091	73
Natural – total	62,819	99.6
Recoverable – total	224	0.3543
Transformed – total	58	0.0927
Protected (Agricultural)	340	0.5383
Recoverable, outside of Protected Areas and Protected Agricultural Areas	12	0.0187
Natural, outside of Protected Areas and Protected Agricultural Areas	17,073	27
Total (within SA)	**63,099**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 7,656 Ha, covering 12% of the total SWSA (Figure 18).

Within it, 99% of the area is "Natural", less than 1% is "Recoverable" and less than 1% is "Transformed".

The PCRAs may also potentially house up to 29 threatened species (13 animals and 16 plants).

Within the PCRAs, an area of 6 Ha (less than 1%) is listed as "Recoverable".

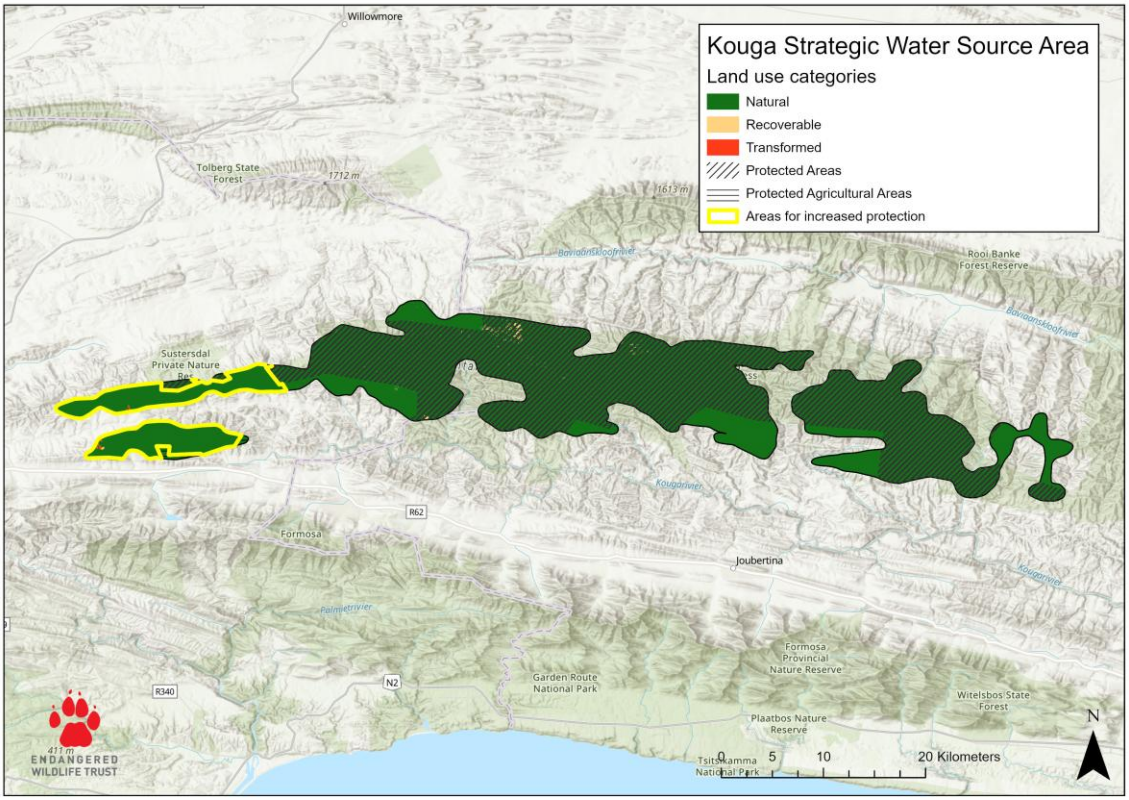


Figure 18: The Kouga Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.

Langeberg Strategic Water Source Area

Protection status:

- Total area within South Africa: 171,515 Ha.
- Percentage within existing formally protected areas: 62%.
- Protected Agricultural Areas: 72,274 Ha (42%).

Landuse:

A total of 77% was listed as "Natural", 2% "Recoverable" and 21% "Transformed" (Figure 19). Further calculations showed that 1,484 Ha (1%) are possibly "Recoverable" after removing Protected Areas and Protected Agricultural Areas, and 16,683 Ha (10%) are "Natural" and not currently protected.

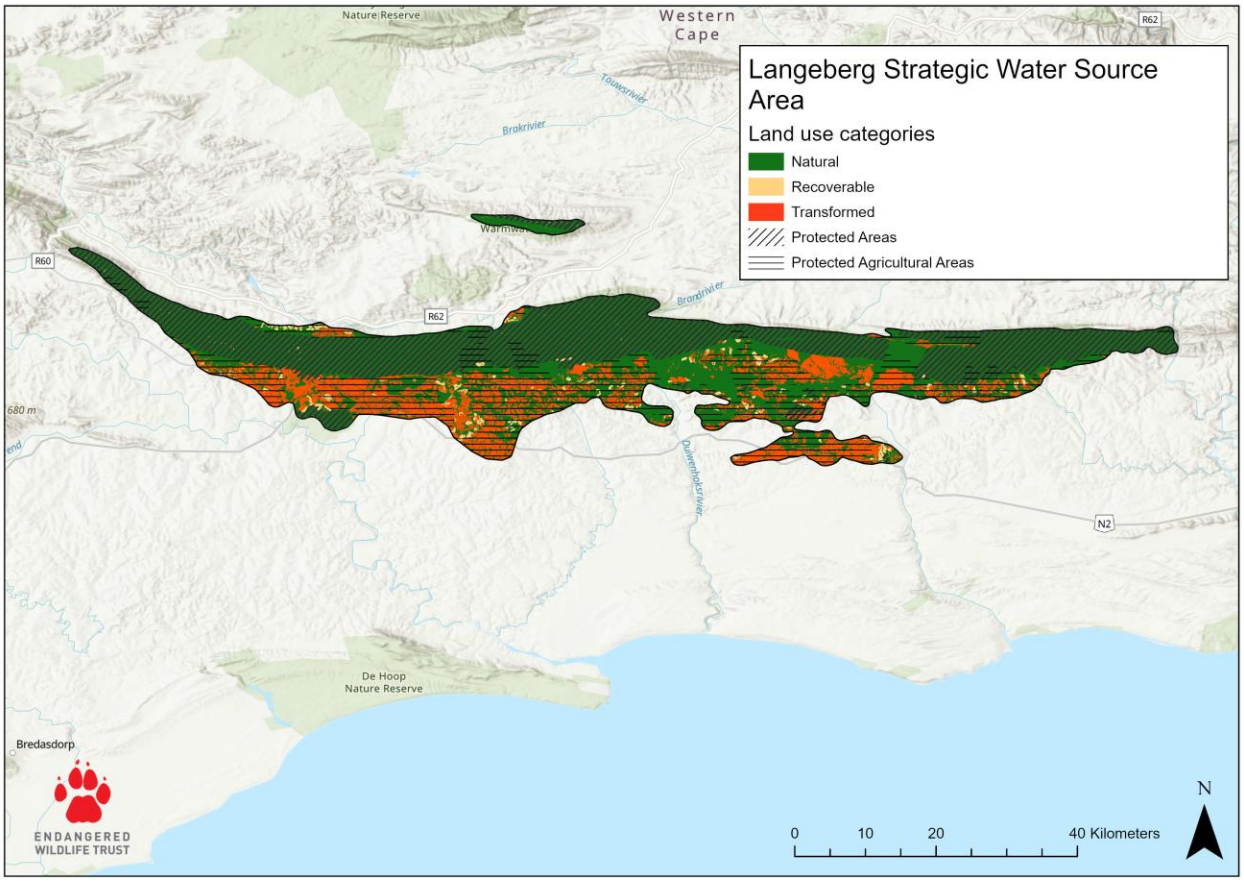


Figure 19: The Langeberg Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of 29 threatened species (6 animals and 23 plants) being found in this SWSA, and a lower confidence estimate of 293 threatened species (42 animals and 251 animals) being found in the SWSA. Of the high confidence estimate, eight species are Critically Endangered. All threatened species are listed in Supplementary Table 7a.

- This SWSA lies within the Fynbos, Forest and Albany Thicket biomes of South Africa and contains 15 different vegetation types. Of the 15 vegetation types, seven are threatened (Figure 20; Supplementary Table 7b).

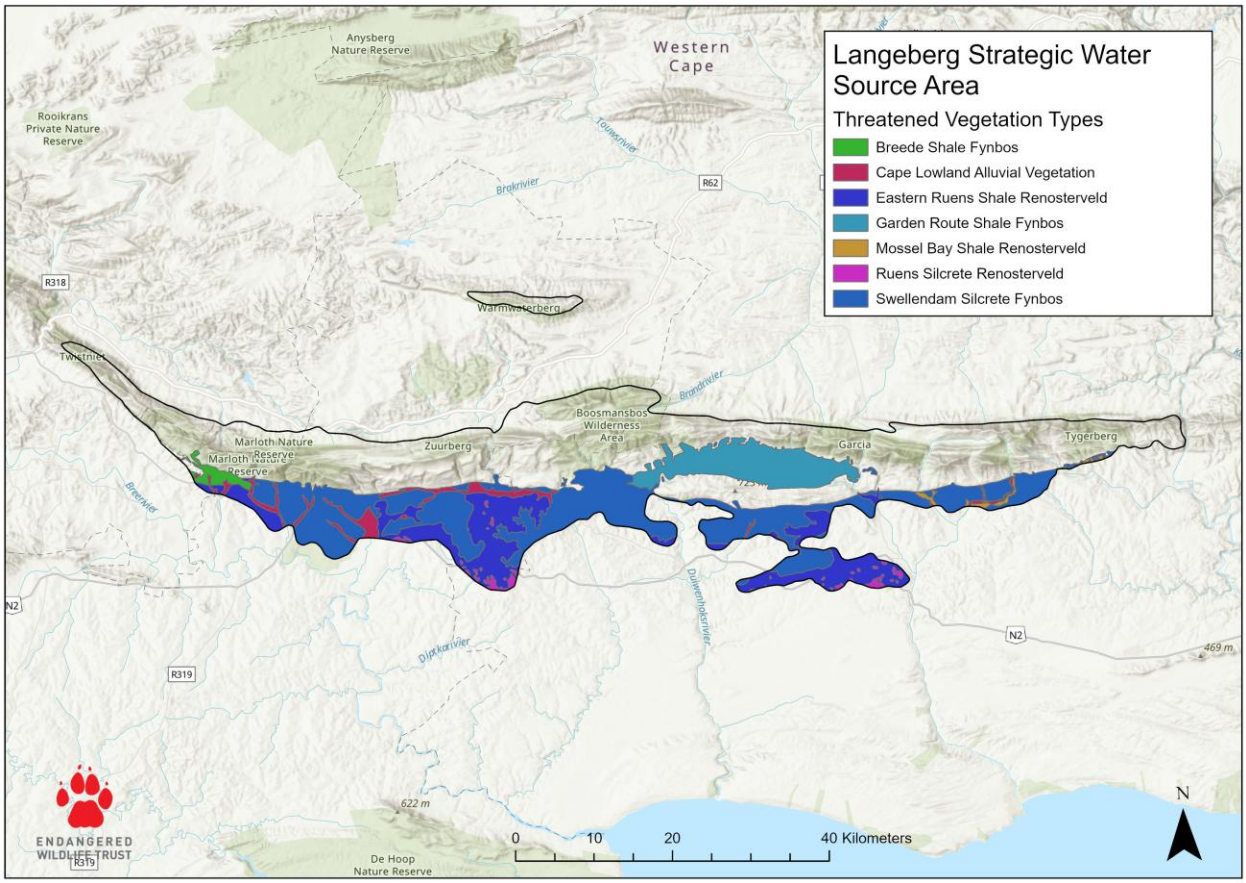


Figure 20: The threatened vegetation found in the Langeberg Strategic Water Source Area.

Summary Table for the Langeberg SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	106,993	62
Natural – total	131,439	77
Recoverable – total	3,881	2
Transformed - total	36,197	21
Protected (Agricultural)	72,274	42
Recoverable, outside of Protected Areas and Protected Agricultural Areas	1,484	1
Natural, outside of Protected Areas and Protected Agricultural Areas	16,683	10
Total (within SA)	**171,515**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 4,728 Ha, covering 3% of the total SWSA (Figure 21).

Within it, 89% of the area is “Natural”, 3% is “Recoverable” and less than 8% is “Transformed”. The PCRAs may also potentially house up to 118 threatened species (20 animals and 98 plants), of which one species is Critically Endangered. There are also three threatened vegetation types within the PCRAs.

Within the PCRAs, we have an area of 152 Ha (3%) listed as “Recoverable”.

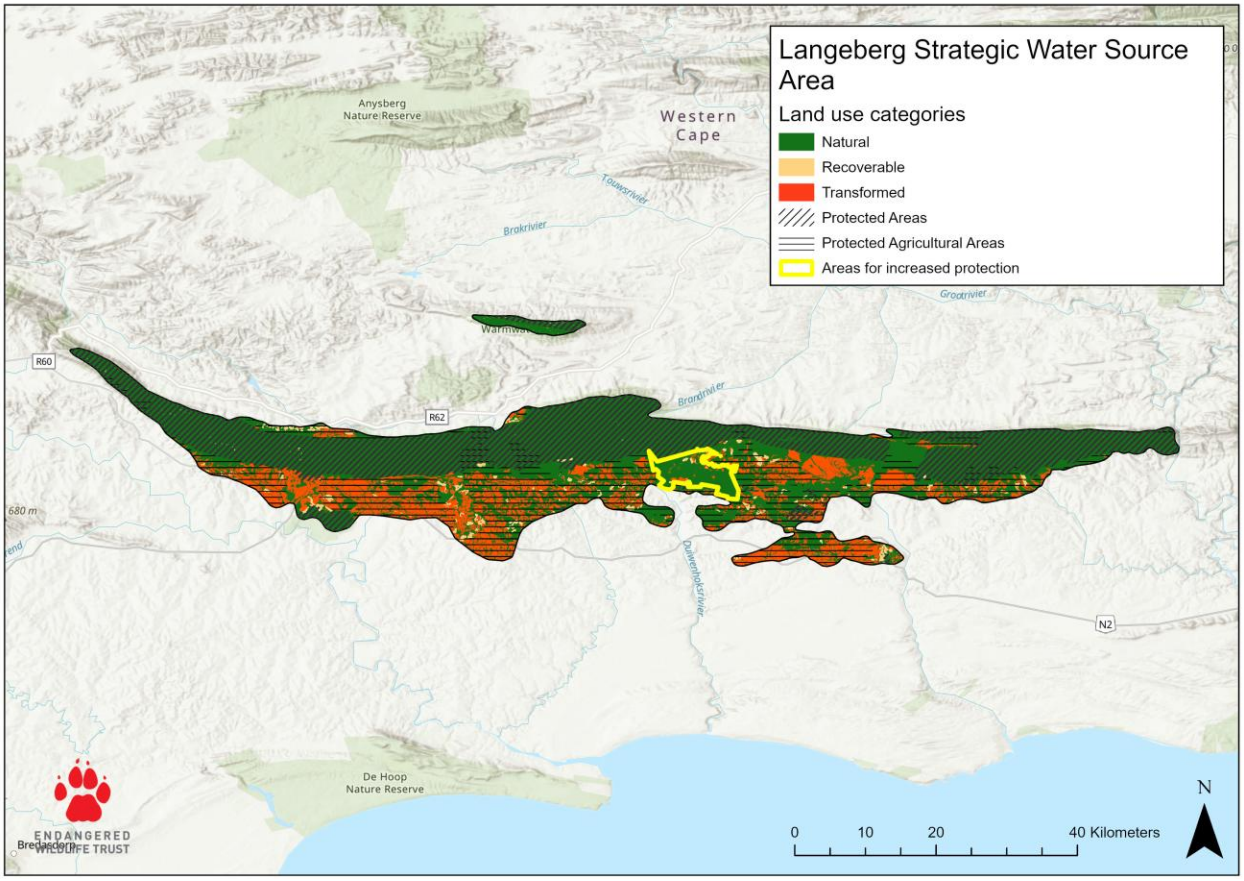


Figure 21: The Langeberg Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.

Maloti Drakensberg Strategic Water Source Area

Protection status:

- Total area within South Africa: 154,703 Ha.
- Percentage within existing formally protected areas: 16%.
- Protected Agricultural Areas cover an area of 56,495 Ha (37%).

Landuse:

A total of 71% was listed as "Natural", 4% "Recoverable" and 25% "Transformed". The majority of this SWSA is located within Lesotho (Figure 22). This SWSA has the second largest proportion of commercial crops of all the SWSAs (Stats SA, 2023). Further calculations showed that 6,852 Ha (4%) is possibly "Recoverable" after removing Protected Areas and Protected Agricultural Areas, and 110,338 Ha (71%) are "Natural" and not currently protected.

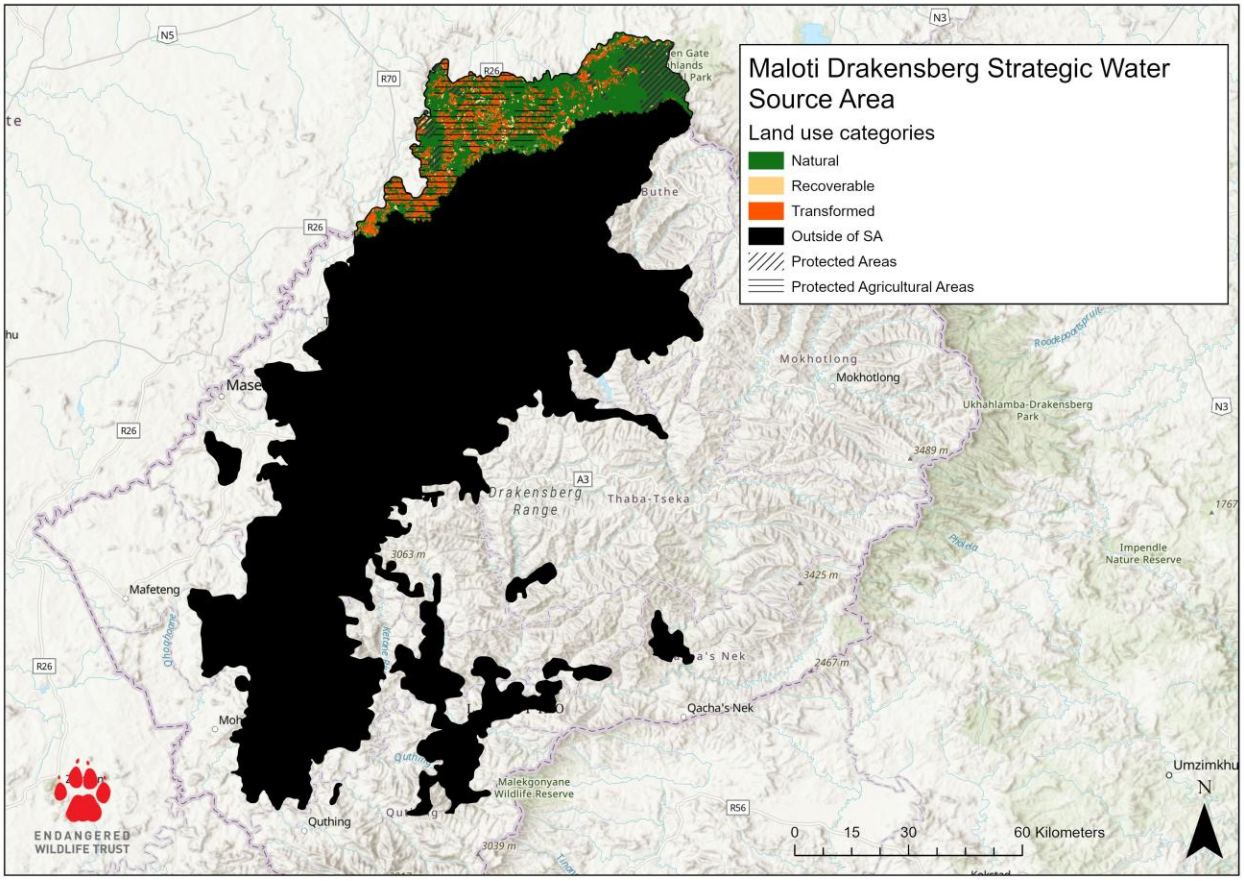


Figure 22: The Maloti Drakensberg Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA. The area in black indicates where the SWSA extends into Lesotho.

Threatened species and vegetation:

- We have a high confidence estimate of one Extremely Rare butterfly species (*Pseudonympha paragaika*) being found in this SWSA, and a lower confidence estimate of 44 threatened species

(43 animals and one plant) being found in the SWSA. All threatened species are listed in Supplementary Table 8a.

- This SWSA lies within the Grassland biome of South Africa and contains 10 different vegetation types. Of the 10 vegetation types, two are threatened (Figure 23; Supplementary Table 8b).

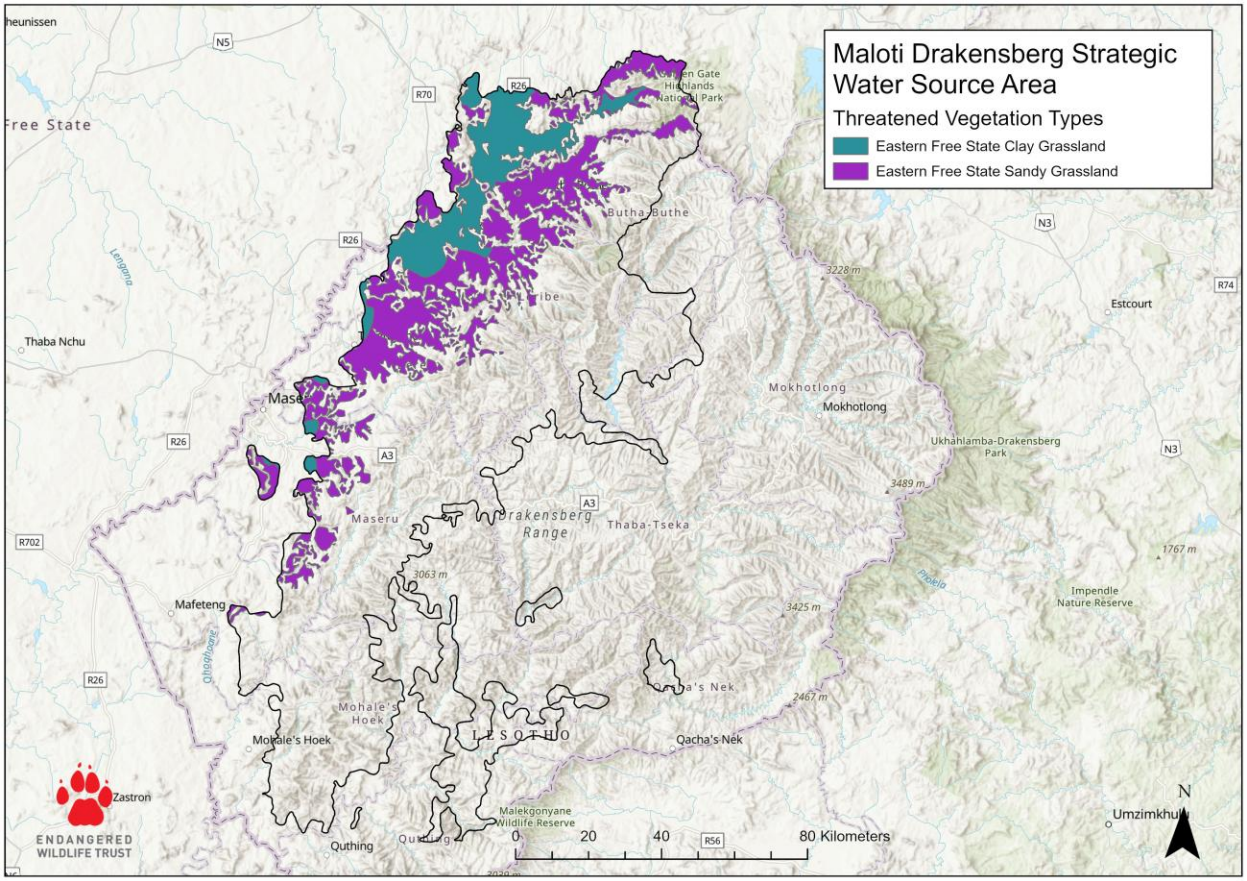


Figure 23: The threatened vegetation found in the Maloti Drakensberg Strategic Water Source Area.

Summary Table for the Maloti Drakensberg SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	24,491	16
Natural – total	110,350	71
Recoverable – total	6,853	4
Transformed - total	39,254	25
Protected (Agricultural)	56,495	37
Recoverable, outside of Protected Areas and Protected Agricultural Areas	6,852	4
Natural, outside of Protected Areas and Protected Agricultural Areas	110,338	71
Total (within SA)	**154,703**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 11,260 Ha, covering 7% of the total SWSA within South Africa (Figure 24).

