

Conservation status and threats to vascular plant species endemic to Soutpansberg Mountain range in Limpopo Province, South Africa

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Abstract

Soutpansberg Mountain range is one of the main biodiversity hotspots in South Africa and it is located in Limpopo Province. It possesses high diversity of flora and fauna. Communities surrounding this mountain have long benefited from the ecosystem services that the area provides. It is of importance to determine the threat status of plant species endemic to this mountain range that has been a great source of ecosystem services. Twenty-two endemic vascular plant species of the mountain range have been identified. In this study we use the South African National Biodiversity Institute (SANBI) current 2017 version Red List categories to determine the threat status of plant species endemic to Soutpansberg Mountain range. SANBI is the national body in South African that is responsible for national threat assessment for plant and animal species and they also provide data to IUCN (International Union of Conservation of Nature) on threat status of plant and animal taxa found in South Africa. We calculated the categorical percentages of threat status of endemic vascular plants species of Soutpansberg Mountain range and the threats these plant species are facing were gotten from SANBI Red List. This study showed that over 50% of the plant species endemic to this area are of conservation concern meaning they deserve conservation attention. Majority of threats are due to anthropogenic pressure. This implies that the endemic flora of this region is facing risk of extinction. This study recommends protection of all the endemic plant species of this mountain range in order to prevent their future extinction.

Introduction

Human reliability on nature is simply a product of adequate ecosystem services

from enriched biodiversity.¹ Ecosystem services includes services such as seafood, wild game, forage, timber, biomass fuels, natural fibers, and many pharmaceuticals, industrial products, and their precursors.² However, most of these ecosystem services might not be present in future due to high level of extinctions in the number of plants and animals as a result of increase in human population, land degradation, urbanization and over exploitation of resources.^{3,4} A study predicted that if the trend of plant species loss currently happening continues, in 50 years a total of 60 000 to 100 000 plant species would have been wiped out of the earth surface.⁵ Plant resources utilization and anthropogenic pressure in South Africa are major threats to biodiversity that promoted extinction risk of several plant taxa.⁶⁻⁸

The Soutpansberg Mountain range is one of the main biodiversity hotspots in South Africa.⁹ It is situated in the north of the Tropic of Capricorn in the Vhembe district which is found next to the northern border of South Africa and Zimbabwe in the Limpopo Province.¹⁰

The mountain range stretches from the small town of Vivo in the west of Punda Maria to the Kruger National Park in the east with a surface area of about 6 800 km² a distance of 60 km at its widest area and total length of 210 km in north-south direction.¹¹ The geology of this mountain range consists of Makgabeng Plateau, Blouberg Mountains, Pink erosion-resistant quartzite and sandstone with pebbles as the major dominating rock.⁹ This mountain range also enjoys variability in its climatic conditions. The moist air from the Indian Ocean precipitates against the southern slope and dissipate in the valley of the northern slope which results into mosaic climatic conditions.^{9,12,13} The mountain receives an annual rainfall of about 2000 mm which can increase to 3233 mm with this occurrence commonly found in the southern slope due to orographic rainfall.¹⁴ The mountain harbors 2500-3000 plant species.¹⁵⁻¹⁷ The mountain range has 1066 plant genera that is 66 more genera than the ones occurring in the cape floristic kingdom, which is considered as one of the 6 floral kingdoms of the world.¹⁶ Although this mountain range is endowed with a lot of plant species only 22 of them are endemic.^{9,12,18} The rich diverse-ness of species on this mountain range is threatened mostly by utilization of resources by humans, habitat fragmentation and alien invasion, thereby posing threat to the endemic species of the area.¹⁹ In this study we evaluated the threat status of endemic plant species of Soutpansberg Mountain. This is to quantify the threats

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faced by plant taxa and endemic plant species of this mountain range.

Materials and Methods

The list of the 22 endemic vascular plant species on Soutpansberg Mountain range were obtained from Hann.¹⁸ The threat status of these species was obtained from the current 2017 version of SANBI Red List. SANBI is the national body in South Africa that is responsible for national threat assessment of plant and animal species (<http://redlist.sanbi.org/redcat.php>). We used the threat of these species from the SANBI Red List to determine the percentages of species that are threatened and not threatened within Soutpansberg Mountain range and the ones that are of conservation concern. Percentages of endemic plant species facing each threat found on SANBI Red List were also calculated. This is to quantify the species facing different kind of threats and to determine the prominent threats of the endemic vascular plant species on this mountain range.

Results

The results of conservation status of vascular plants endemic to Soutpansberg

Mountain range are as follows: 4.5% of endemic plant species on Soutpansberg Mountain are data deficient (DD), 4.4% are data deficient taxonomically problematic (DDT), 9% are vulnerable (VU), 36% are rare (R), 9% are critically rare (CR), 4.5% are near threatened (NT), 4.5% are not on SANBI Red List and 18% are of least concern (LC). Seventy-three percent of all the Vascular plants endemic to Soutpansberg Mountain range in Limpopo Province of South Africa are of conservation concern (rare, vulnerable, critically endangered, near threatened and data deficient). Regarding the percentage of the species facing different threats as found in SANBI Red List, 4.5% are threatened by harvesting, 4.5% by natural disaster, 18% by habitat destruction, 4.5% by bush encroachment, 4.5% by invasive encroachment, 13.6% by individual's collection (whole plant harvest), 4.5% by fire occurrence, and 4.5% not on Red List. There are no threats found on the SANBI Red List for 63.6% of all the endemic plant species of Soutpansberg Mountain range, and that 10 out of 13 (77%) of threatened species that were not found are of conservation concern.