Within the PCRAs, 98% of the area is “Natural”, 1% is “Recoverable” and 1% is “Transformed”.

The PCRAs may also potentially house up to 28 threatened species (27 animals and one plant), of which one species is Critically Endangered. There are also two threatened vegetation types within the PCRAs.

Within the PCRAs, an area of 186 Ha (1%) is listed as “Recoverable”.

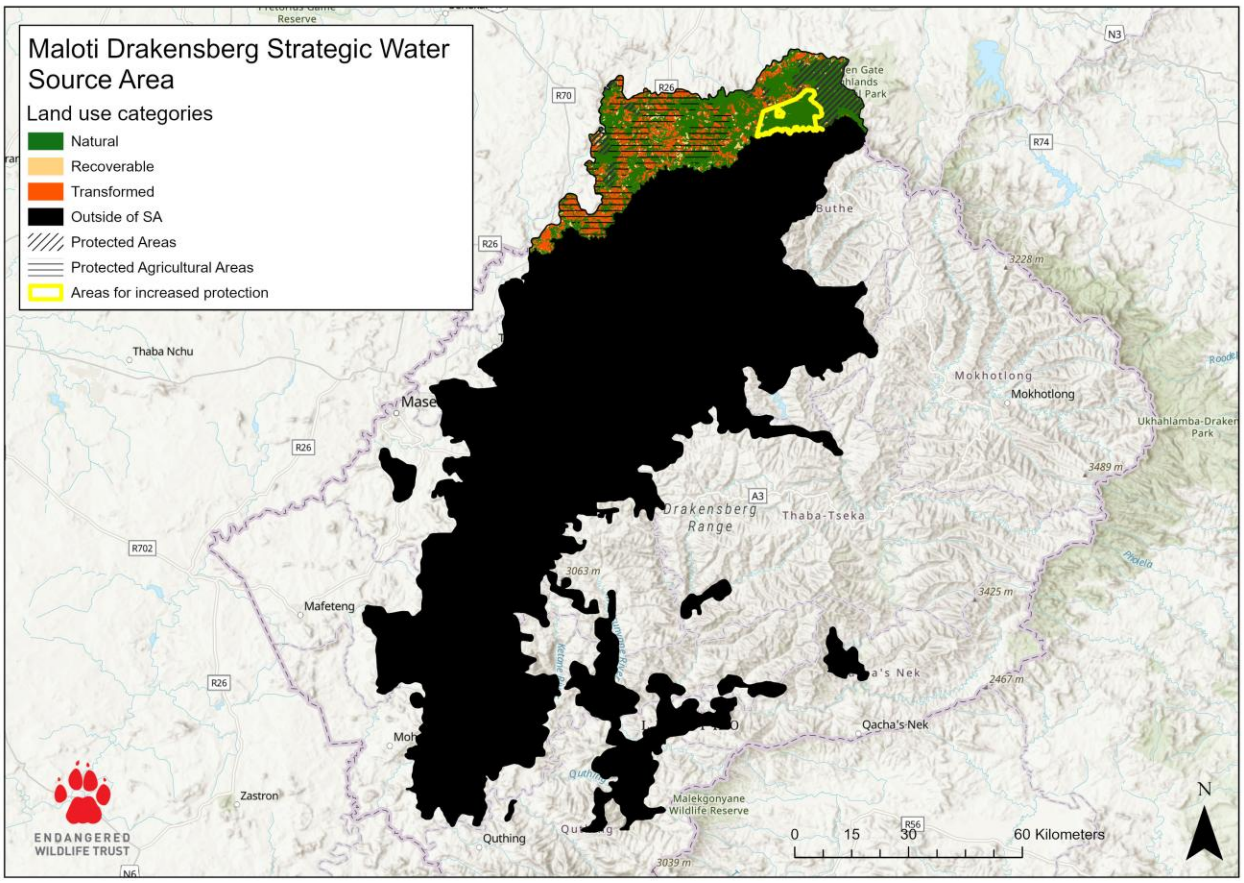


Figure 24: The Maloti Drakensberg Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.



Mbabane Hills Strategic Water Source Area

Protection status:

- Total area within South Africa: 295,783 Ha.
- Percentage within existing formally protected areas: 59%.
- Protected Agricultural Areas: 51,286 Ha (17%).

Landuse:

A total of 66% was listed as "Natural", 2% "Recoverable" and 33% "Transformed". The majority of this SWSA is located within eSwatini (Figure 25). This SWSA has the third largest proportion of timber plantations of all the SWSAs (Stats SA, 2003). Further calculations showed that 1,623 Ha (1%) is possibly "Recoverable" after removing Protected Areas and Protected Agricultural Areas, and 91,716 Ha (31%) are "Natural" and not currently protected.

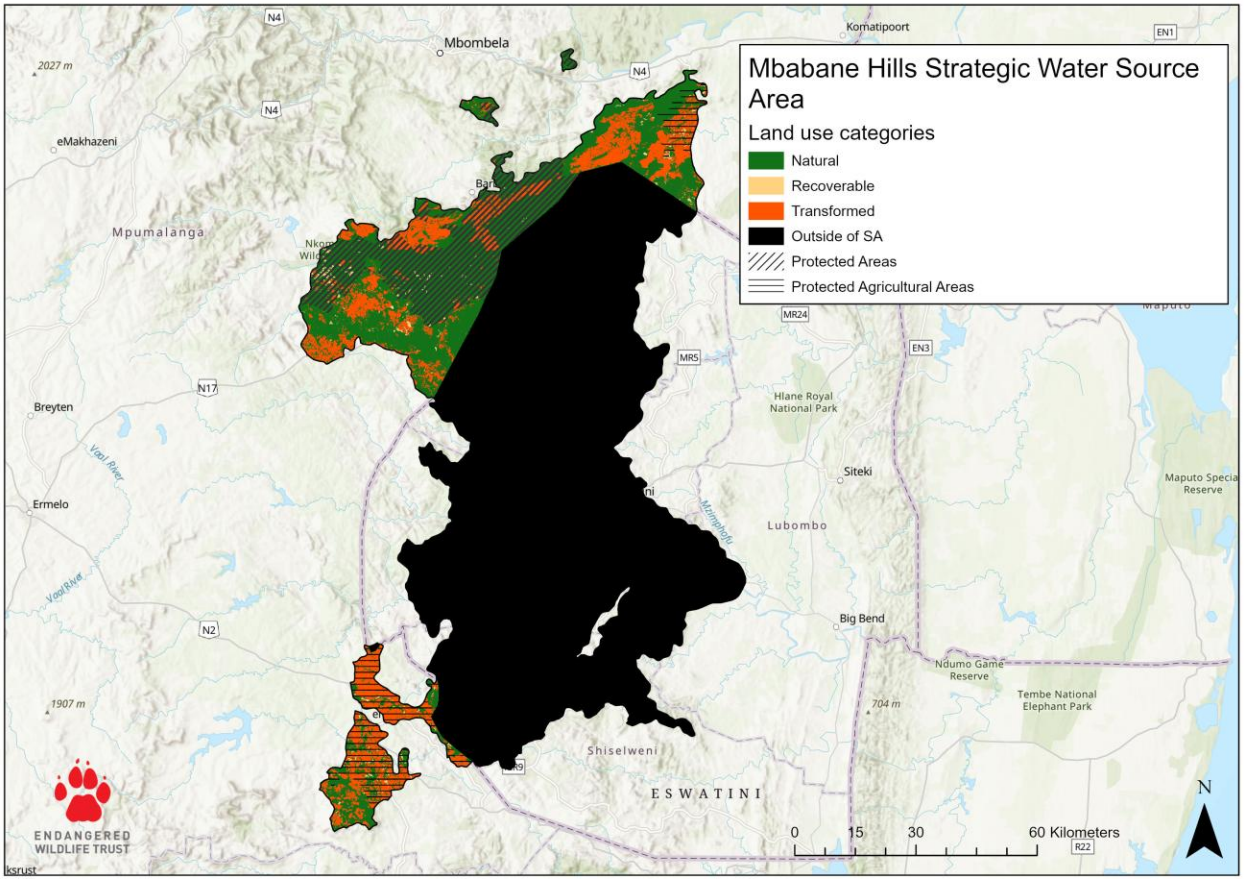


Figure 25: The Mbabane Hills Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA. The area in black indicates where the SWSA extends into Eswatini.

Threatened species and vegetation:

- We have a high confidence estimate of six threatened species (three animals and three plants) being found in this SWSA, and a lower confidence estimate of 121 threatened species (74 animals

and 47 plants) being found in the SWSA. Of the high confidence estimate, two species are Critically Endangered. All threatened species are listed in Supplementary Table 9a.

- This SWSA lies within the Grassland, Savanna and Forest biomes of South Africa and contains 15 different vegetation types. Of the 15 vegetation types, two are threatened (Figure 26; Supplementary Table 9b).

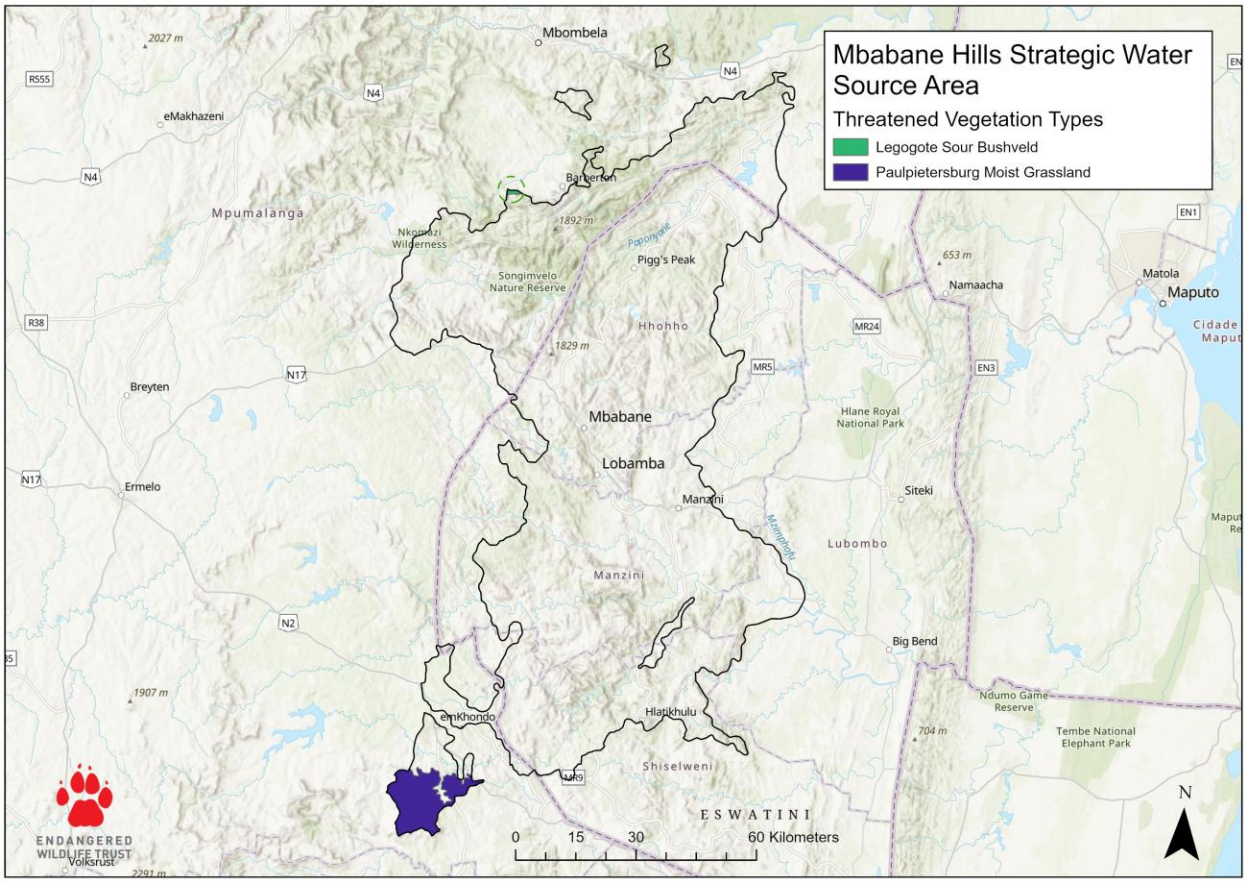


Figure 26: The threatened vegetation found in the Mbabane Hills Strategic Water Source Area.

Summary Table for the Mbabane Hills SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	173,549	59
Natural – total	194,644	66
Recoverable – total	5,435	2
Transformed - total	97,045	33
Protected (Agricultural)	51,286	17
Recoverable, outside of Protected Areas and Protected Agricultural Areas	1,623	1
Natural, outside of Protected Areas and Protected Agricultural Areas	91,716	31
Total (within SA)	**295,783**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 32,475 Ha, covering 11% of the total SWSA within South Africa (Figure 27).

Within the PCRAs, 84% of the area is “Natural”, 1% is “Recoverable” and 16% is “Transformed”.

We have a high confidence estimate of one Endangered plant species and a lower confidence estimate of up to 58 threatened species (42 animals and 16 plants), one of which is Critically Endangered.

Within the PCRAs, we have an area of 252 Ha (1%) listed as “Recoverable”.

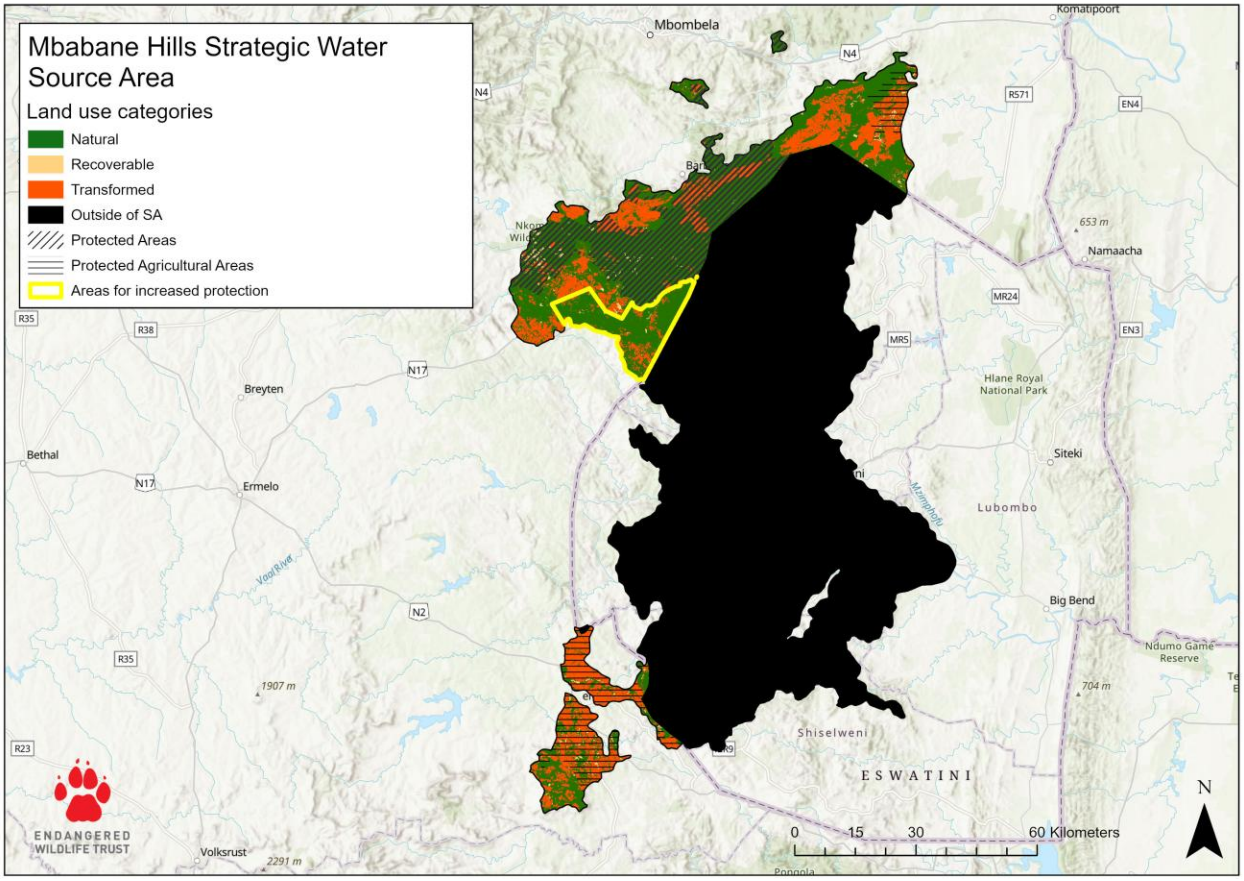


Figure 27: The Mbabane Hills Strategic Water Source showing the areas most suitable for increased protection outlined in yellow.



Mfolozi Headwaters Strategic Water Source Area

Protection status:

- Total area within South Africa: 192,069 Ha.
- Percentage within existing formally protected areas: only 8%. This is the SWSA with the third lowest protection levels of all the SWSAs (Stats SA, 2023).
- Protected Agricultural Areas: 50,093 Ha (26%).

Landuse:

A total of 64% was listed as "Natural", 6% "Recoverable" and 30% "Transformed" (Figure 28). Further calculations showed that 11,342 Ha (6%) is possibly "Recoverable" after removing Protected Areas and Protected Agricultural Areas, and 123,142 Ha (64%) are "Natural" and not currently protected.

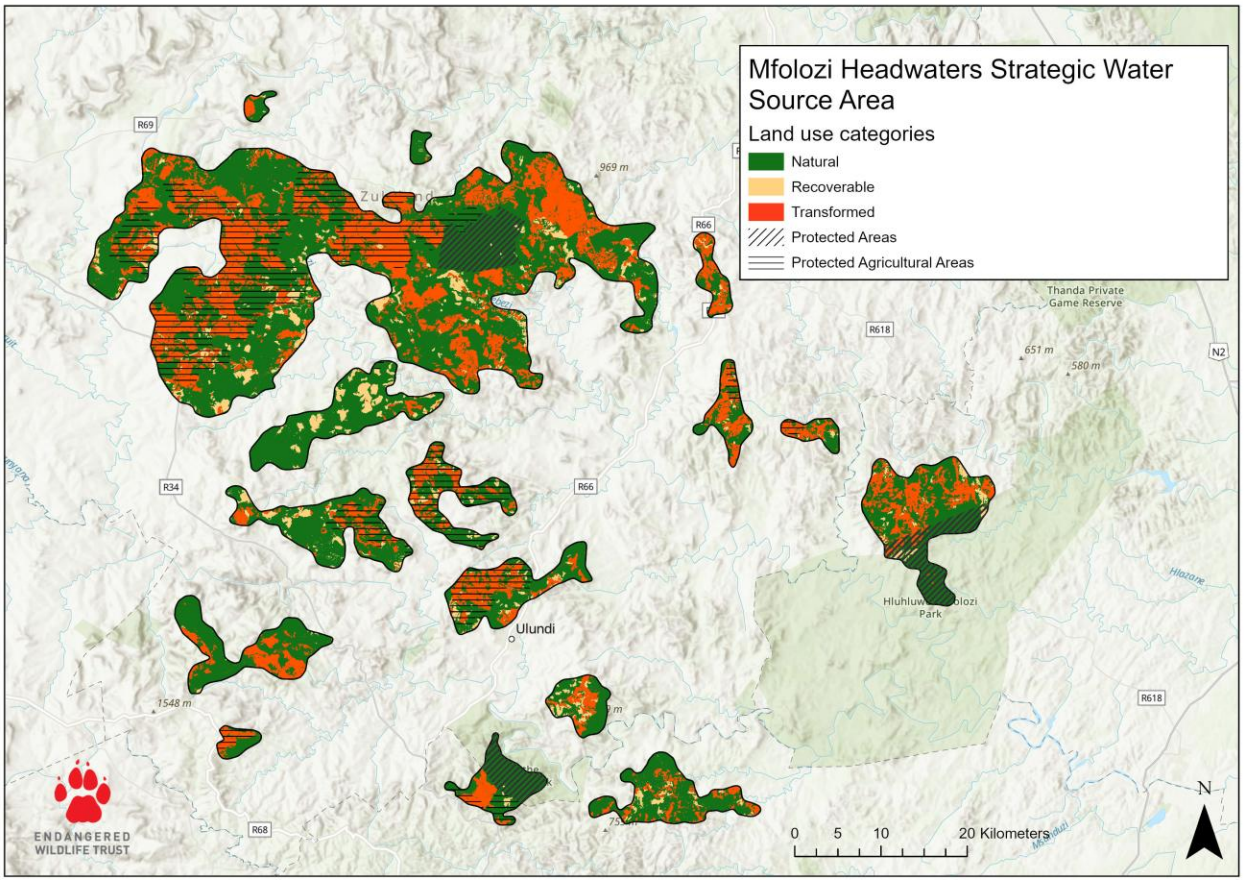


Figure 28: The Mfolozi Headwaters Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of one Critically Rare animal (*Quamtana merwei*) being found in this SWSA, and a lower confidence estimate of 88 threatened species (67 animals and 21 plants) being found in the SWSA. All threatened species are listed in Supplementary Table 10a.

- This SWSA lies within the Savanna, Grassland and Forest biomes of South Africa and contains 13 different vegetation types. Of the 13 vegetation types, six are threatened (Figure 29; Supplementary Table 10b).

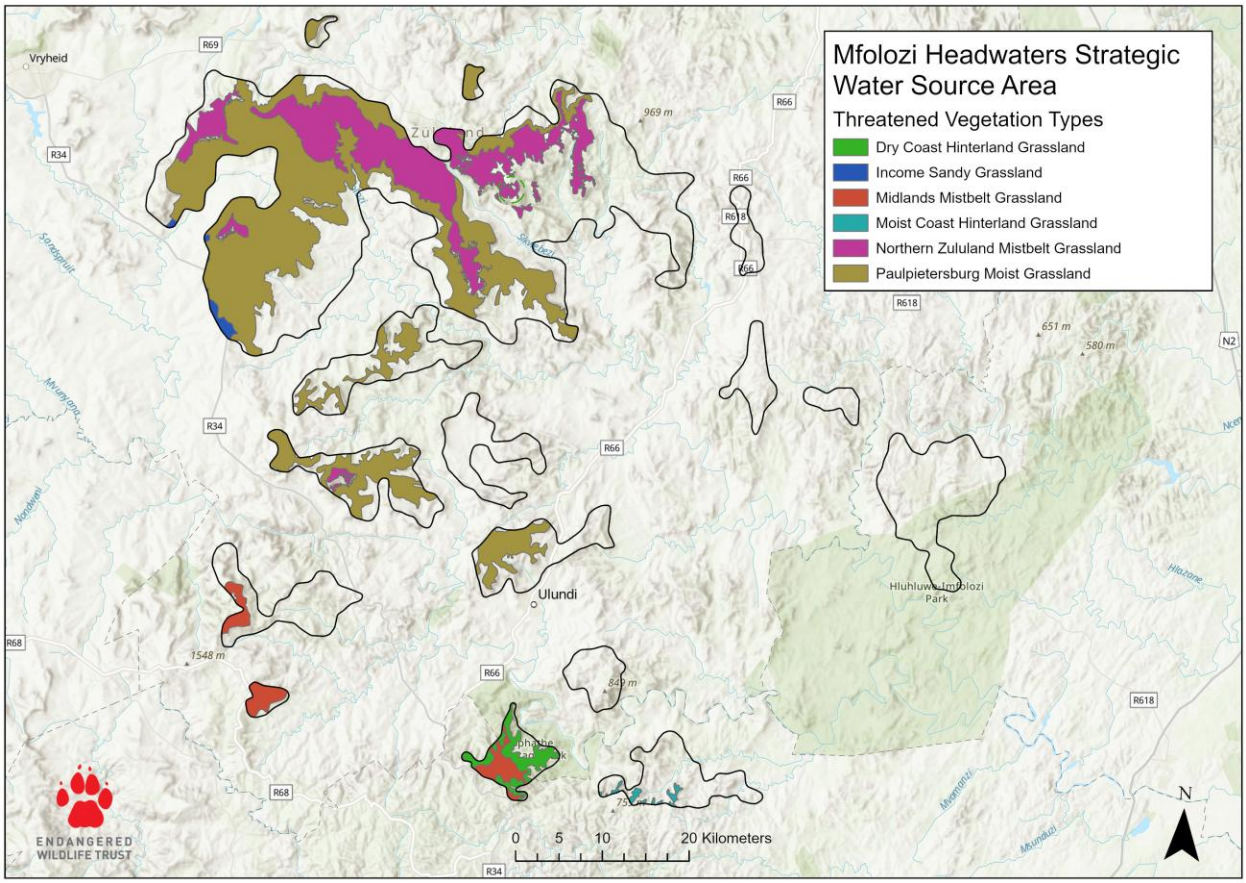


Figure 29: The threatened vegetation found in the Mfolozi Headwaters Strategic Water Source Area.

Summary Table for the Mfolozi Headwaters SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	15,634	8
Natural – total	123,151	64
Recoverable – total	11,343	6
Transformed – total	57,575	30
Protected (Agricultural)	50,093	26
Recoverable, outside of Protected Areas and Protected Agricultural Areas	11,342	6
Natural, outside of Protected Areas and Protected Agricultural Areas	123,142	64
Total (within SA)	**192,069**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 12,612 Ha, covering 7% of the total SWSA within South Africa (Figure 30).

Within it, 82% of the area is “Natural”, 16% is “Recoverable” and 2% is “Transformed”.

The PCRAs may also potentially house up to 35 threatened species (29 animals and six plants). There are also two threatened vegetation types within the PCRAs.

Within the PCRAs, we have an area of 2,008 Ha (16%) listed as “Recoverable”.

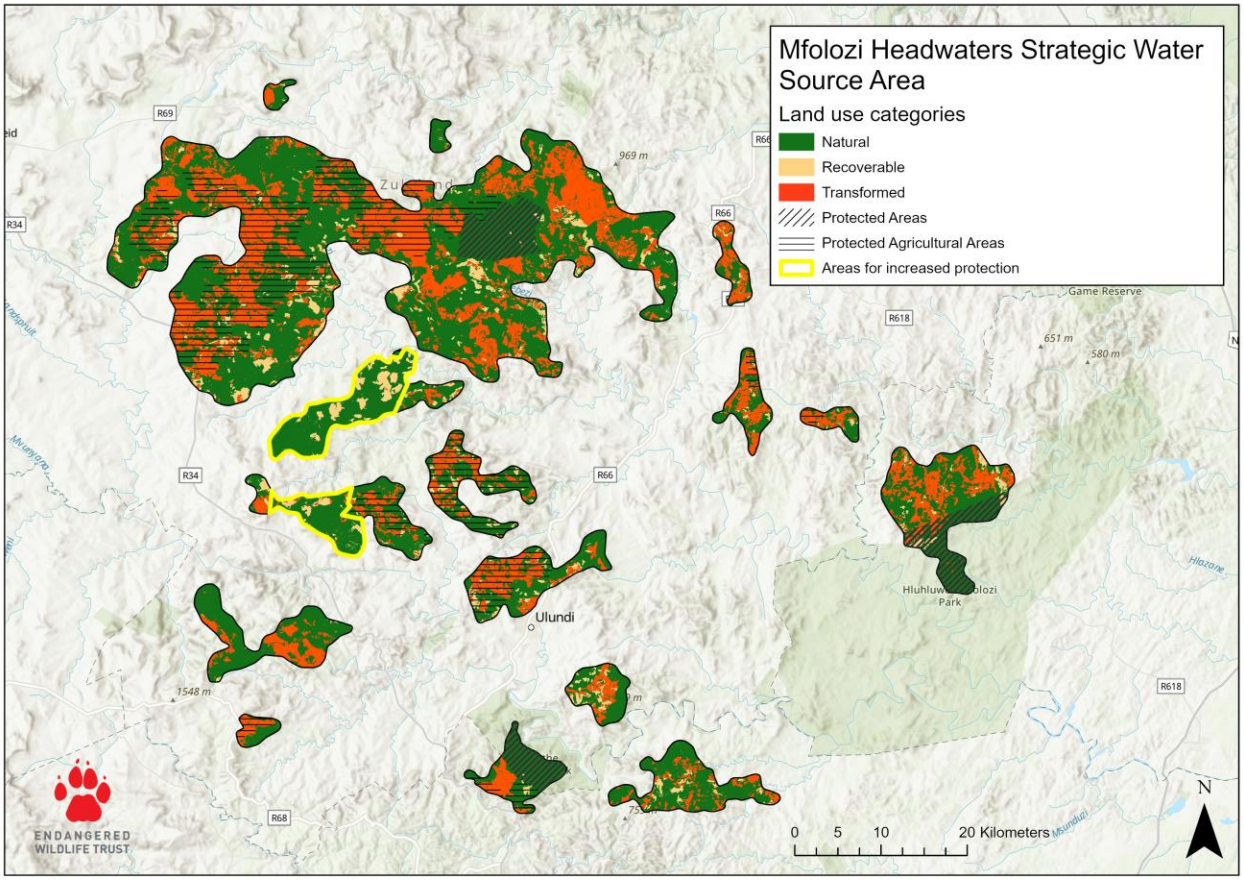


Figure 30: The Mfolozi Headwaters Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.



Mpumalanga Drakensberg Strategic Water Source Area

Protection status:

- Total area within South Africa: 837,274 Ha.
- Percentage within existing formally protected areas: 13%.
- Protected Agricultural Areas: 359,648 Ha (43%).

Landuse:

A total of 51% was listed as “Natural”, 2% “Recoverable” and 47% “Transformed” (Figure 31). This SWSA has the second largest proportion of timber plantations, and the third largest extent of mines in comparison to the rest of the SWSAs (Stats SA, 2023). Further calculations showed that 12,141 Ha (1%) are possibly “Recoverable” after removing Protected Areas and Protected Agricultural Areas, and 253,654 Ha (30%) are “Natural” and not currently protected.

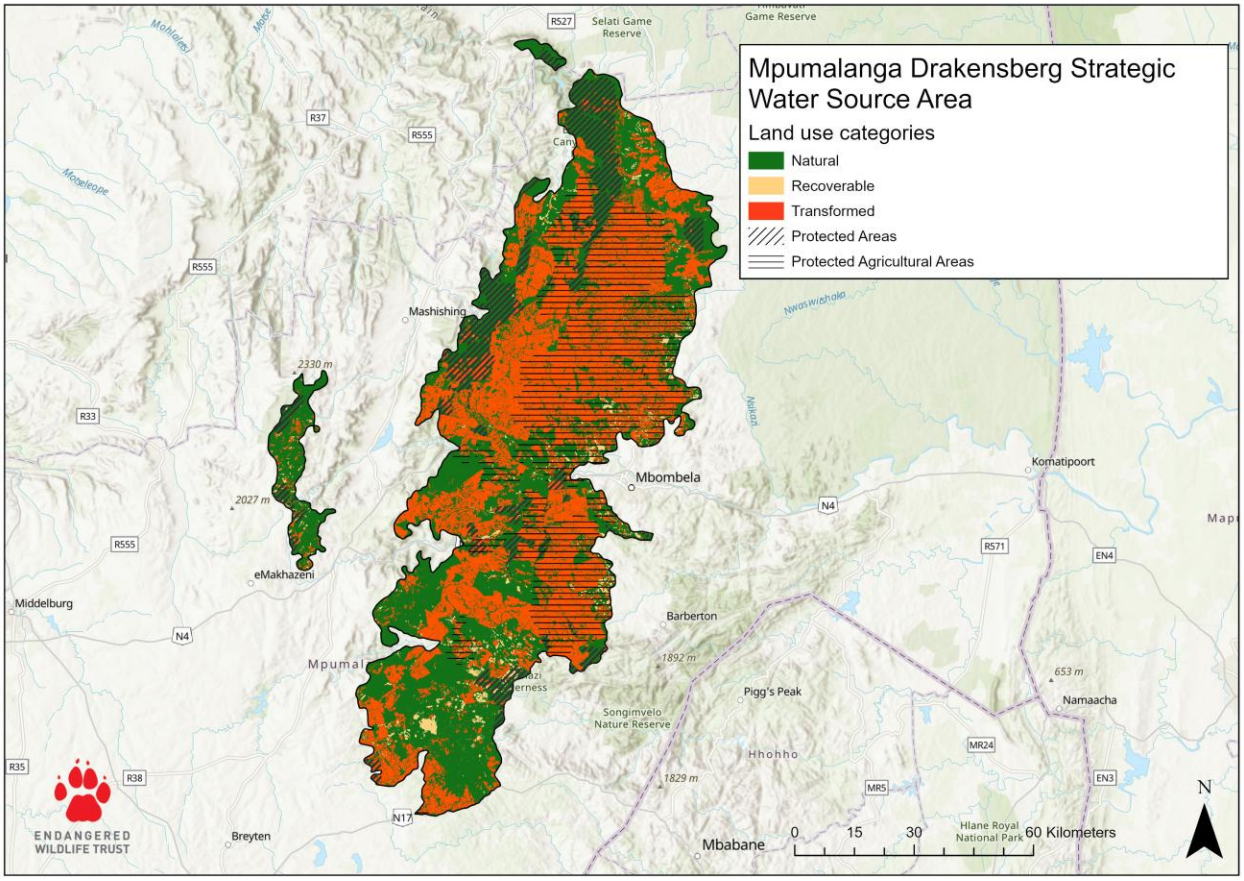


Figure 31: The Mpumalanga Drakensberg Strategic Water Source Area indicating the various National Land Cover classes that have been classified into “Natural”, “Recoverable” and “Transformed”. Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of eight threatened species (four animals and four plants) being found in this SWSA, and a lower confidence estimate of 167 threatened species (94 animals

and 73 plants) being found in the SWSA. Of the high confidence estimate, one species is Critically Endangered. All threatened species are listed in Supplementary Table 11a.

- This SWSA lies within the Grassland, Savanna and Forest biomes of South Africa and contains 19 different vegetation types. Of the 19 vegetation types, four are threatened (Figure 32; Supplementary Table 11b).

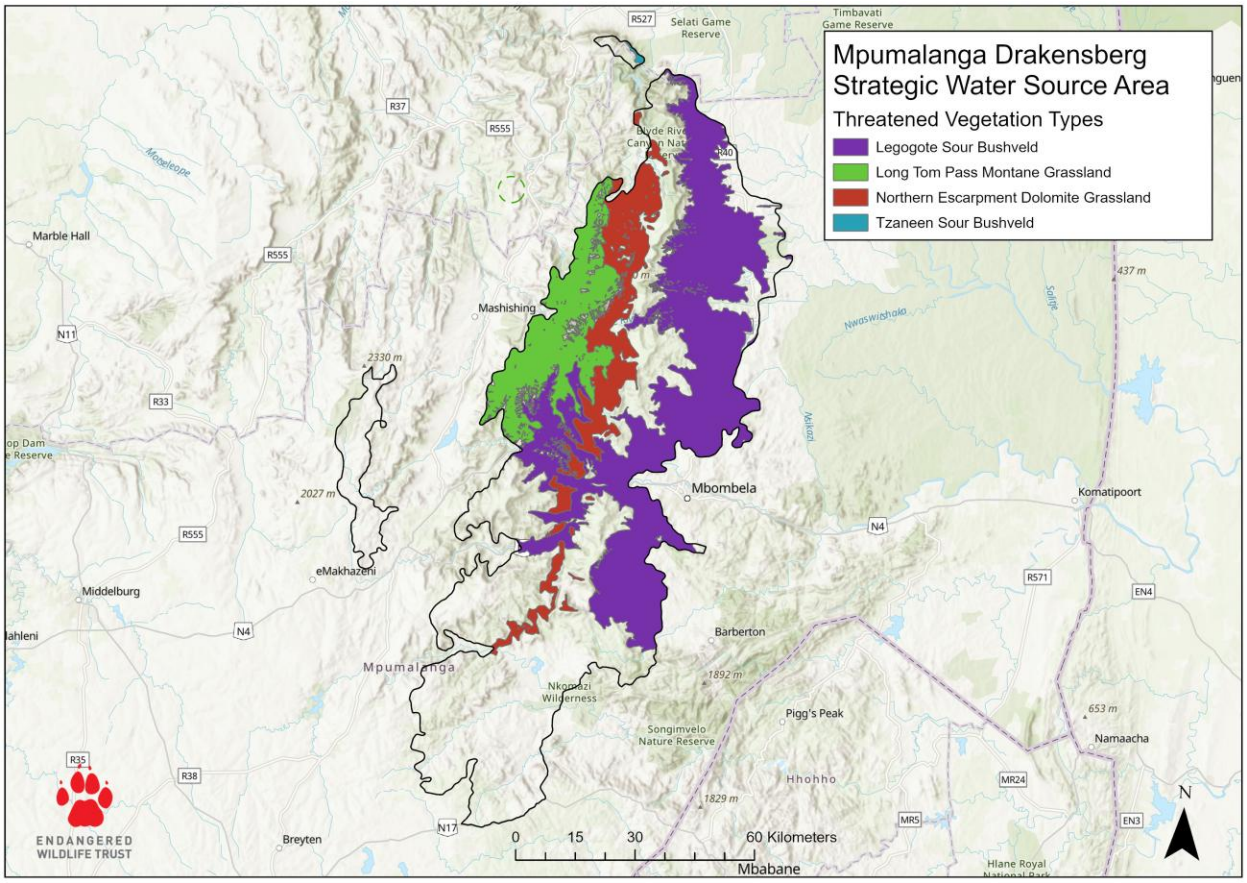


Figure 32: The threatened vegetation found in the Mpumalanga Drakensberg Strategic Water Source Area.

Summary Table for the Mpumalanga Drakensberg SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	106,832	13
Natural – total	423,411	51
Recoverable – total	20,341	2
Transformed – total	393,522	47
Protected (Agricultural)	359,648	43
Recoverable, outside of Protected Areas and Protected Agricultural Areas	12,141	1
Natural, outside of Protected Areas and Protected Agricultural Areas	253,654	30
Total (within SA)	**837,274**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 81,716 Ha, covering 10% of the total SWSA within South Africa (Figure 33).

Within it, 74% of the area is “Natural”, 5% is “Recoverable” and 21% is “Transformed”.

The PCRAs may also potentially house up to 54 threatened species (46 animals and eight plants). There is also one threatened vegetation type within the PCRAs.

Within the PCRAs, we have an area of 4,300 Ha (5%) listed as “Recoverable”.

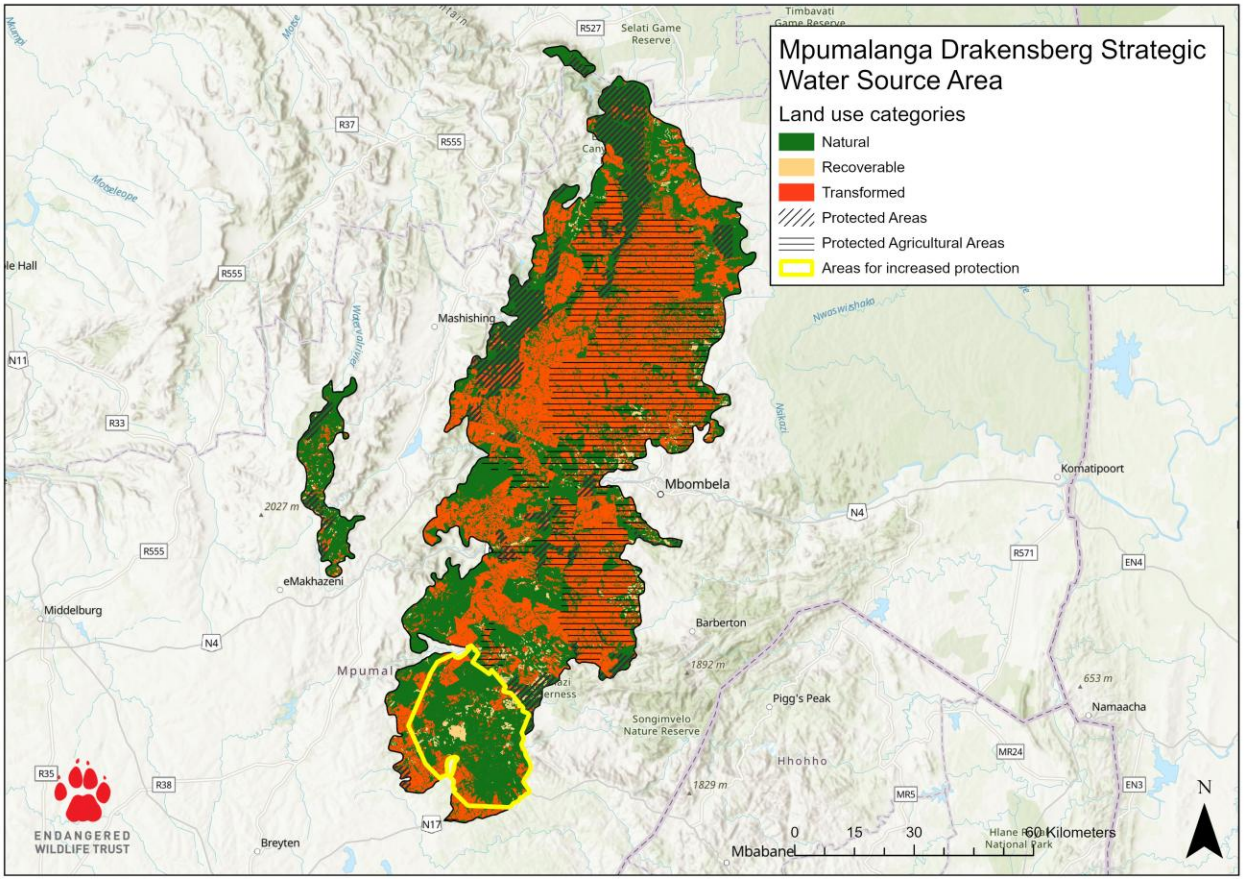


Figure 33: The Mpumalanga Drakensberg Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.



Northern Drakensberg Strategic Water Source Area

Protection status:

- Total area within South Africa: 868,804 Ha.
- Percentage within existing formally protected areas: 17%.
- Protected Agricultural Areas: 261,754 Ha (30%).

Landuse:

A total of 78% was listed as “Natural”, 6% “Recoverable” and 16% “Transformed”. A portion of the SWSA is located within Lesotho (Figure 34). This SWSA has the second largest area taken up by timber plantations, and the second largest area taken up by subsistence crops of all the SWSAs (Stats SA, 2023). Further calculations showed that 50,773 Ha (6%) are possibly “Recoverable” after removing Protected Areas and Protected Agricultural Areas, and 677,353 Ha (78%) are “Natural” and not currently protected.

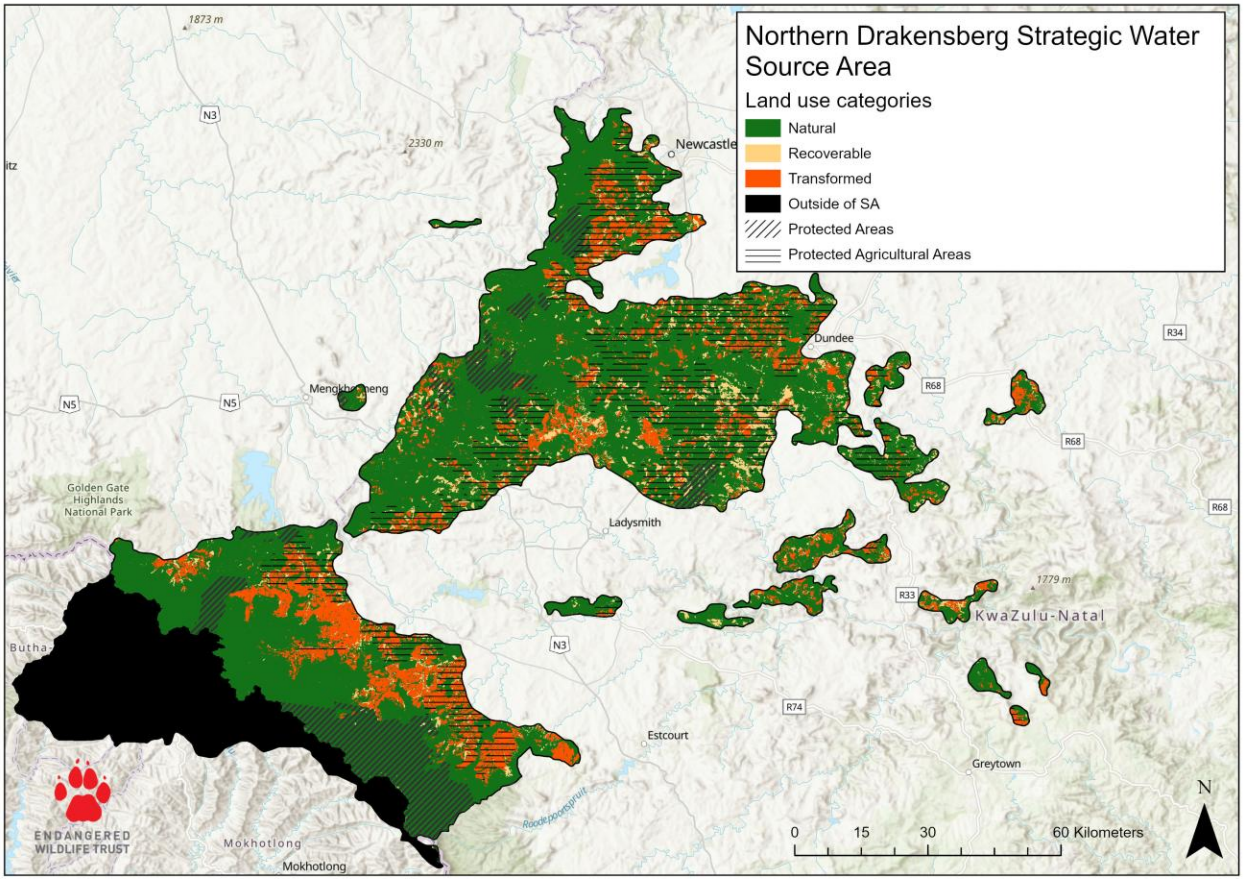


Figure 34: The Northern Drakensberg Strategic Water Source Area indicating the various National Land Cover classes that have been classified into “Natural”, “Recoverable” and “Transformed”. Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA. The area in black indicates where the SWSA extends into Lesotho.

Threatened species and vegetation:

- We have a high confidence estimate of nine threatened species (two animals and seven plants) being found in this SWSA, and a lower confidence estimate of 134 threatened species (80 animals

and 54 plants) being found in the SWSA. All threatened species are listed in Supplementary Table 12a.

- This SWSA lies within the Grassland, Savanna and Forest biomes of South Africa and contains 18 different vegetation types. Of the 18 vegetation types, four are threatened (Figure 35; Supplementary Table 12b).

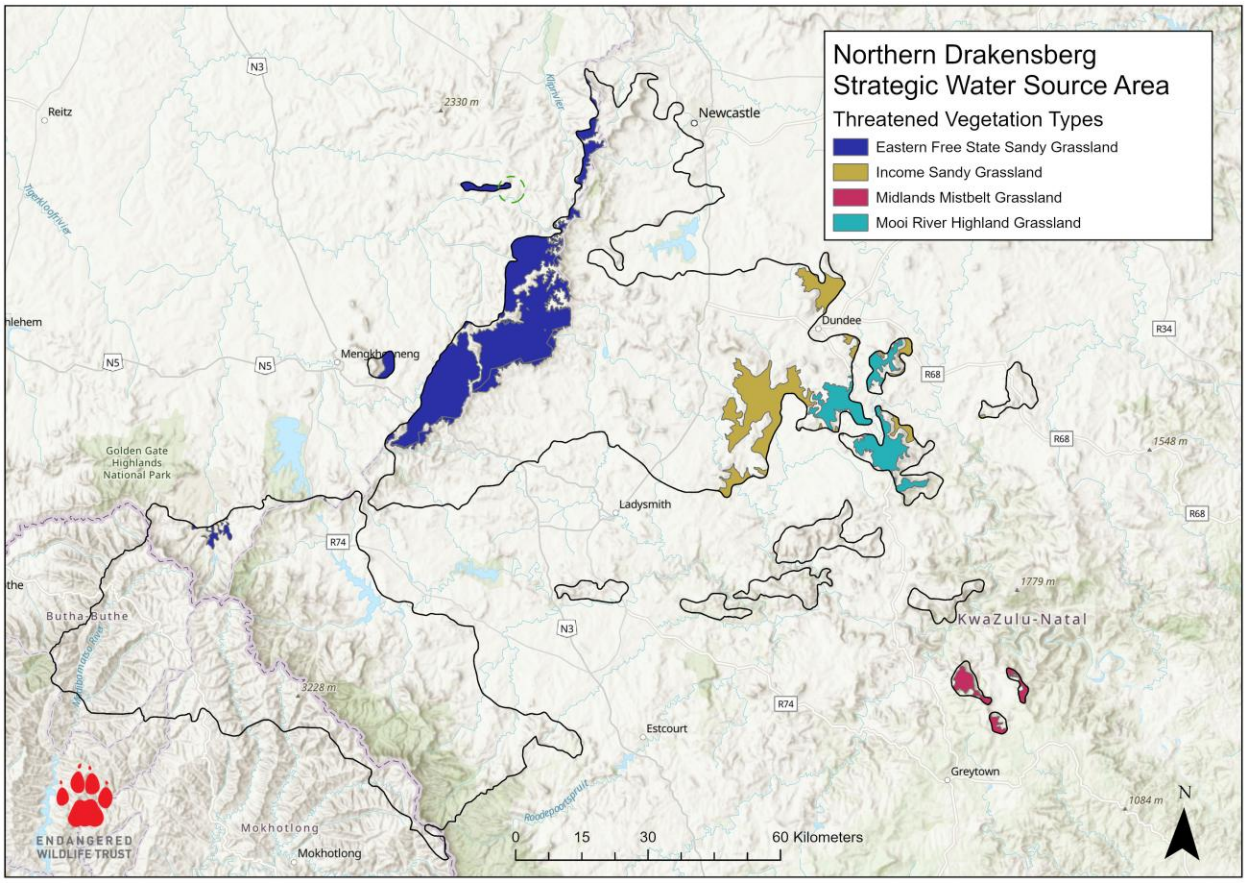


Figure 35: The threatened vegetation found in the Northern Drakensberg Strategic Water Source Area.