Discussion and Conclusions

Species endemism is an important factor in identifying areas demanding conservation because endemic taxa are critically important to areas they are situated.²⁰⁻²³ Although there are instances where species endemism does not correlate with species richness, this does not negate the importance of endemism in conservation.²⁴ This therefore makes evaluation of conservation status of endemic flora of importance. Threat to endemic species can cause adverse effect on natural ecosystems thereby reducing ecosystem services.²

The most prominent threats found among endemic flora of Soutpansberg Mountain range are habitat destruction and harvesting of individual species. These prominent threats are human induced threats (Table 1). Efforts needs to be made to get the status of data deficient species of endemic plants on this mountain because there are records of some ecological forces posing threat to one of them (*Aloe vossii* Reynolds) (Table 1). This species might likely be highly threatened. There is also a need to evaluate all the species whose

threats status were not found on SANBI Red List and to determine threats or potential threats they might be facing because most of them are of conservation concern (Table 1).

Species that are not yet described and the ones that are taxonomically problematic can be set back to conservation of endemic species because their geographic range and distribution are not well known.²⁴ This was also found in this study in which the status of a new species described by Hann²⁵ could not be ascertained (Table 1). There might be a possibility of some other undescribed species present on this mountain range which might make quantification of the overall conservation status of endemic vascular plant taxa on this mountain range difficult. Effort should be made to include the newly described species by Hann²⁵ on the South African national Red List records to further contribute to the overall conservation status of this mountain.

A continuous reassessment of already determined status of these species should be encouraged to determine certain status changes, and also detect other threats not yet to known to endemic flora of

Table 1. List of vascular plant species endemic to Soutpansberg Mountain, their family, their SANBI red list status and their threats.

Family	Species	SANBI red list status	Threats on SANBI red list
Asphodelaceae	<i>Aloe petrophila</i> Pillans	Rare	No threat found
Asphodelaceae	<i>Aloe soutpansbergensis</i> I.Verd.	Rare	No threat found
Asphodelaceae	<i>Aloe vogtsii</i> Reynolds	Near Threatened	Habitat destruction
Asphodelaceae	<i>Aloe vossii</i> Reynolds	Data Deficient Taxonomically Problematic	Bush encroachment, invasive encroachment, fire occurrences, habitat destruction
Acanthaceae	<i>Blepharis spinipes</i> K. Vollesen	Data Deficient	No threat found
Pedaliaceae	<i>Ceratotheca saxicola</i> E.A.Bruce	Rare	No threat found
Asteraceae	<i>Cineraria erodioides</i> var. <i>tomentosa</i> Cron	Critically Rare	No threat found
Combretaceae	<i>Combretum vendae</i> A.E.van Wyk	Least Concern	No threat found
Crassulaceae	<i>Cotyledon barbeyi</i> var. <i>soutpansbergensis</i> Van Jaarsv. & A.E.van Wyk	Critically Rare	No threat found
Mesembryanthemaceae	<i>Delosperma zoutpansbergense</i> L. Bolus	Least Concern	No threat found
Zamiaceae	<i>Encephalartos hirsutus</i> P.J. Hurter	Critically Endangered	Individual's collection
Apocynaceae	<i>Huernia nouhuysii</i> I.Verd	Vulnerable	Native species dynamic changes, harvesting, natural disaster and habitat degradation
Convolvulaceae	<i>Ipomoea bisavium</i> A. Meeuse	Rare	No threat found
Crassulaceae	<i>Kalanchoe crundallii</i> Verdoorn	Rare	Individual's Collections
Mesembryanthemaceae	<i>Khadia borealis</i> L. Bolus	Rare	No threat found
Orchidaceae	<i>Mystacidium brayboniae</i> Summerh.	Near Threatened	Individual's collection
Rubiaceae	<i>Pavetta tshikondeni</i> N. Hahn	Rare	No threat found
Fabaceae	<i>Rhynchosia vendae</i> C. H. Stirton	Vulnerable	Habitat destruction
Fabaceae	<i>Senegalia montis-salinarum</i> N. Hann.	Not on red list	Not on red list
Apocynaceae	<i>Stapelia clavicornata</i> Verdoorn	Least Concern	No threat found
Gesneriaceae	<i>Streptocarpus parviflorus</i> Hook. f. subsp. <i>soutpansbergensis</i> Weigend & T. J. Edwards	Least Concern	No threat found
Rubiaceae	<i>Vangueria soutpansbergensis</i> N. Hahn.	Rare	No threat found

Soutpansberg Mountain range. Because this study revealed that there are no threats for majority of these species whereas many of them are of conservation concern. Our study has therefore given an overview of the conservation status and threats to the survival of endemic vascular plant species on Soutpansberg Mountain range in Limpopo Province of South Africa. We concluded that majority of endemic plants on this mountain needs effective conservation plan. Because majority of these plants are of conservation concern, this study recommend that such plants should be protected.

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