Summary Table for the Northern Drakensberg SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	147,045	17
Natural – total	677,411	78
Recoverable – total	50,777	6
Transformed – total	142,118	16
Protected (Agricultural)	261,754	30
Recoverable, outside of Protected Areas and Protected Agricultural Areas	50,773	6
Natural, outside of Protected Areas and Protected Agricultural Areas	677,353	78
Total (within SA)	**868,804**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 256,354Ha, covering 30% of the total SWSA within South Africa (Figure 36).

Within it, 87% of the area is “Natural”, 3% is “Recoverable” and 11% is “Transformed”.

We have a high confidence estimate of four threatened plant species and a lower confidence estimate of up to 89 threatened species (61 animals and 28 plants), two of which are Critically Endangered. There is also one threatened vegetation type within the PCRAs.

Within the PCRAs, we have an area of 6,742 Ha (3%) identified as “Recoverable”.

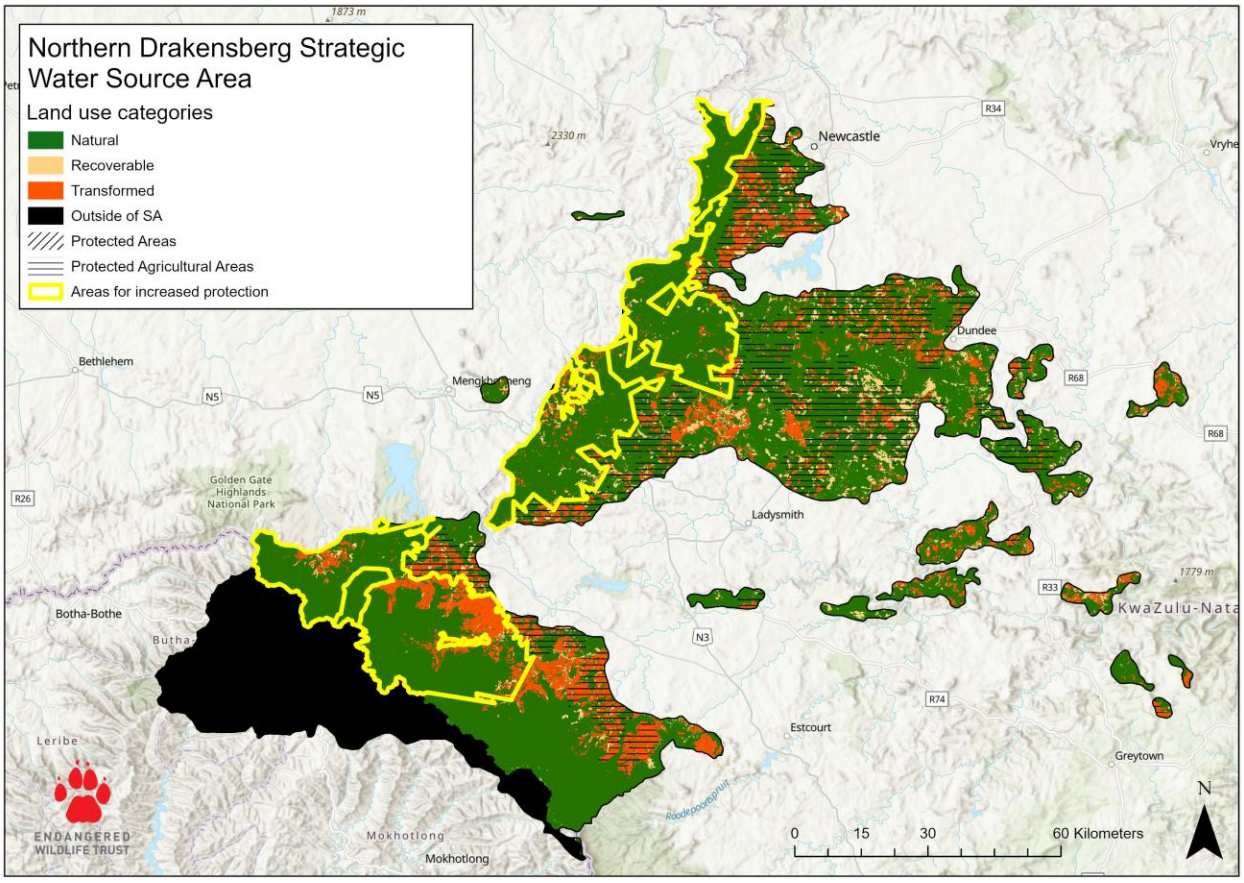


Figure 36: The Northern Drakensberg Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.



Outeniqua Strategic Water Source Area

Protection status:

- Total area within South Africa: 304,235 Ha.
- Percentage within existing formally protected areas: 47%.
- Protected Agricultural Areas: 32,556 Ha (11%).

Landuse:

A total of 72% was listed as "Natural", 3% "Recoverable" and 25% "Transformed" (Figure 37). Further calculations showed that 4,643 Ha (2%) is possibly "Recoverable" after removing Protected Areas and Protected Agricultural Areas, and 107,183 Ha (35%) are "Natural" and not currently protected. This SWSA has the highest decrease in the area taken up by timber plantations between 1,990 and 2020 (Stats SA, 2023).

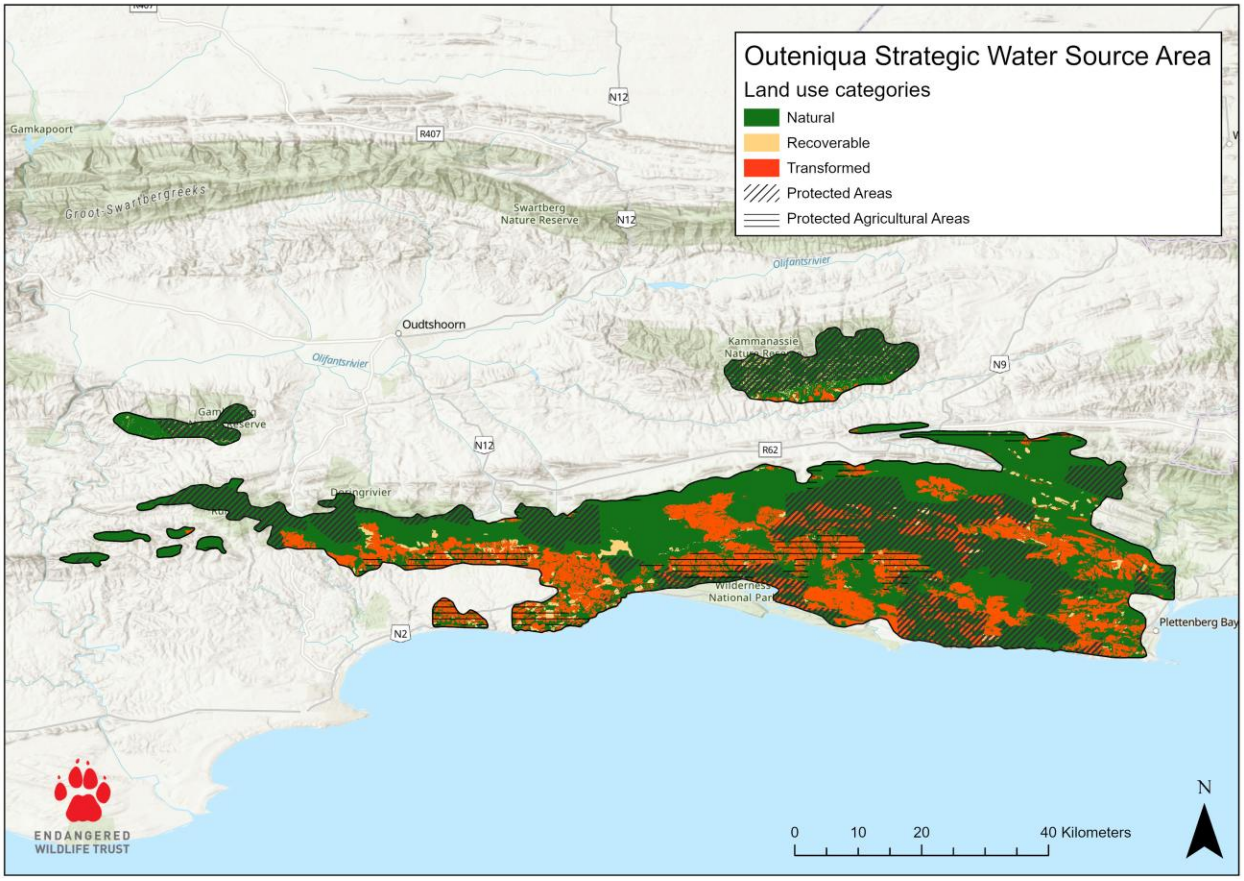


Figure 37: The Outeniqua Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of 11 threatened species (seven animals and four plants) being found in this SWSA, and a lower confidence estimate of 207 threatened species (57 animals

and 150 plants) being found in the SWSA. Of the high confidence estimate, two species are Critically Endangered. All threatened species are listed in Supplementary Table 13a.

- This SWSA lies within the Fynbos, Forest and Albany Thicket biomes of South Africa and contains 32 different vegetation types. Of the 32 vegetation types, eight are threatened (Figure 38; Supplementary Table 13b).
- The Outeniqua SWSA contains the highest proportion of the Forest biome in comparison to the other SWSAs (Stats SA, 2023).

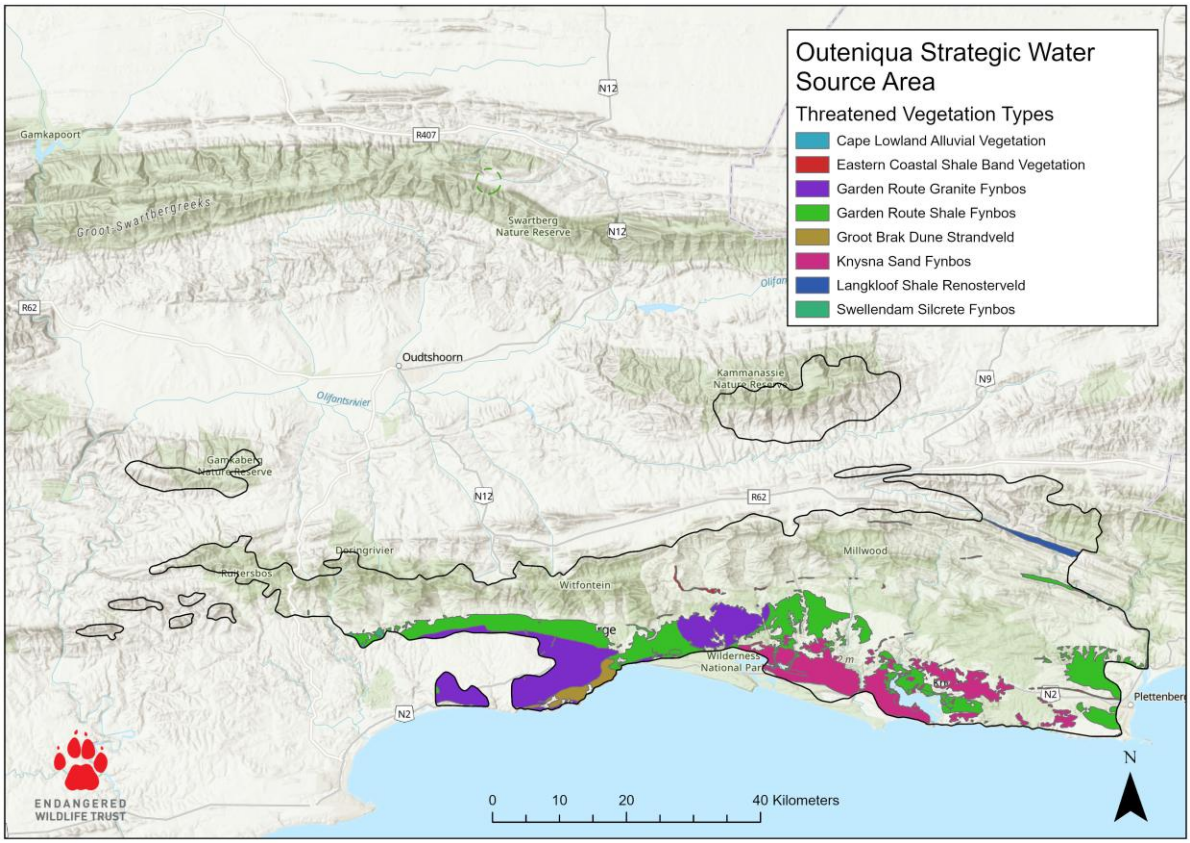


Figure 38: The threatened vegetation found in the Outeniqua Strategic Water Source Area.

Summary Table for the Outeniqua SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	143,846	47
Natural – total	219,328	72
Recoverable – total	8,839	3
Transformed - total	76,066	25
Protected (Agricultural)	32,556	11
Recoverable, outside of Protected Areas and Protected Agricultural Areas	4,643	2
Natural, outside of Protected Areas and Protected Agricultural Areas	107,183	35
Total (within SA)	**304,235**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 60,445 Ha, covering 20% of the total SWSA within South Africa (Figure 39).

Within it, 83% of the area is “Natural”, 3% is “Recoverable” and 15% is “Transformed”.

The PCRAs may also potentially house up to 85 threatened species (25 animals and 60 plants). There are also four threatened vegetation types housed within the PCRAs.

Within the PCRAs, we have an area of 1,711 Ha (3%) listed as “Recoverable”.

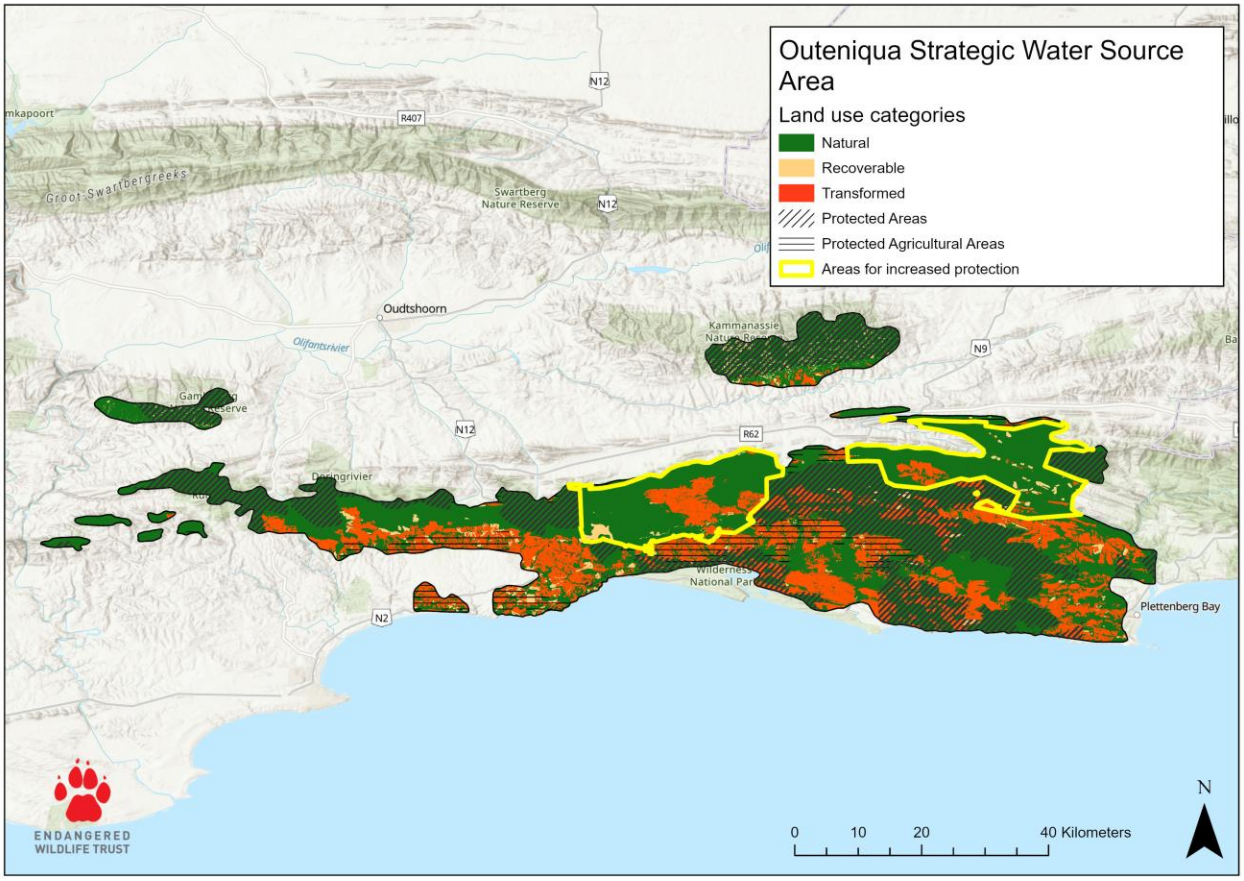


Figure 39: The Outeniqua Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.



Southern Drakensberg Strategic Water Source Area

Protection status:

- Total area within South Africa: 1,842,147 Ha.
- The Southern Drakensberg SWSA is the largest of the 22 SWSAs (Stats SA, 2023).
- Percentage within existing formally protected areas: 22%.
- Protected Agricultural Areas: 841,733 Ha (46%).

Landuse:

A total of 59% was listed as “Natural”, 4% “Recoverable” and 37% “Transformed” (Figure 40). A portion of the SWSA is located within Lesotho. This SWSA has the largest extent of urban areas, and the second largest extent of timber plantations (Stats SA, 2023). Further calculations showed that 36,426 Ha (2%) are possibly “Recoverable” after removing Protected Areas and Protected Agricultural Areas, and 529,536 Ha (29%) are “Natural” and not currently protected.

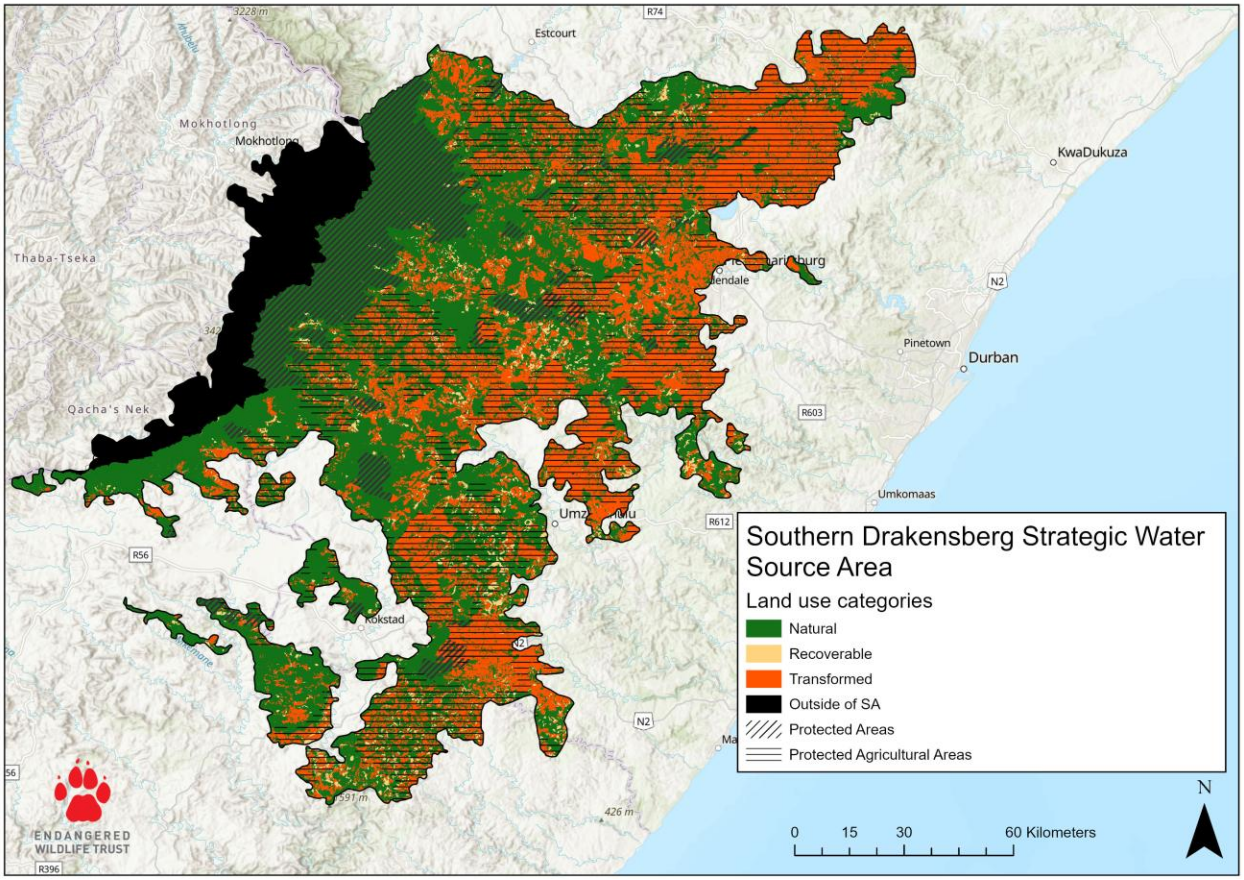


Figure 40: The Southern Drakensberg Strategic Water Source Area indicating the various National Land Cover classes that have been classified into “Natural”, “Recoverable” and “Transformed”. Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA. The area in black indicates where the SWSA extends into Lesotho.

Threatened species and vegetation:

- We have a high confidence estimate of eight threatened species (one animal and seven plants) being found in this SWSA, and a lower confidence estimate of 234 threatened species (104 animals and 130 plants) being found in the SWSA. Of the high confidence estimate, one species is Critically Endangered. All threatened species are listed in Supplementary Table 14a.
- This SWSA lies within the Grassland, Savanna and Forest biomes of South Africa and contains 25 different vegetation types. Of the 25 vegetation types, seven are threatened (Figure 41; Supplementary Table 14b).

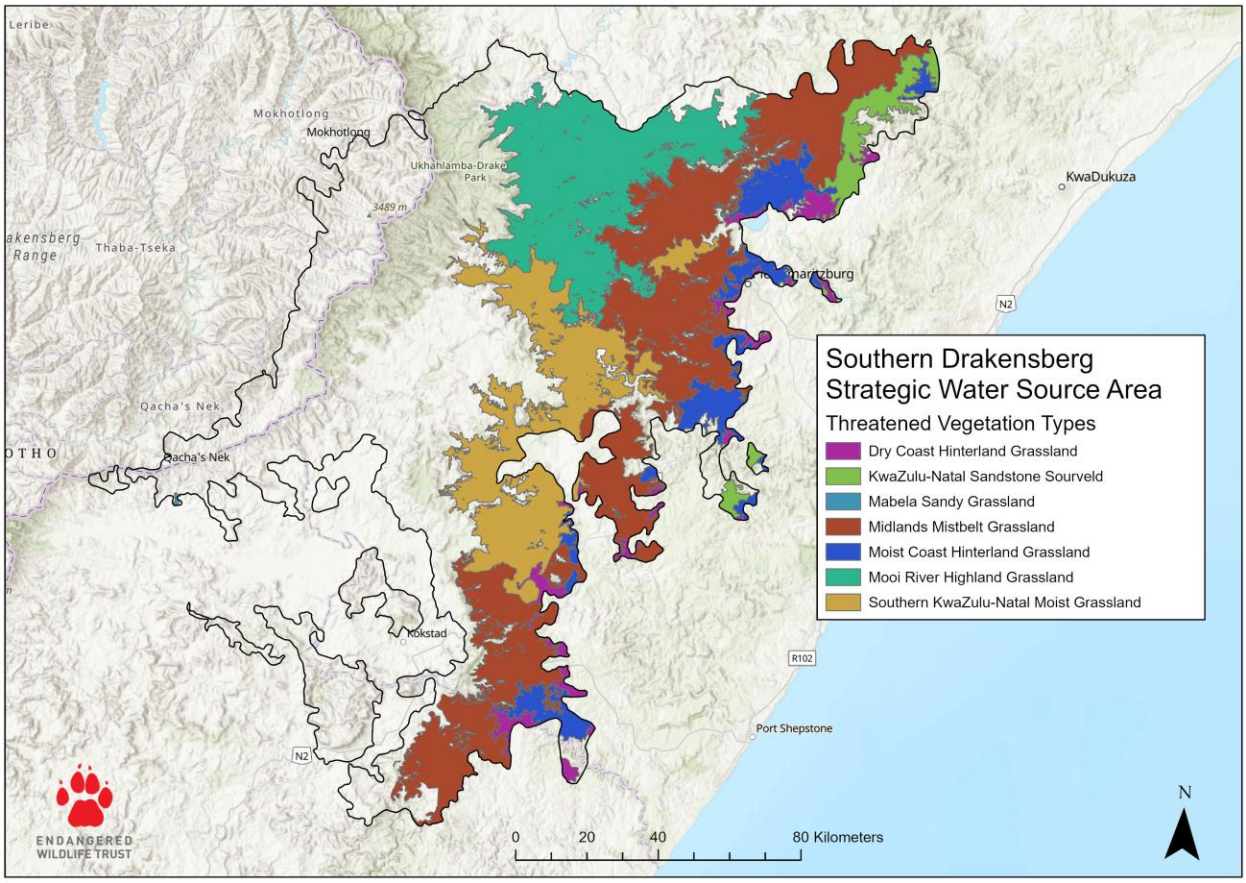


Figure 41: The threatened vegetation found in the Southern Drakensberg Strategic Water Source Area.

Summary Table for the Southern Drakensberg SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	404,724	22
Natural – total	1,090,887	59
Recoverable – total	65,610	4
Transformed – total	687,701	37
Protected (Agricultural)	841,733	46
Recoverable, outside of Protected Areas and Protected Agricultural Areas	36,426	2

Natural, outside of Protected Areas and Protected Agricultural Areas	529,536	29
Total (within SA)	**1,842,147**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 105,892 Ha, covering 6% of the total SWSA within South Africa (Figure 42).

Within it, 87% of the area is “Natural”, 2% is “Recoverable” and 11% is “Transformed”.

The PCRAs may also potentially house up to 97 threatened species (55 animals and 42 plants), three of which are Critically Endangered. There are also three threatened vegetation types housed within the PCRAs.

Within the PCRAs, we have an area of 2,186 Ha (2%) listed as “Recoverable”.

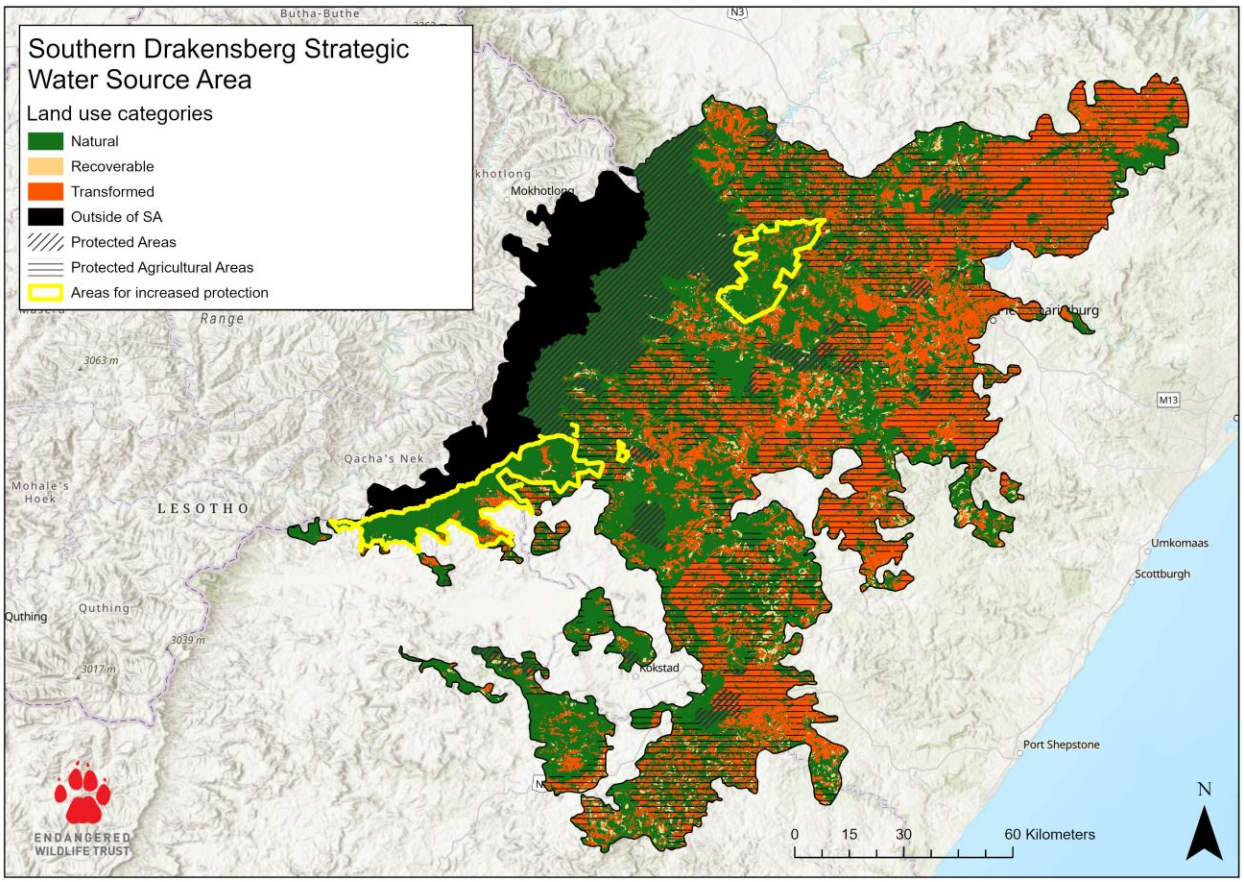


Figure 42: The Southern Drakensberg Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.

Soutpansberg Strategic Water Source Area

Protection status:

- Total area within South Africa: 234,685 Ha.
- Percentage within existing formally protected areas: 18%.
- Protected Agricultural Areas: 44,107 Ha (19%).

Landuse:

A total of 53% was listed as “Natural”, 9% “Recoverable” and 37% “Transformed” (Figure 43). This SWSA has the second highest proportion of urban land cover of all the SWSAs (Stats SA, 2023). Further calculations showed that 22,222 Ha (9%) are possibly “Recoverable” after removing Protected Areas and Protected Agricultural Areas, and 125,516 Ha (53%) are “Natural” and not currently protected.

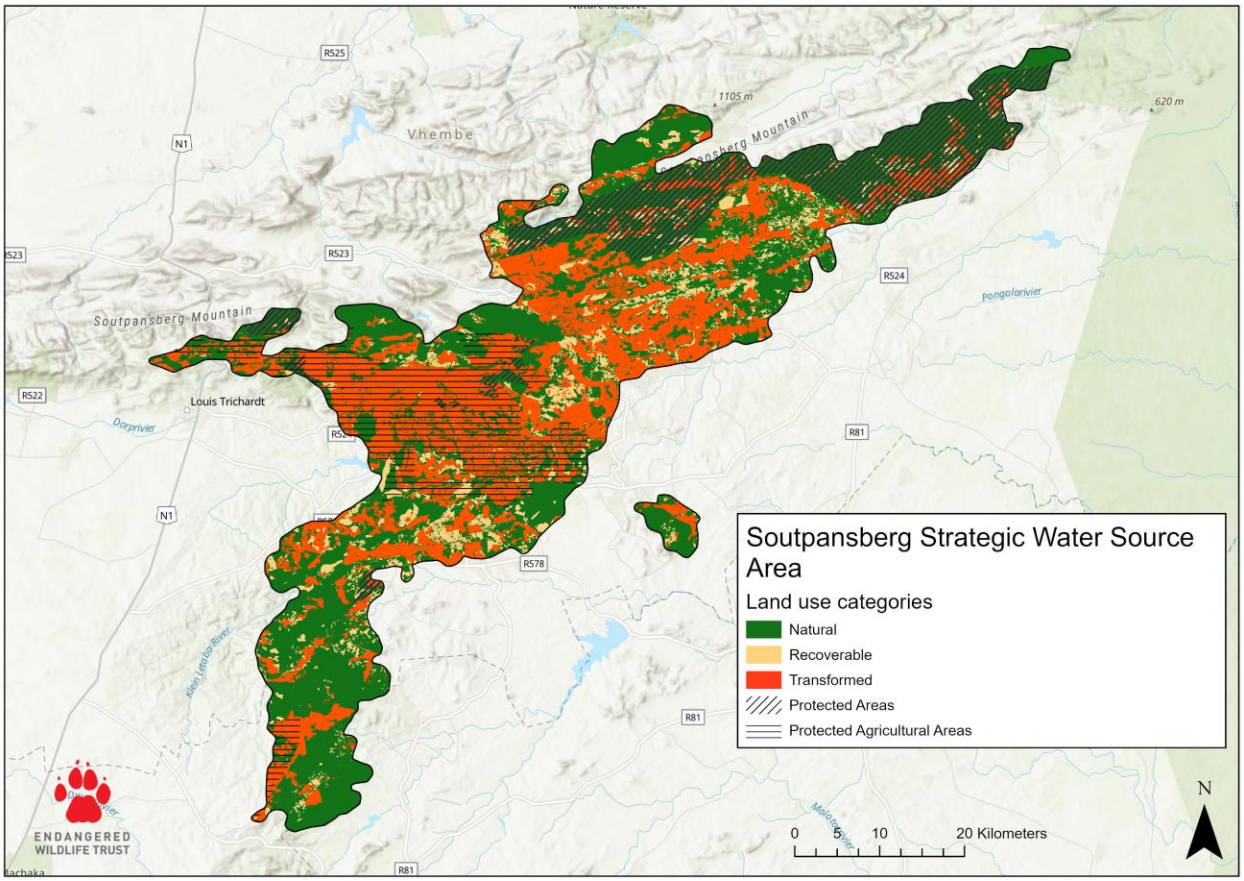


Figure 43: The Soutpansberg Strategic Water Source Area indicating the various National Land Cover classes that have been classified into “Natural”, “Recoverable” and “Transformed”. Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of two Critically Endangered animal species being found in this SWSA, and a lower confidence estimate of 64 threatened species (51 animals and 13 plants) being found in the SWSA. All threatened species are listed in Supplementary Table 15a.

- This SWSA lies within the Savanna, Grassland and Forest biomes of South Africa and contains nine different vegetation types. Of the nine vegetation types, one is threatened (Figure 44; Supplementary Table 15b).

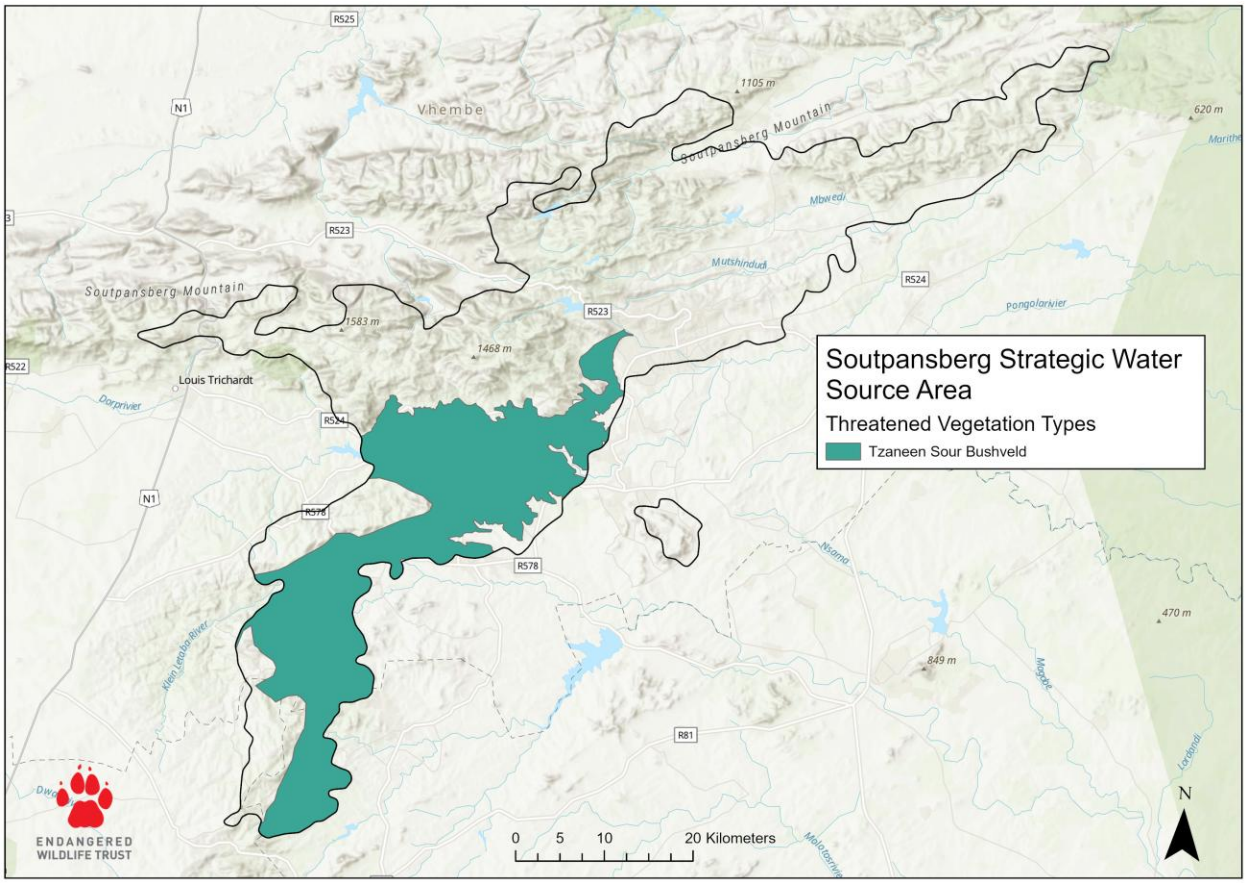


Figure 44: The threatened vegetation found in the Soutpansberg Strategic Water Source Area.

Summary Table for the Soutpansberg SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	42,726	18
Natural – total	125,535	53
Recoverable – total	22,226	9
Transformed - total	86,924	37
Protected (Agricultural)	44,107	19
Recoverable, outside of Protected Areas and Protected Agricultural Areas	22,222	9
Natural, outside of Protected Areas and Protected Agricultural Areas	125,516	53
Total (within SA)	**234,685**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 31,889 Ha, covering 14% of the total SWSA within South Africa (Figure 45).

Within it, 78% of the area is “Natural”, 7% is “Recoverable” and 15% is “Transformed”.

The PCRAs may also potentially house up to 21 threatened species (19 animals and two plants). There is one threatened vegetation type housed within the PCRAs.

Within the PCRAs, we have an area of 2,124 Ha (7%) listed as “Recoverable”.

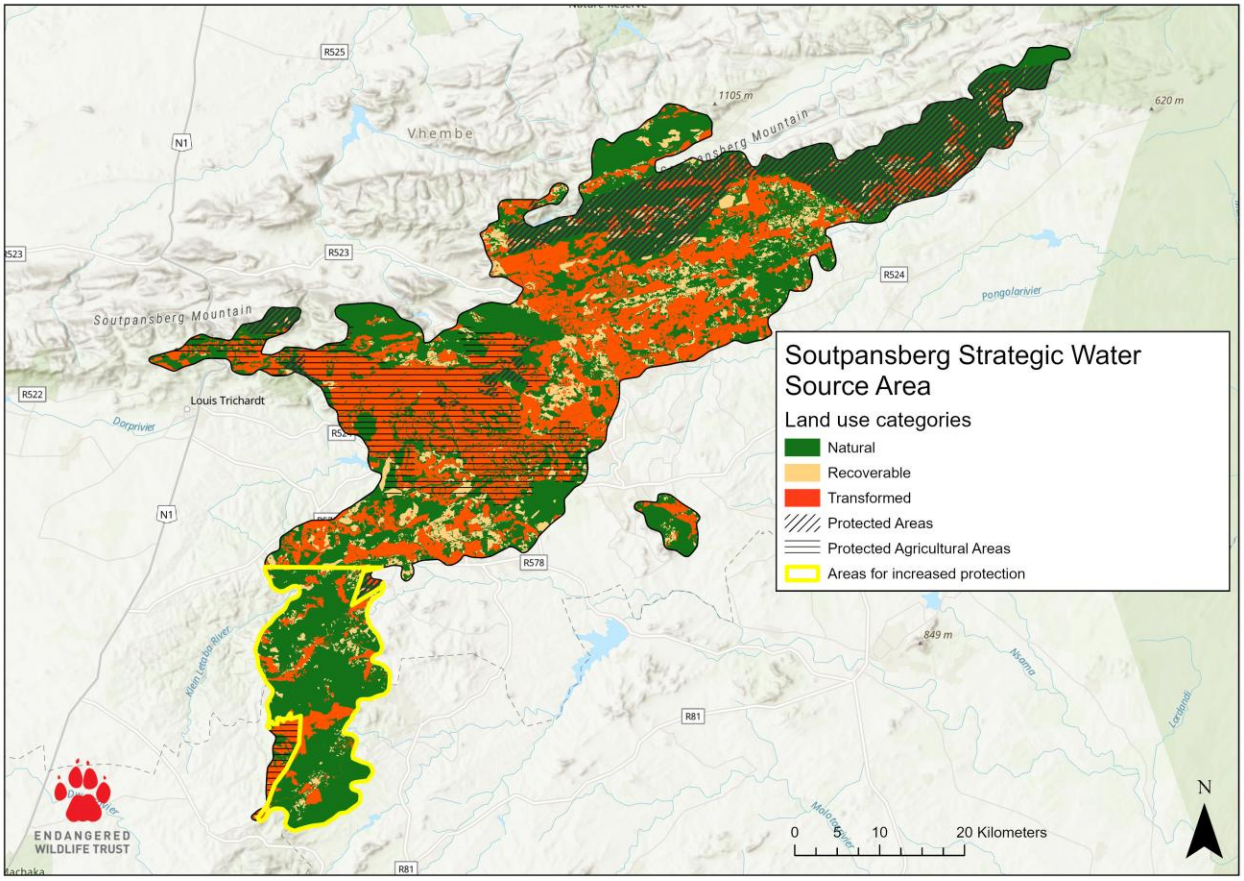


Figure 45: The Soutpansberg Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.



Swartberg Strategic Water Source Area

Protection status:

- Total area within South Africa: 77,984 Ha.
- Percentage within existing formally protected areas: 75%.
- Protected Agricultural Areas: 3,406 Ha (4%).

Landuse:

A total of 89% was listed as “Natural”, 9% “Recoverable” and 1% “Transformed” (Figure 46). This SWSA has the second largest proportion of natural areas of all the SWSAs (Stats SA, 2023). Further calculations showed that 1,422 Ha (2%) are possibly “Recoverable” after removing Protected Areas and Protected Agricultural Areas, and 15,343 Ha (20%) are “Natural” and not currently protected.

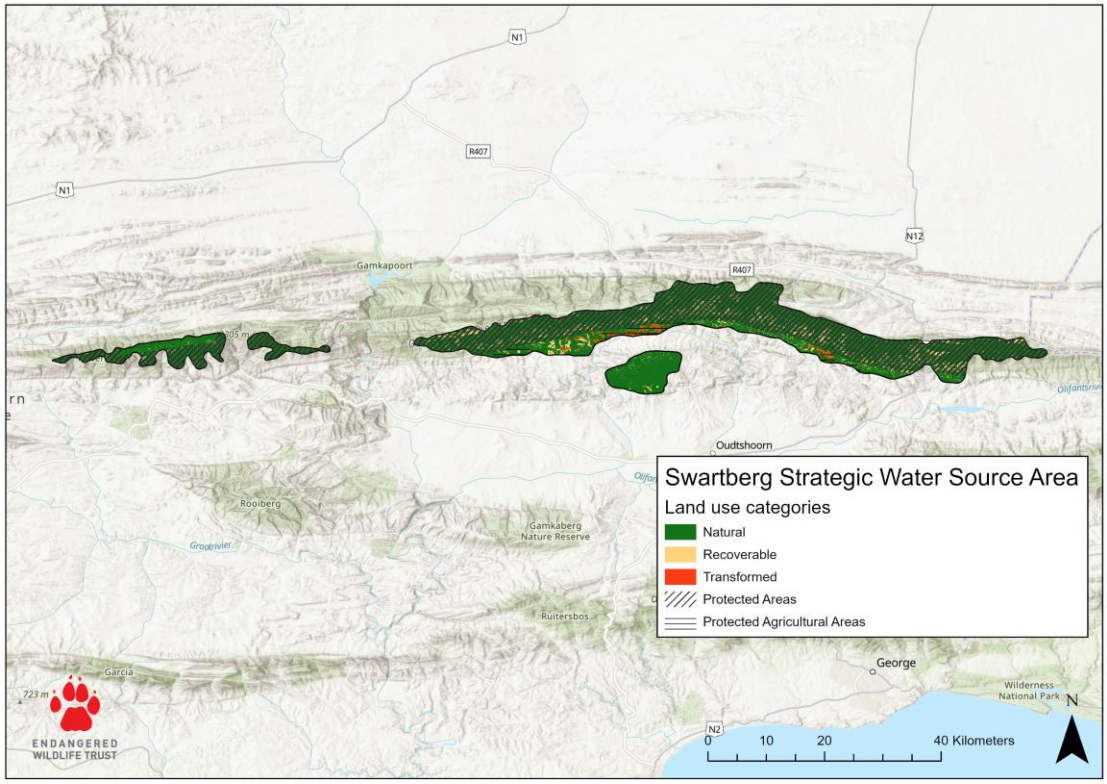


Figure 46: The Swartberg Strategic Water Source Area indicating the various National Land Cover classes that have been classified into “Natural”, “Recoverable” and “Transformed”. Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of 17 threatened species (four animals and 13 plants) being found in this SWSA, and a lower confidence estimate of 143 threatened species (32 animals and 111 plants) being found in the SWSA. Of the high confidence estimate, two species are Critically Endangered. All threatened species are listed in Supplementary Table 16a.
- This SWSA lies within the Fynbos biome of South Africa and contains seven different vegetation types, none of which are threatened.

Summary Table for the Swartberg SWSA:

Type	Hectares	Percentage
Protected (Conservation)	58,311	75
Natural – total	69,780	89
Recoverable – total	7,051	9
Transformed – total	1,153	1
Protected (Agricultural)	3,406	4
Recoverable, outside of Protected Areas and Protected Agricultural Areas	1,422	2
Natural, outside of Protected Areas and Protected Agricultural Areas	15,343	20
Total (within SA)	**77,984**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 6,602 Ha, covering 8% of the total SWSA within South Africa (Figure 47).

Within it, 96% of the area is “Natural”, 3% is “Recoverable” and less than 1% is “Transformed”.

The PCRAs may also potentially house up to 22 threatened species (16 animals and six plants), one of which is Critically Endangered.

Within the PCRAs, we have an area of 217 Ha (3%) listed as “Recoverable”.

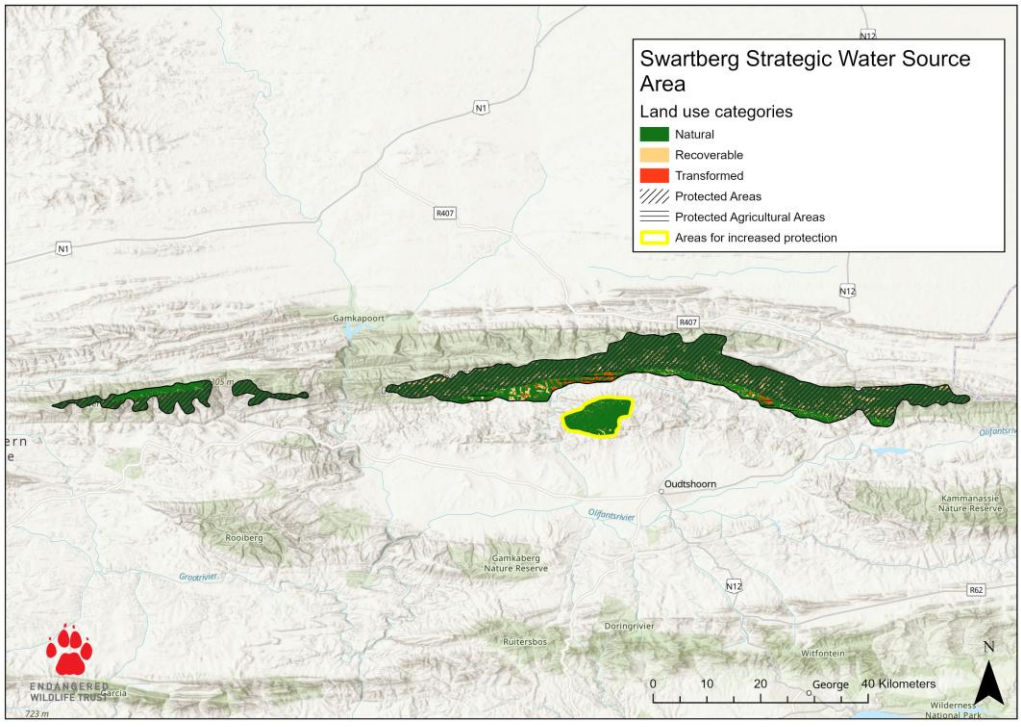


Figure 47: The Swartberg Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.

Table Mountain Strategic Water Source Area

Protection status:

- Total area within South Africa: 47,241 Ha.
- The Table Mountain SWSA is the smallest of the 22 SWSAs.
- Percentage within existing formally protected areas: 51%.
- There are no Protected Agricultural Areas in this SWSA.

Landuse:

A total of 53% was listed as "Natural", less than 1% "Recoverable" and 46% "Transformed" (Figure 48). This SWSA is intensively transformed, making it the SWSA with the second lowest proportion of natural areas (Stats SA, 2023). Further calculations showed that 148 Ha (less than 1%) are possibly "Recoverable" after removing Protected Areas and Protected Agricultural Areas, and 3,597 Ha (8%) are "Natural" and not currently protected.

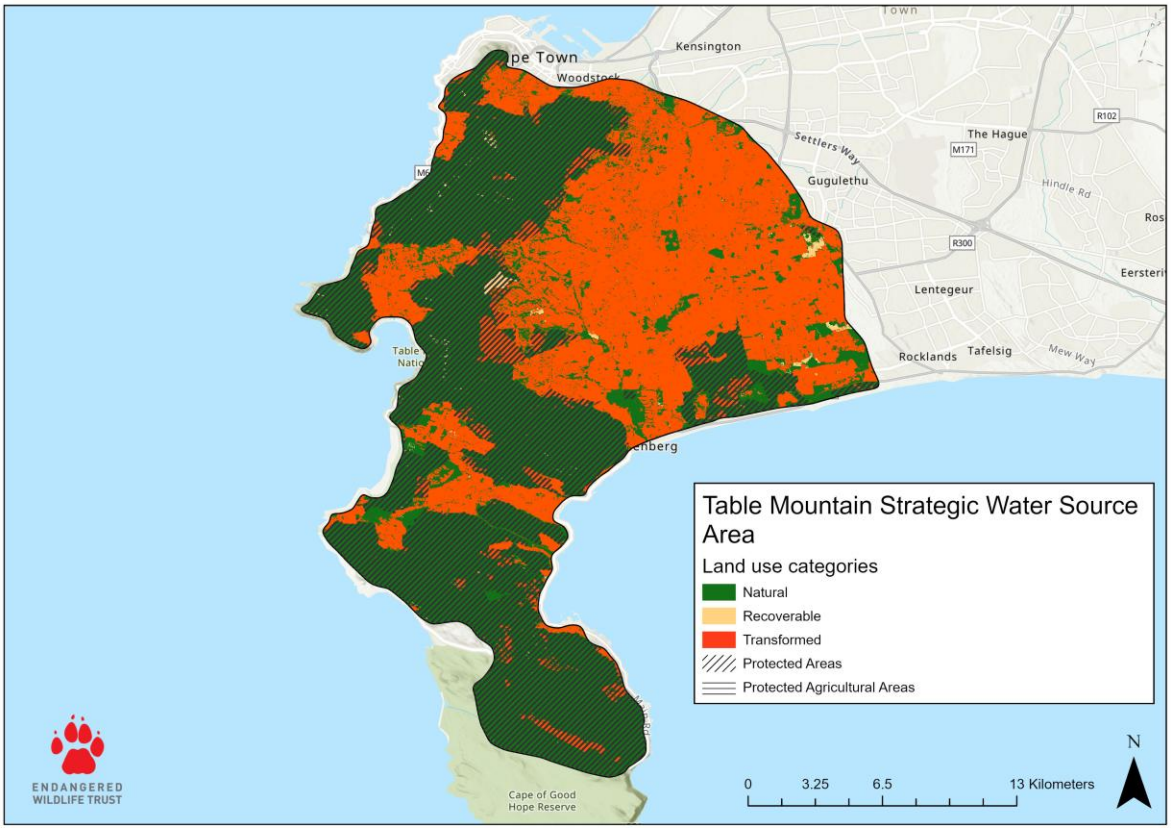


Figure 48: The Table Mountain Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of 31 threatened species (seven animals and 24 plants) being found in this SWSA, and a lower confidence estimate of 358 threatened species (68 animals and 290 plants) being found in the SWSA. Of the high confidence estimate, 11 species are Critically Endangered. All threatened species are listed in Supplementary Table 17a.

- This SWSA lies within the Fynbos and Forest biomes of South Africa and contains 11 different vegetation types. Of the 11 vegetation types, seven are threatened (Figure 49; Supplementary Table 17b).

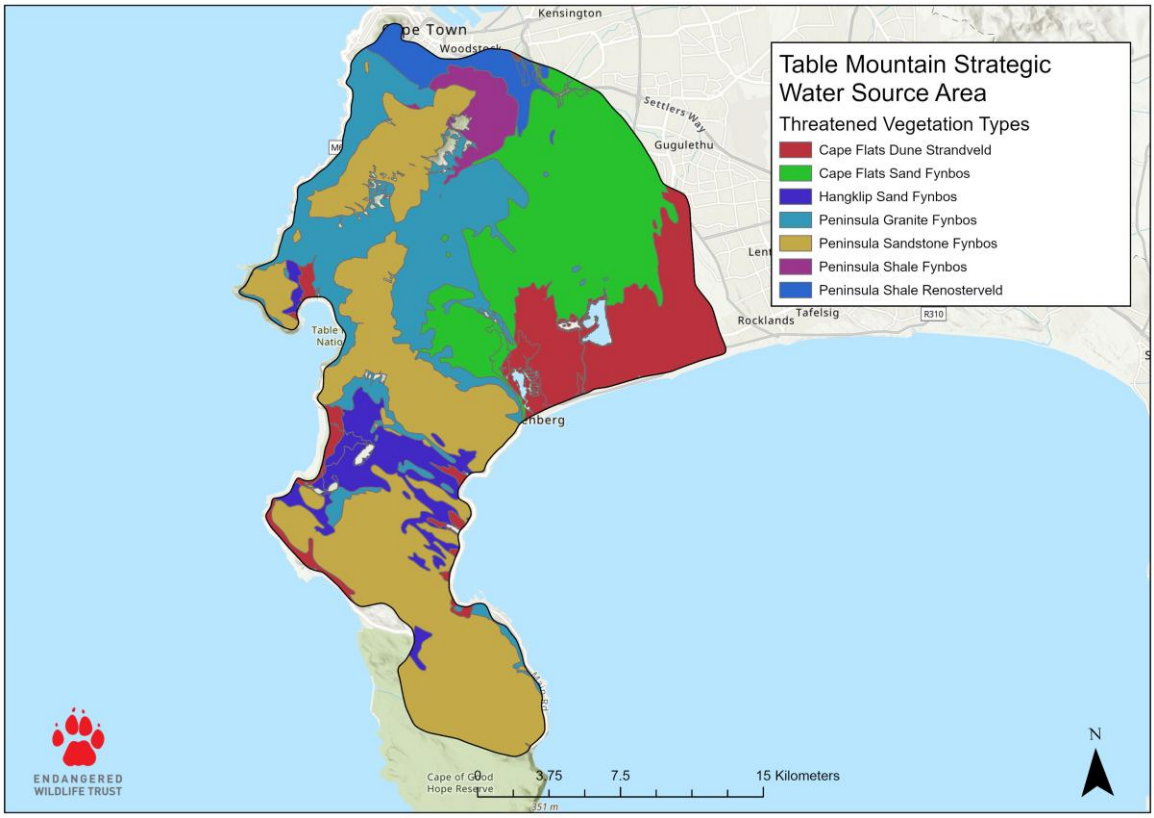


Figure 49: The threatened vegetation found in the Table Mountain Strategic Water Source Area.

Summary Table for the Table Mountain SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	23,945	51
Natural – total	25,123	53
Recoverable – total	296	0.626
Transformed – total	21,824	46
Protected (Agricultural)	0	0
Recoverable, outside of Protected Areas and Protected Agricultural Areas	148	0.314
Natural, outside of Protected Areas and Protected Agricultural Areas	3,597	8
Total (within SA)	**47,241**	**100**

Potential Conservation and Restoration Areas (PCRAs):

There are no “Recoverable” areas within the PCRA, and no realistic potential for protected area expansion.

Tsitsikamma Strategic Water Source Area

Protection status:

- Total area within South Africa: 322,201 Ha.
- Percentage within existing formally protected areas: 17%.
- Protected Agricultural Areas: 98,537 Ha (31%).

Landuse:

A total of 73% was listed as "Natural", 2% "Recoverable" and 25% "Transformed" (Figure 50). Further calculations showed that 3,179 Ha (1%) is possibly "Recoverable" after removing Protected Areas and Protected Agricultural Areas, and 144,317 Ha (45%) are "Natural" and not currently protected.

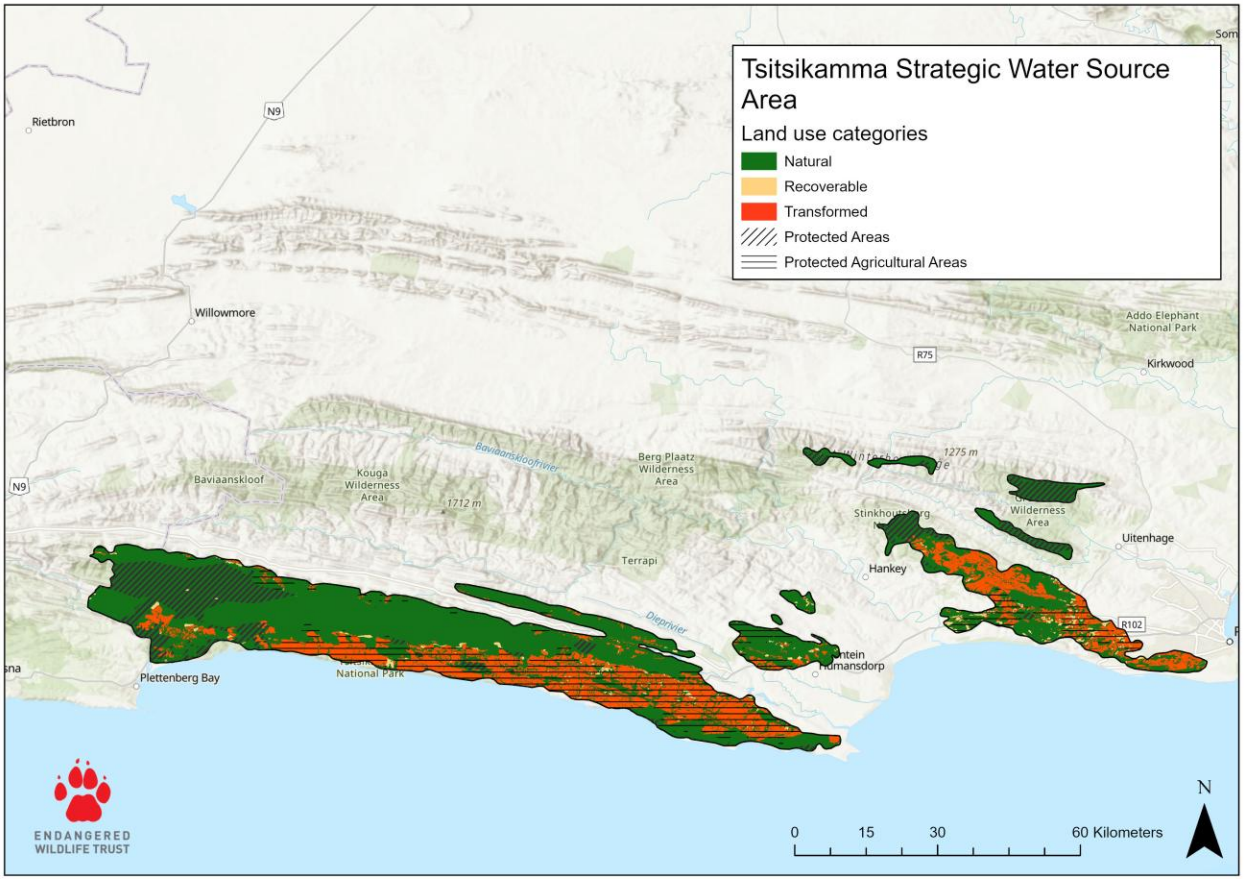


Figure 50: The Tsitsikamma Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of two Vulnerable plant species being found in this SWSA, and a lower confidence estimate of 142 threatened species (47 animals and 95 plants) being found in the SWSA. All threatened species are listed in Supplementary Table 18a.
- This SWSA lies within the Fynbos, Forest and Albany Thicket biomes of South Africa and contains 25 different vegetation types. Of the 25 vegetation types, six are threatened (Figure 51; Supplementary Table 18b).

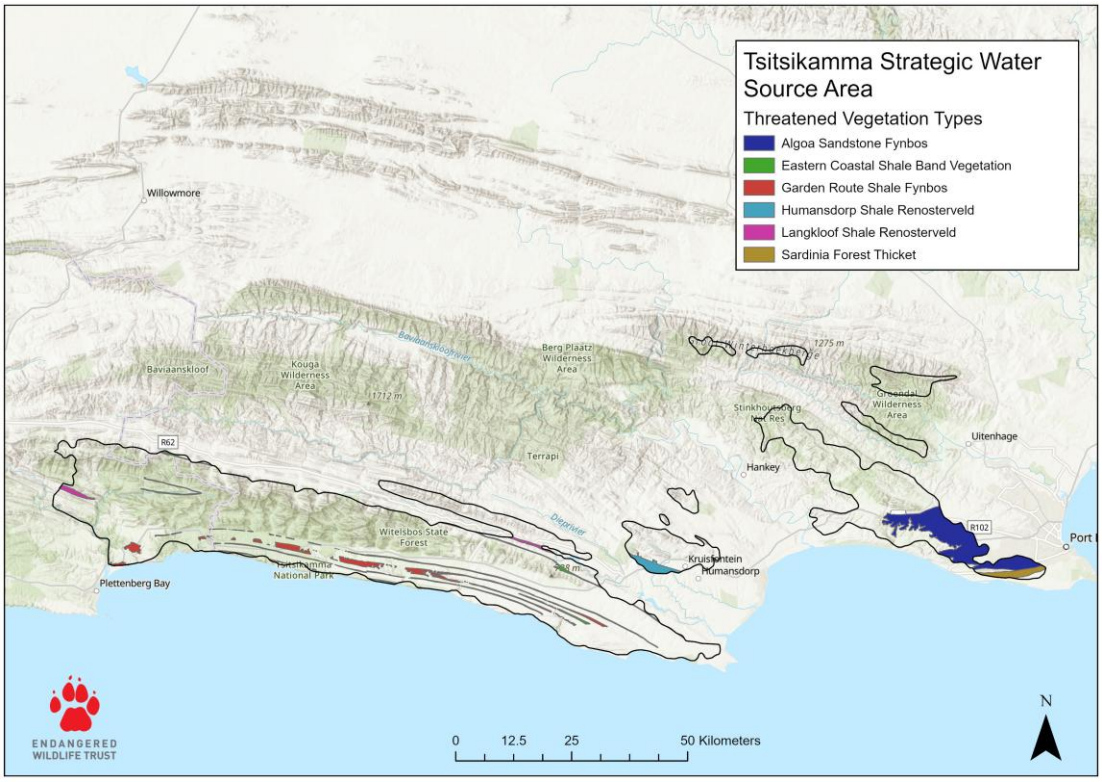


Figure 51: The threatened vegetation found in the Tsitsikamma Strategic Water Source Area.

Summary Table for the Tsitsikamma SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	55,469	17
Natural – total	235,949	73
Recoverable – total	5,978	2
Transformed - total	80,275	25
Protected (Agricultural)	98,537	31
Recoverable, outside of Protected Areas and Protected Agricultural Areas	3,179	1
Natural, outside of Protected Areas and Protected Agricultural Areas	144,317	45
Total (within SA)	**322,201**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 84,667 Ha, covering 26% of the total SWSA within South Africa (Figure 52).

Within it, 94% of the area is “Natural”, 1% is “Recoverable” and 5% is “Transformed”.

We have a high confidence estimate of one Vulnerable plant species and a lower confidence estimate of up to 73 threatened species (32 animals and 41 plants), four of which are Critically Endangered. There are three threatened vegetation types housed within the PCRAs.

Within the PCRAs, we have an area of 630 Ha (1%) listed as “Recoverable”.

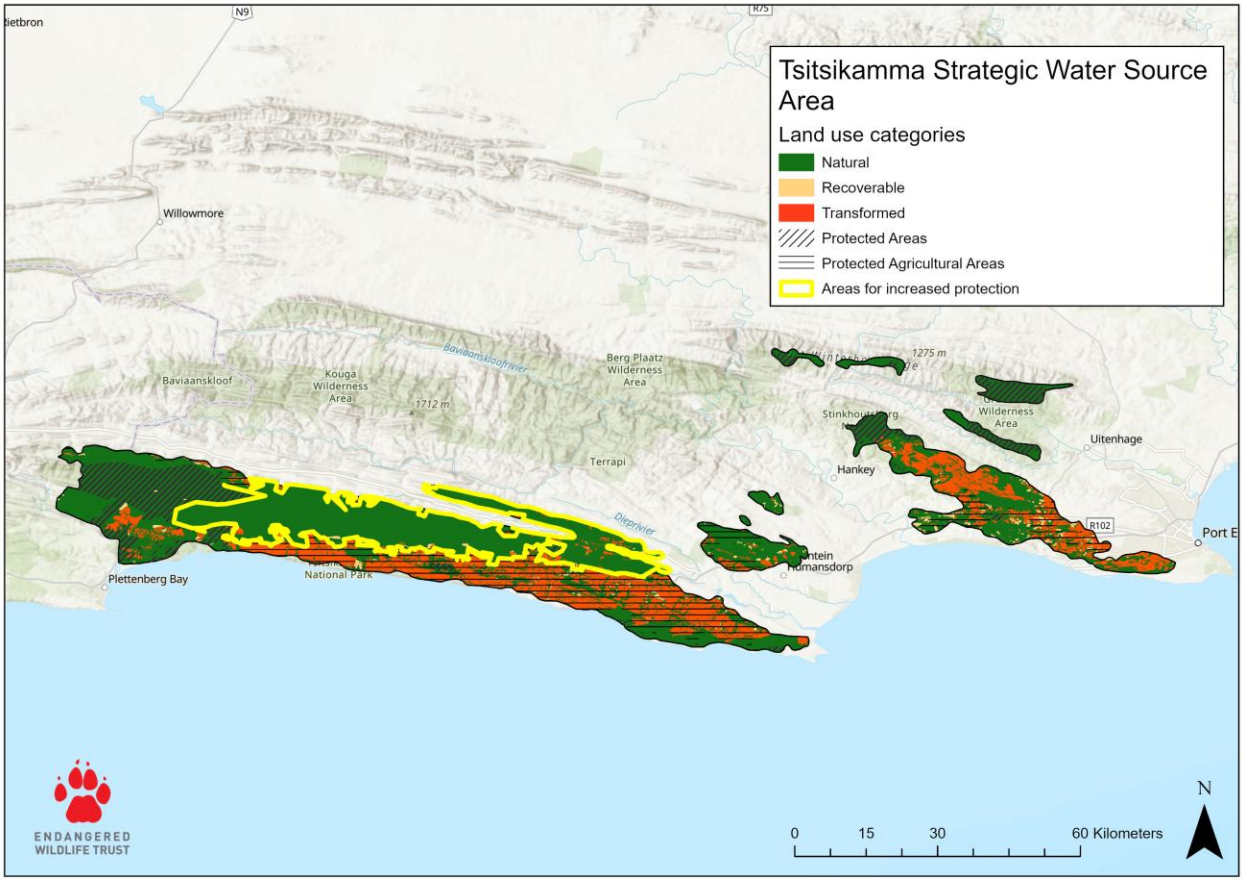


Figure 52: The Tsitsikamma Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.

Upper Usutu Strategic Water Source Area

Protection status:

- Total area within South Africa: 539,331 Ha.
- Percentage within existing formally protected areas: Only 8%.
- Protected Agricultural Areas: 324,074 Ha (60%).

Landuse:

A total of 44% was listed as "Natural", 4% "Recoverable" and 51% "Transformed". A portion of this SWSA is located within eSwatini. (Figure 53). This SWSA had the lowest proportion of natural areas, and the highest proportion of timber plantations in comparison to the other SWSAs (Stats SA, 2023). Further calculations showed that 2,763 Ha (1%) is possibly "Recoverable" after removing Protected Areas and Protected Agricultural Areas, and 93,207 Ha (17%) are "Natural" and not currently protected.

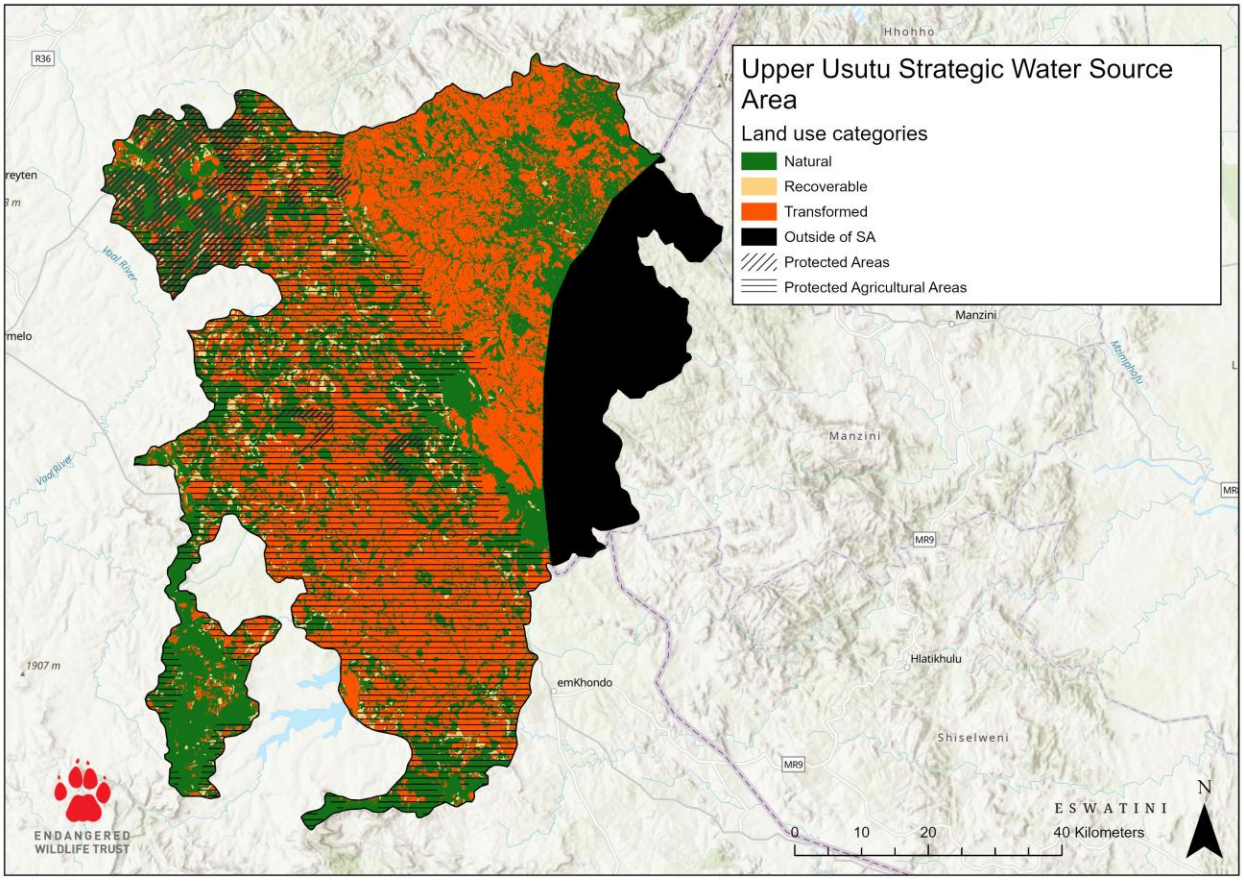


Figure 53: The Upper Usutu Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA. The area in black indicates where the SWSA extends into Eswatini.

Threatened species and vegetation:

- There are 78 threatened species (55 animals and 23 plants) found in the SWSA, of which one species is Critically Endangered. All threatened species are listed in Supplementary Table 19a.

- This SWSA lies within the Grassland, Savanna and Forest biomes of South Africa and contains eight different vegetation types. Of the eight vegetation types, two are threatened (Figure 54; Supplementary Table 19b).

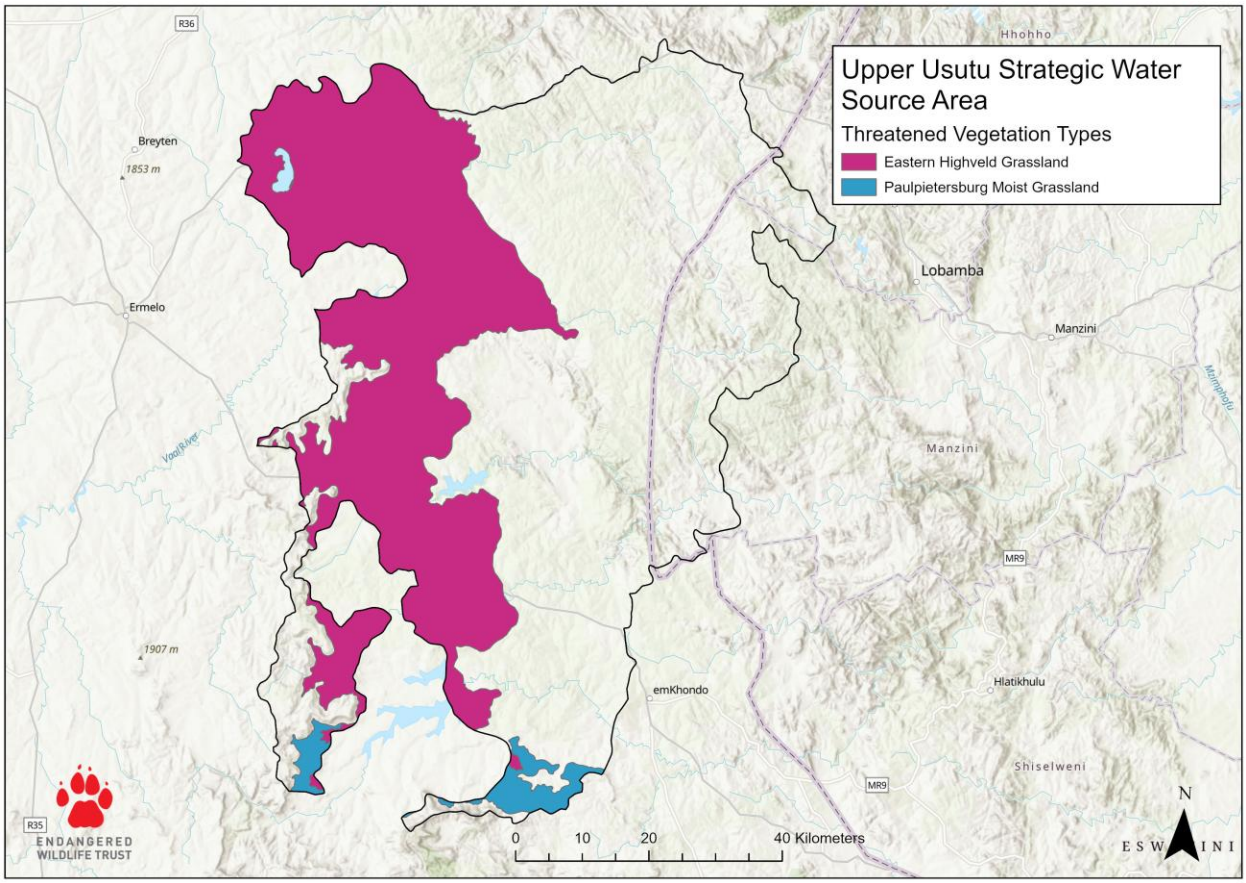


Figure 54: The threatened vegetation found in the Upper Usutu Strategic Water Source Area.

Summary Table for the Upper Usutu SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	42,227	8
Natural – total	239,394	44
Recoverable – total	23,483	4
Transformed – total	277,175	51
Protected (Agricultural)	324,074	60
Recoverable, outside of Protected Areas and Protected Agricultural Areas	2,763	1
Natural, outside of Protected Areas and Protected Agricultural Areas	93,207	17
Total	**539,331**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 22,517 Ha, covering 4% of the total SWSA within South Africa (Figure 55).

Within it, 87% of the area is “Natural”, 3% is “Recoverable” and 10% is “Transformed”.

The PCRAs may also potentially house up to 47 threatened species (35 animals and 12 plants), one of which is Critically Endangered. There are two threatened vegetation types housed within the PCRAs.

Within the PCRAs, we have an area of 645 Ha (3%) listed as “Recoverable”.

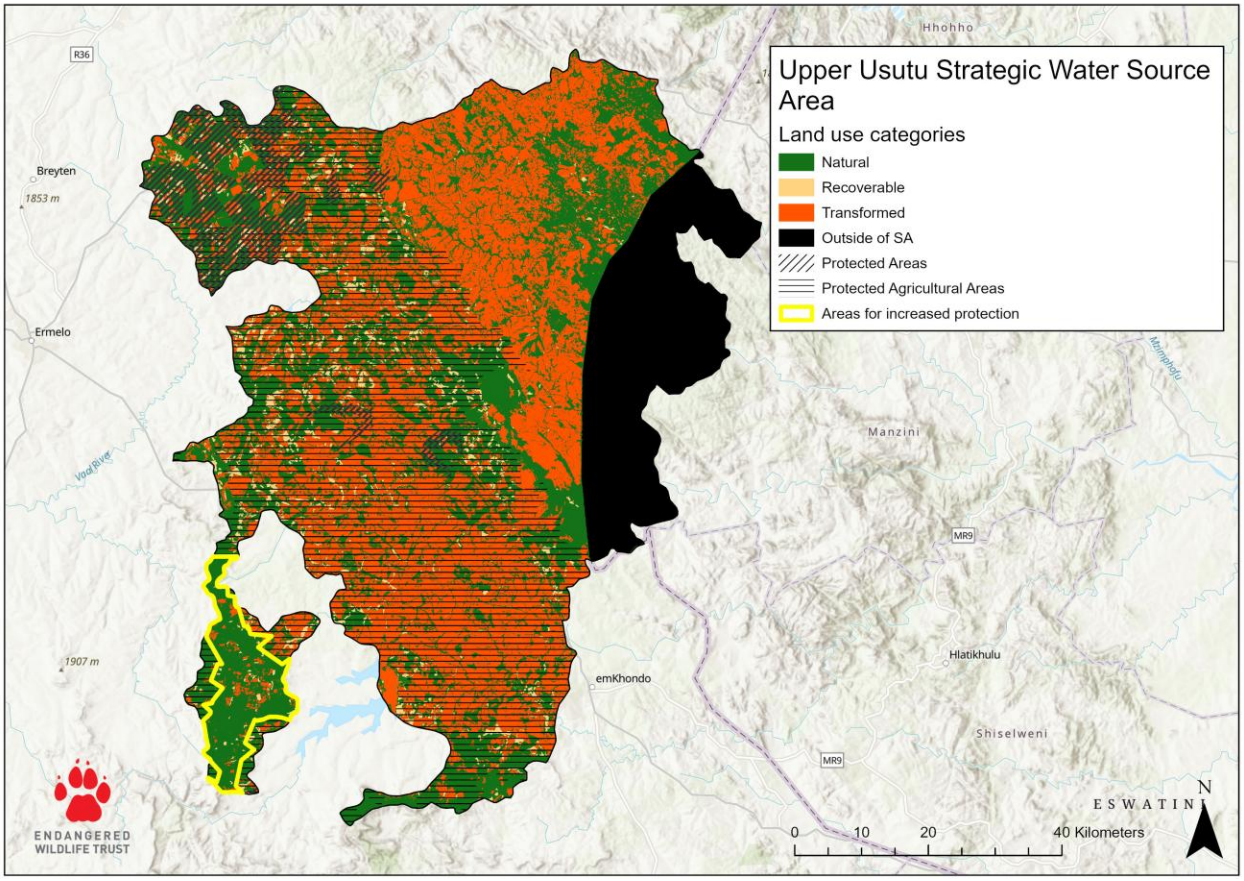


Figure 55: The Upper Usutu Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.



Upper Vaal Strategic Water Source Area

Protection status:

- Total area within South Africa: 139,401 Ha.
- Percentage within existing formally protected areas: only 8%.
- Protected Agricultural Areas: 106,782 Ha (77%).

Landuse:

A total of 59% was listed as “Natural”, 8% “Recoverable” and 33% “Transformed” (Figure 56). This SWSA has the largest extent and proportion of mines, and the largest proportion of commercial crop fields in comparison to the other SWSAs (Stats SA, 2023). Further calculations showed that 2258 Ha (2%) is possibly “Recoverable” after removing Protected Areas and Protected Agricultural Areas, and 21,119 Ha (15%) are “Natural” and not currently protected.

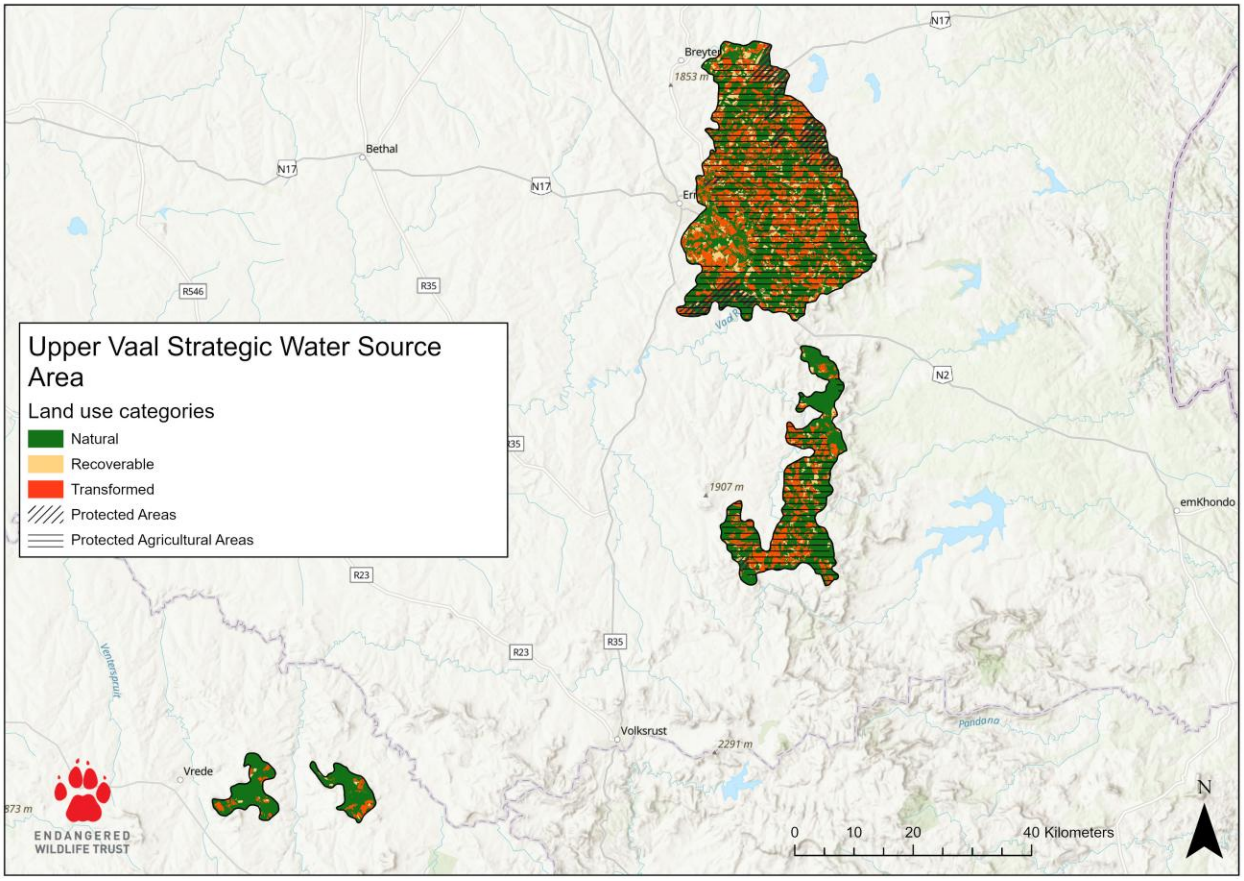


Figure 56: The Upper Vaal Strategic Water Source Area indicating the various National Land Cover classes that have been classified into “Natural”, “Recoverable” and “Transformed”. Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- There are 52 threatened species (38 animals and 14 plants) found in the SWSA, of which one species is Critically Endangered. All threatened species are listed in Supplementary Table 20a.

- This SWSA lies within the Grassland and Forest biomes of South Africa and contains four different vegetation types. Of the four vegetation types, one is threatened (Figure 57; Supplementary Table 20b).

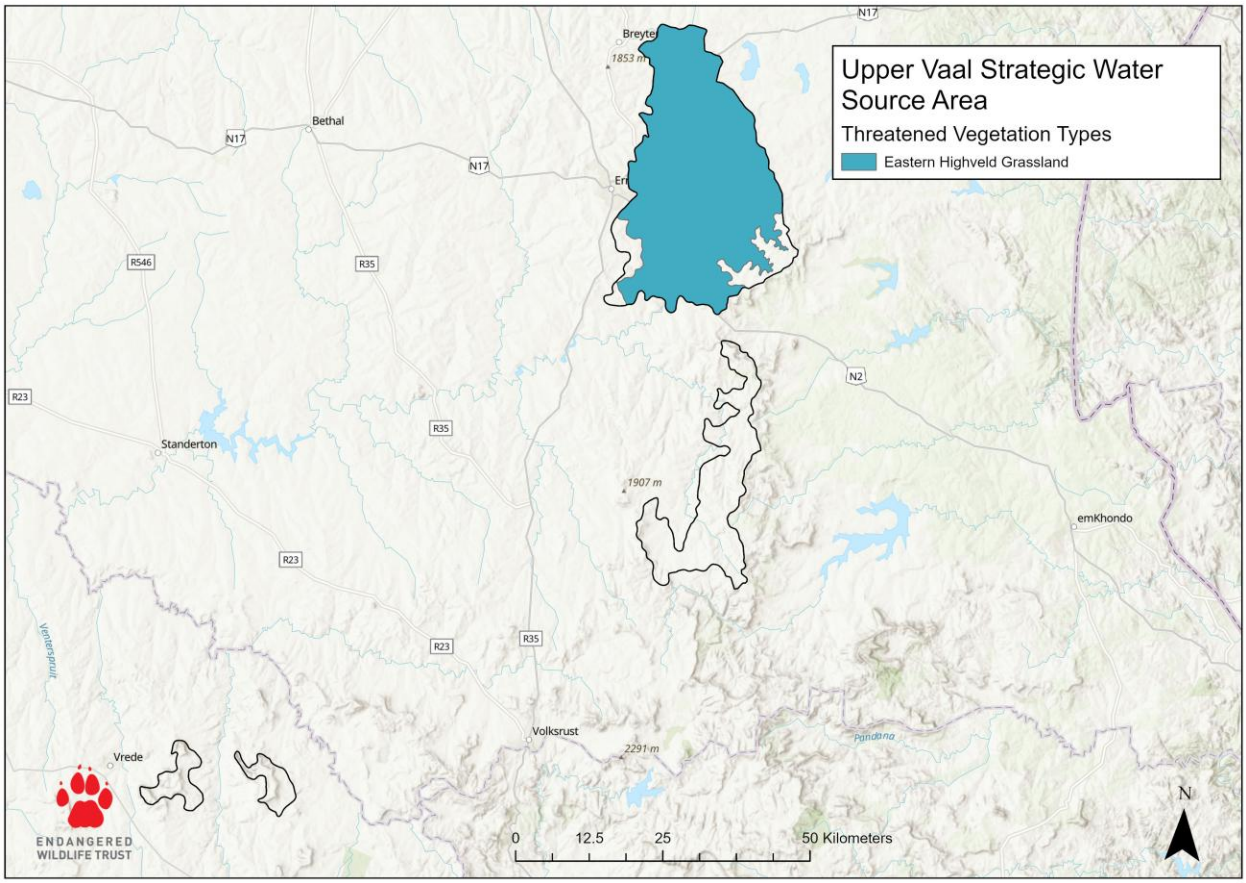


Figure 57: The threatened vegetation found in the Upper Vaal Strategic Water Source Area.

Summary Table for the Upper Vaal SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	10,723	8
Natural – total	81,869	59
Recoverable – total	11,837	8
Transformed - total	45,694	33
Protected (Agricultural)	106,782	77
Recoverable, outside of Protected Areas and Protected Agricultural Areas	2,258	2
Natural, outside of Protected Areas and Protected Agricultural Areas	21,119	15
Total (within SA)	**139,401**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 13,746 Ha, covering 10% of the total SWSA within SA (Figure 58).

Within it, 84% of the area is “Natural”, 3% is “Recoverable” and 13% is “Transformed”.

The PCRAs may also potentially house up to 43 threatened species (33 animals and 10 plants), one of which is Critically Endangered.

Within the PCRAs, we have an area of 419 Ha (3%) listed as “Recoverable”.

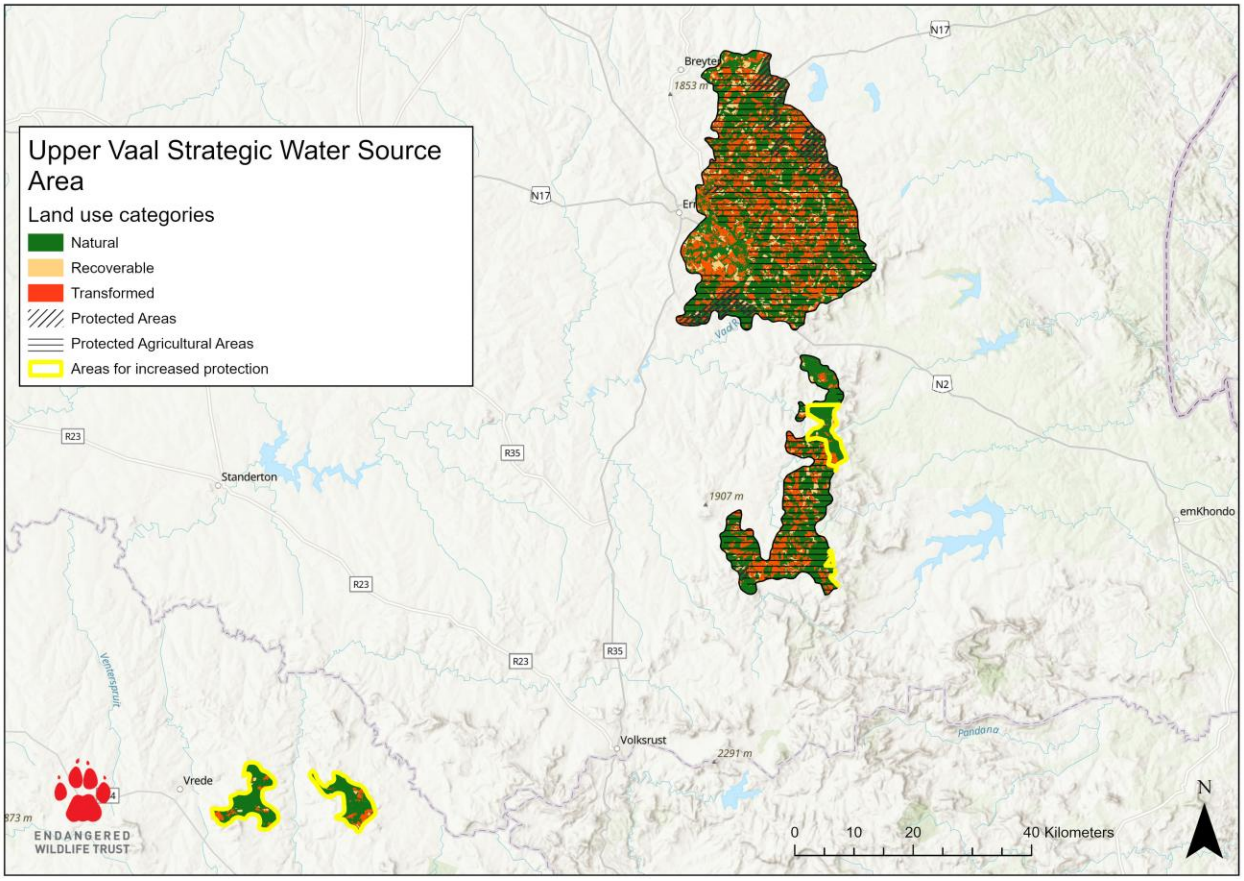
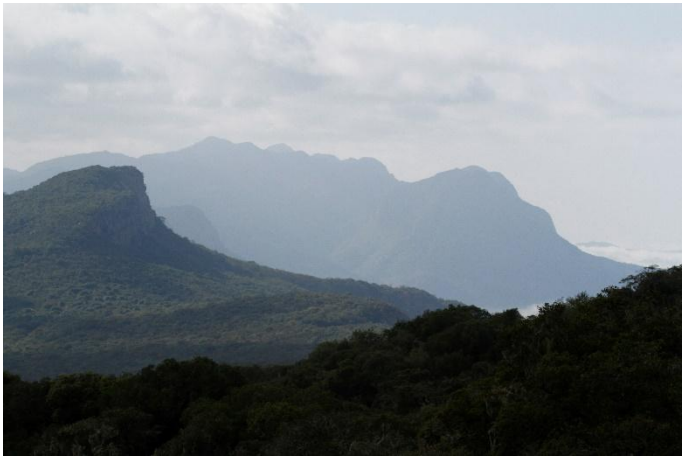


Figure 58: The Upper Vaal Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.



Waterberg Strategic Water Source Area

Protection status:

- Total area within South Africa: 103,220 Ha.
- Percentage within existing formally protected areas: 36%.
- Protected Agricultural Areas: 11,219 Ha (11%).

Landuse:

A total of 88% was listed as “Natural”, 4% “Recoverable” and 7% “Transformed” (Figure 59). This SWSA has the third highest proportion of natural areas of all the SWSAs (Stats SA, 2023). Further calculations showed that 1,928 Ha (2%) is possibly “Recoverable” after removing Protected Areas and Protected Agricultural Areas, and 49,532 Ha (48%) are “Natural” and not currently protected.

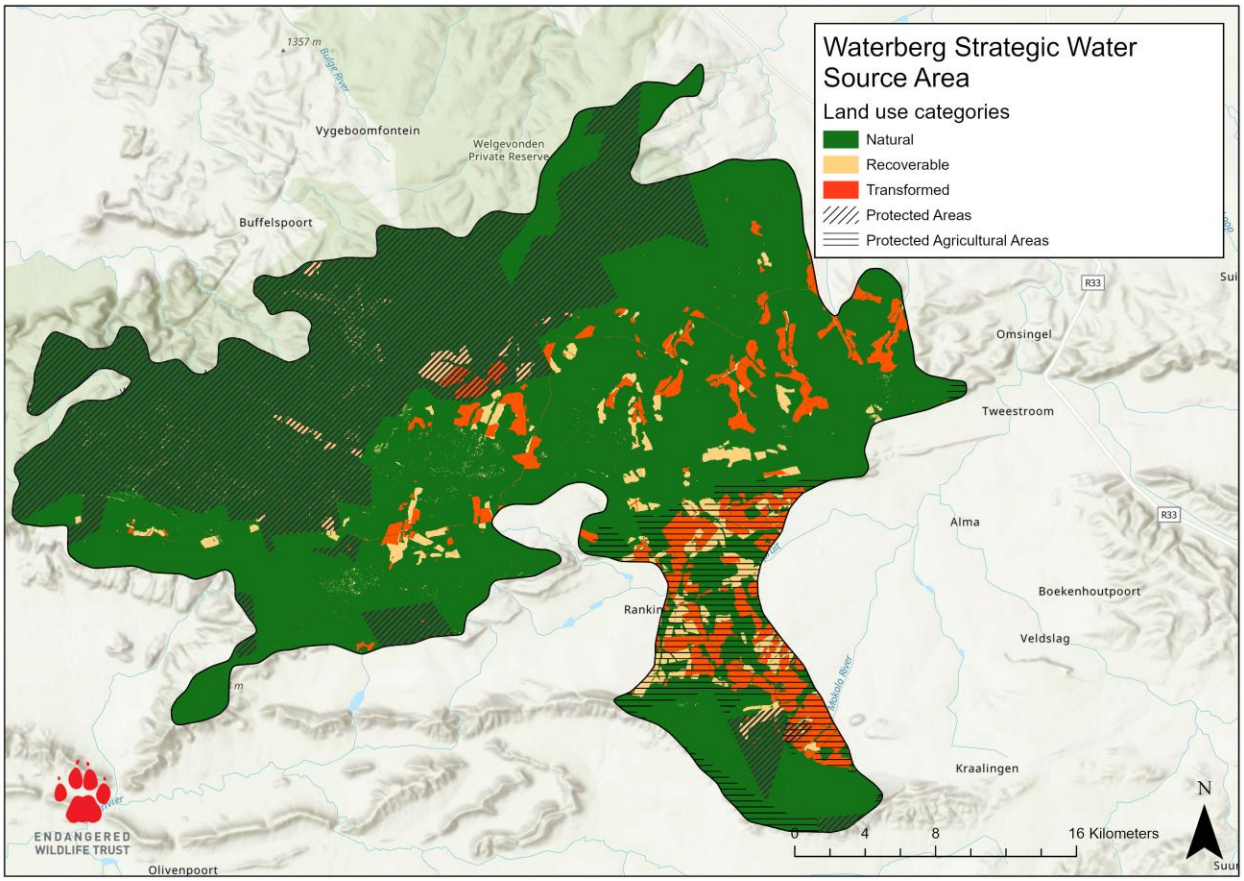


Figure 59: The Waterberg Strategic Water Source Area indicating the various National Land Cover classes that have been classified into “Natural”, “Recoverable” and “Transformed”. The hatched areas indicate protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of one Vulnerable butterfly species being found in this SWSA, and a lower confidence estimate of 41 threatened species (35 animals and six plants) being found in the SWSA. All threatened species are listed in Supplementary Table 21a.

- This SWSA lies within the Savanna and Grassland biomes of South Africa and contains three different vegetation types, none of which are threatened.

Summary Table for the Waterberg SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	37,431	36
Natural – total	91,021	88
Recoverable – total	4,579	4
Transformed – total	7,619	7
Protected (Agricultural)	11,219	11
Recoverable, outside of Protected Areas and Protected Agricultural Areas	1,928	2
Natural, outside of Protected Areas and Protected Agricultural Areas	49,532	48
Total (within SA)	**103,220**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 52,126 Ha, covering 51% of the total SWSA within SA (Figure 60).

Within it, 90% of the area is “Natural”, 4% is “Recoverable” and 6% is “Transformed”.

We have a high confidence estimate of one Vulnerable butterfly species and a lower confidence estimate of up to 38 threatened species (32 animals and six plants), one of which is Critically Endangered.

Within the PCRAs, we have an area of 1,913 Ha (4%) listed as “Recoverable”.



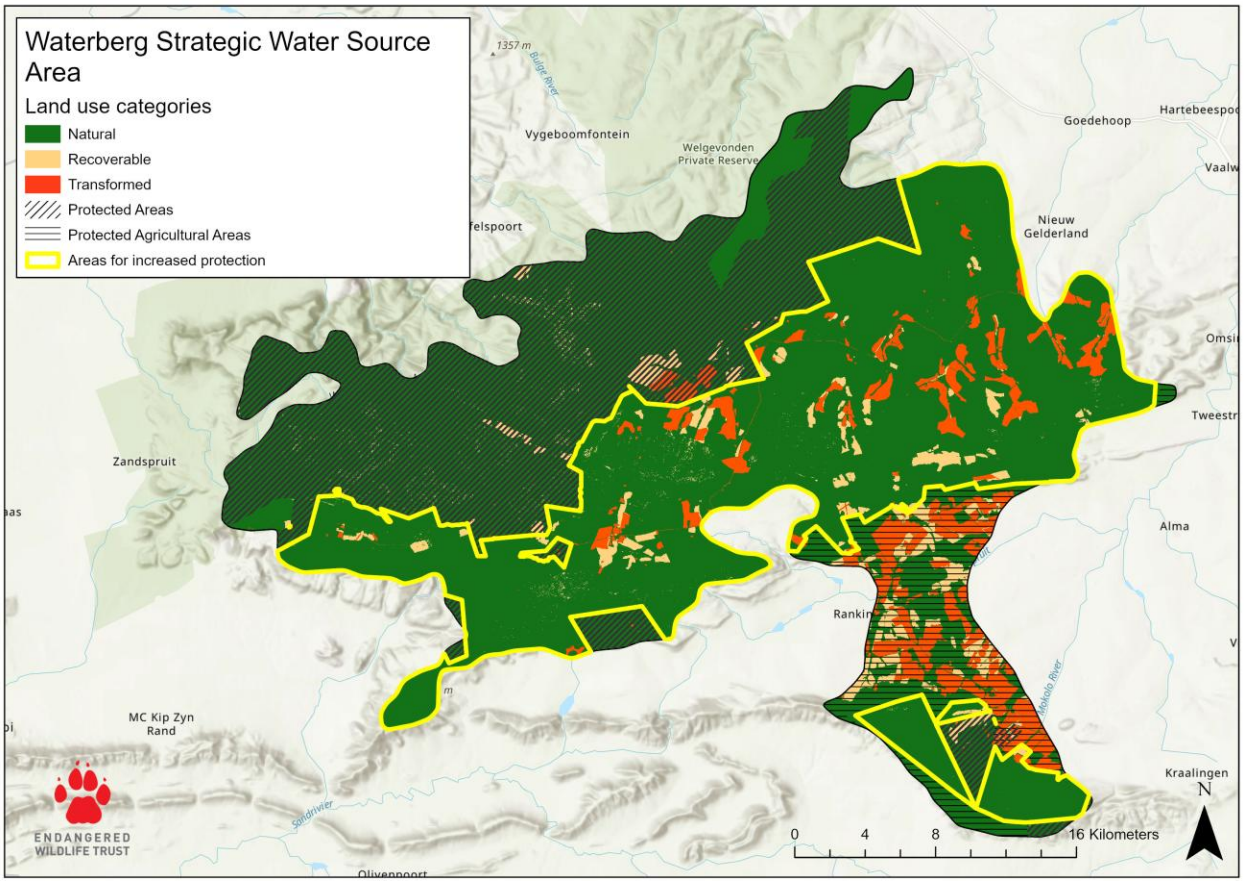


Figure 60: The Waterberg Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.

Wolkberg Strategic Water Source Area

Protection status:

- Total area within South Africa: 259,639 Ha.
- Percentage within existing formally protected areas: 16%.
- Protected Agricultural Areas: 74,499 Ha (29%).

Landuse:

A total of 59% was listed as "Natural", 4% "Recoverable" and 37% "Transformed" (Figure 61). Further calculations showed that 10,195 Ha (4%) is possibly "Recoverable" after removing Protected Areas and Protected Agricultural Areas, and 154,436 Ha (59%) are "Natural" and not currently protected.

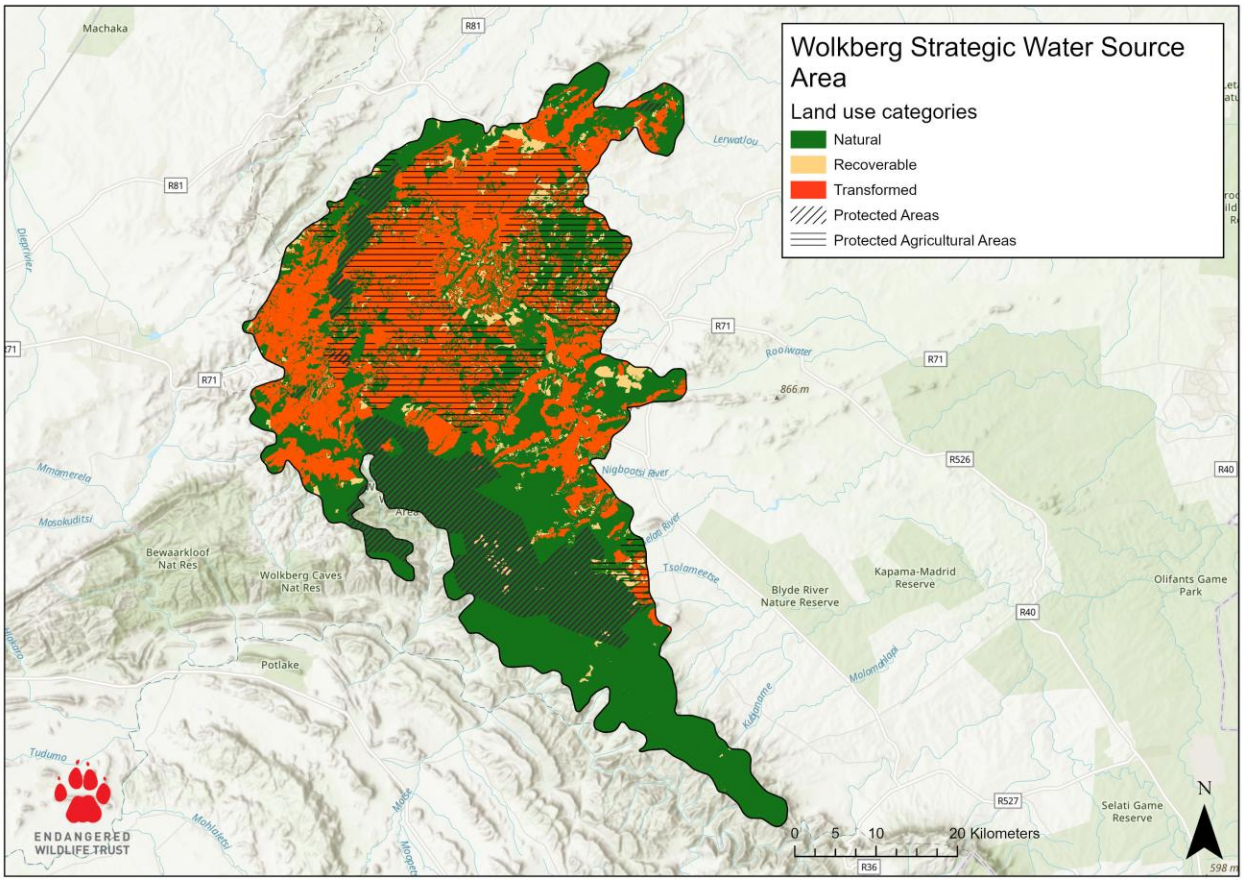


Figure 61: The Wolkberg Strategic Water Source Area indicating the various National Land Cover classes that have been classified into "Natural", "Recoverable" and "Transformed". Hatching indicates the protected areas and horizontal lines indicate the protected agricultural areas within the SWSA.

Threatened species and vegetation:

- We have a high confidence estimate of one Critically Endangered butterfly species being found in this SWSA, and a lower confidence estimate of 98 threatened species (65 animals and 33 plants) being found in the SWSA. All threatened species are listed in Supplementary Table 22a.

- This SWSA lies within the Savanna, Grassland and Forest biomes of South Africa and contains 13 different vegetation types. Of the 13 vegetation types, two are threatened (Figure 62; Supplementary Table 22b).

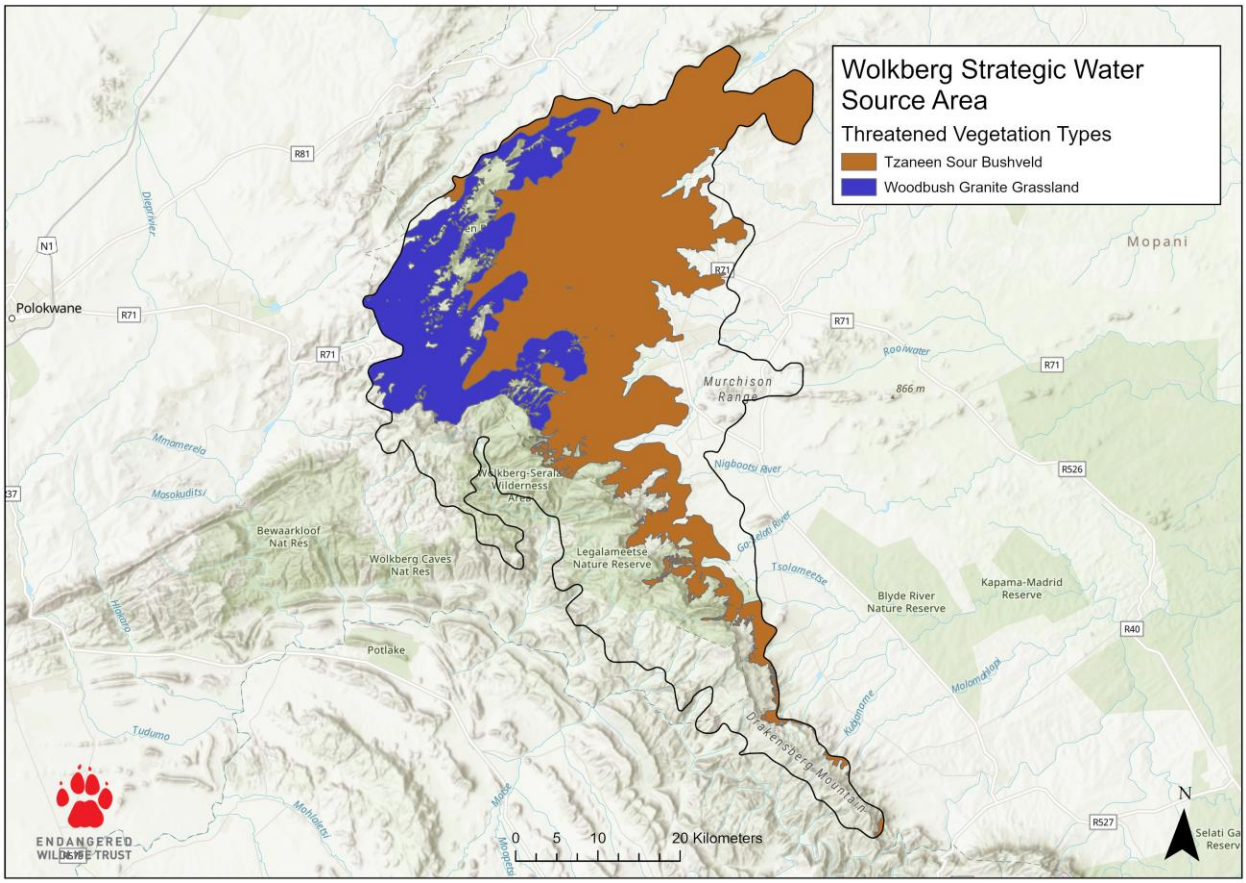


Figure 62: The threatened vegetation found in the Wolkberg Strategic Water Source Area.

Summary Table for the Wolkberg SWSA:

Type	**Hectares**	**Percentage**
Protected (Conservation)	42,282	16
Natural – total	154,464	59
Recoverable – total	10,197	4
Transformed - total	94,976	37
Protected (Agricultural)	74,499	29
Recoverable, outside of Protected Areas and Protected Agricultural Areas	10,195	4
Natural, outside of Protected Areas and Protected Agricultural Areas	154,436	59
Total (within SA)	**259,639**	**100**

Potential Conservation and Restoration Areas (PCRAs):

Total size of PCRAs: 30,098 Ha, covering 12% of the total SWSA within South Africa (Figure 63).

Within it, 99% of the area is “Natural”, less than 1% is “Recoverable” and 1% is “Transformed”.

The PCRAs may also potentially house up to 68 threatened species (41 animals and 27 plants), one of which is Critically Endangered. There is one threatened vegetation type housed within the PCRAs.

Within the PCRAs, we have an area of 139 Ha (less than 1%) listed as “Recoverable”.

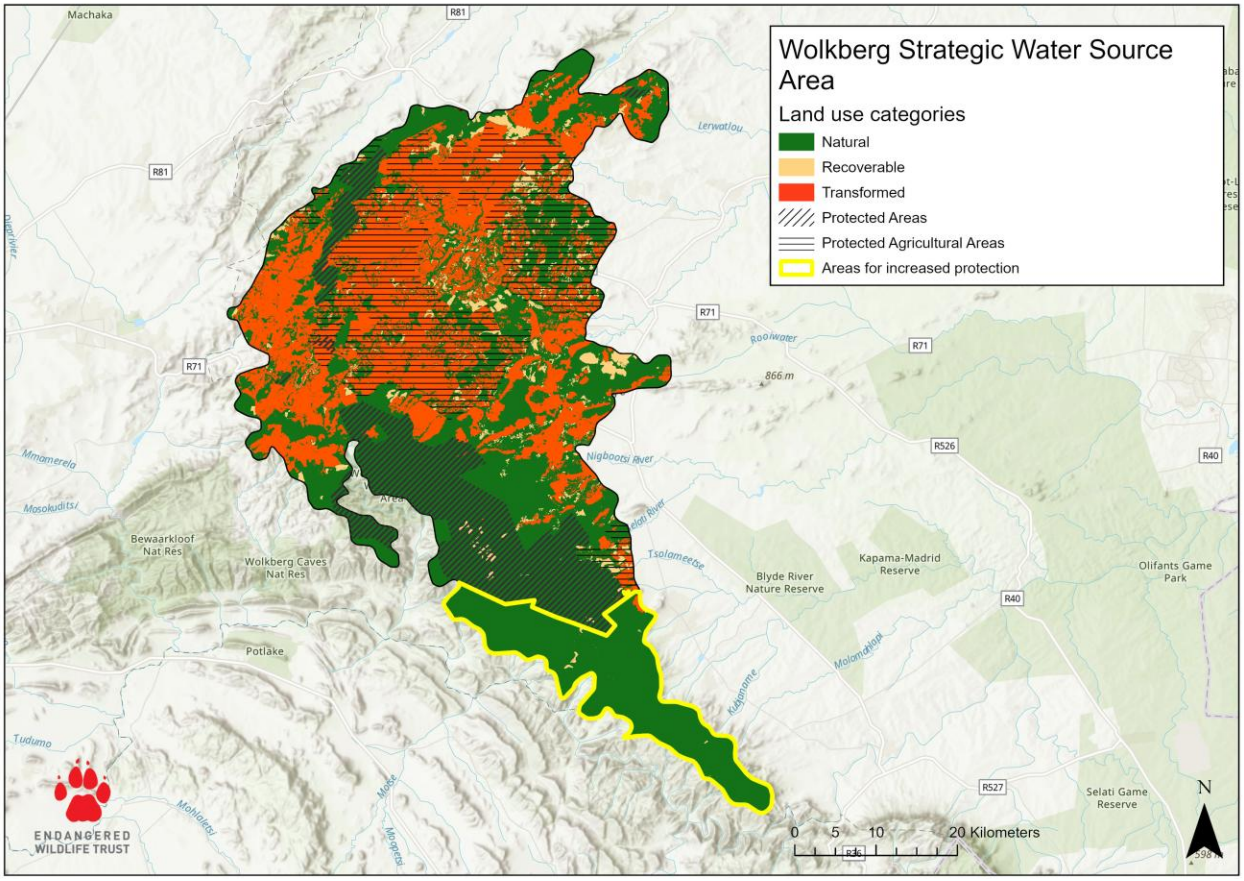


Figure 63: The Wolkberg Strategic Water Source Area showing the areas most suitable for increased protection outlined in yellow.



Summary table of results for all Strategic Water Source Areas

SWSA name	PA (%)	Natural (%)	Transformed (%)	PAA (%)	Threatened species	Threatened vegetation	PCRA size (Ha)	Recoverable within PCRA (Ha)	TOTAL AREA OF SWSA
Amathole	3	71	26	20	88 (2)	2	97838	2107	200162
Boland	52	68	29	38	1113 (40)	28	21699	207	608040
Eastern Cape Drakensberg	1	75	21	40	68 (1)	2	509592	7214	1452839
Enkangala Grassland	9	70	25	36	93 (0)	4	165529	7266	788131
Groot Winterhoek	82	80	12	32	674 (7)	11	20197	821	518277
Kouga	73	100	0	1	44 (0)	0	7656	6	63099
Langeberg	62	77	21	42	293 (8)	7	4728	152	171515
Maloti Drakensberg	16	71	25	37	44 (0)	2	11260	186	154703
Mbabane Hills	59	66	33	17	121 (2)	2	32475	252	295783
Mfolozi Headwaters	8	64	30	26	88 (1)	6	12612	2008	192069
Mpumalanga Drakensberg	13	51	47	43	167 (1)	4	81715	4300	837274
Northern Drakensberg	17	78	16	30	134 (0)	4	256354	6742	868804
Outeniqua	47	72	25	11	207 (2)	8	60445	1711	304235
Southern Drakensberg	22	59	37	46	234 (1)	7	105892	2186	1842147
Soutpansberg	18	53	37	19	64 (2)	1	31889	2124	234685
Swartberg	75	89	1	4	143 (2)	0	6602	217	77984
Table Mountain	51	53	46	0	358 (11)	7	32	0	47241
Tsitsikamma	17	73	25	31	142 (0)	6	84667	630	322201
Upper Usutu	8	44	51	60	78 (1)	2	22517	645	539331
Upper Vaal	8	59	33	77	52 (1)	1	13746	419	139401
Waterberg	36	88	7	11	41 (0)	0	52126	1913	103220
Wolkberg	16	59	37	29	98 (1)	2	30098	139	259639

Key to table column headings:

PA (%): % of land in formally protected areas

Natural (%): % of land within the "Natural" land use category

Transformed (%): % of land within the "Transformed" land use category

PAA (%): % of land in Protected Agricultural Areas

Threatened species: number of threatened species within the SWSA, with the number of Critically Endangered species in brackets

PCRA size (Ha): total area of the potential conservation and restoration areas within South Africa

Recoverable within PCRA (Ha): area of land within the PCRA falling within the "Recoverable" land use category

Summary table of results comparing SANBI's Protected Area database and DFFE's Protected Area database and for all Strategic Water Source Areas

SWSA name	SANBI (Ha)	SANBI (%)	DFFE SAPAD (Ha)	DFFE SAPAD (%)
Amathole	6327	3	5378	3
Boland	271636	45	317399	52
Eastern Cape Drakensberg	20644	1	17448	1
Enkangala Grassland	99744	13	72111	9
Groot Winterhoek	326054	63	425814	82
Kouga	45600	72	46091	73
Langeberg	83403	49	106993	62
Maloti Drakensberg	24485	16	24491	16
Mbabane Hills	104440	35	173549	59
Mfolozi Headwaters	13136	7	15634	8
Mpumalanga Drakensberg	114299	14	106832	13
Northern Drakensberg	95144	11	147045	17
Outeniqua	129390	43	143846	47
Southern Drakensberg	258764	14	404724	22
Soutpansberg	43706	19	42726	18
Swartberg	59713	77	58311	75
Table Mountain	21466	45	23945	51
Tsitsikamma	111252	35	55469	17
Upper Usutu	42218	8	42227	8
Upper Vaal	10811	8	10723	8
Waterberg	37883	37	37431	36
Wolkberg	45613	18	42282	16

Key to table column headings:
SANBI (Ha): Hectares of land in formally protected areas as based on the SANBI Protected Areas database (2022)
SANBI (%): % of land in formally protected areas as based on the SANBI Protected Areas database (2022)
DFFE SAPAD (Ha): Hectares of land in formally protected areas as based on the DFFE Protected Areas database (2023)
DFFE SAPAD (%): % of land in formally protected areas as based on the DFFE Protected Areas database (2023)

Conclusions and recommendations

The Strategic Water Source Areas make up just over 8.2% (10,020,780 ha) of South Africa's terrestrial land surface area. As mentioned in the introductory paragraphs, the intention of this report to illustrate and strategically prioritise what the actual protected area expansion opportunities are across these landscapes towards contributing to the Global Biodiversity Framework targets, and specifically the 30x30 target. Currently, only around 9.28% of South Africa's land surface is formally protected, meaning that we effectively need to more than triple this in order to reach the ambitious 30% target by 2030. **The summary table on the page above illustrates the extent of intact natural contiguous area that lend themselves to protected area expansion (PCRA), a total area of less than 1.34% (1,629,669 ha) of South Africa's land surface area.** This is significantly less than the total SWSA surface area due to extensive existing protected, transformed and agricultural areas. However, these are critically important for securing not only water security in South Africa but also the extensive biodiversity that exists within these priority areas. Linked to this there is a considerable amount of recoverable land (41,245 ha) within these potential protected area landscapes. Restoration of degraded areas is expensive and time-consuming, and these types of prioritization exercises can ensure that limited resources are targeted at strategically important areas to ensure maximum impact from a landscape integrity and biodiversity perspective.

Conservation and restoration of South Africa's SWSAs will not only improve water security for the country, but also contribute significantly to preventing the loss of threatened species and habitats, reducing greenhouse gas emissions, and improving climate change adaptation for the surrounding and downstream communities.

There are many ways to interpret these maps and the associated supplementary information but, at a glance, the following SWSAs appear to be the most suitable for further action from a protected area expansion and restoration perspective.

- SWSAs that are poorly protected, but still have large contiguous natural areas are Amathole, Eastern Cape Drakensberg (already earmarked for the new Grasslands National Park), Enkangala Grasslands, Mfolozi Headwaters, Northern Drakensberg, Southern Drakensberg, Soutpansberg, Waterberg and Tsitsikamma.
- SWSAs that have large amounts of recoverable areas (more than 20,000 hectares) are Eastern Cape Drakensberg, Enkangala Grasslands, Northern Drakensberg, Southern Drakensberg, and Soutpansberg. However, these may not be aligned with the protected area expansion landscapes referred to in the bullet point above.

Regardless of the interpretation or conclusions drawn by each of the readers of this report, our hope is that it proves useful in guiding and encouraging conservation efforts in these critical landscapes and, where possible, leveraging partnerships towards landscape-level ecosystem conservation.

The results of this report come with the caveat that we have not ground-truthed the areas that we have highlighted for restoration and conservation.

Finally, we would like to, once again, thank the Federal Republic of Germany, through the German Embassy in Pretoria, for their support to enable the production of this report.

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