

The last two decades saw rapid urbanization and development in South Africa, resulting in highly fragmented sprawling cities. This affects urban ecosystems and the deliverance of their services. This paper aimed to study and map urbanization, change and transformation of natural grasslands and wetlands in the Tlokwe Municipal Area (TMA). Results were used to quantify the effect of the land use change on the different vegetation types represented as well as determining the relevant ecosystem services rendered. The study area includes both the Grassland - and elements of the Savanna Biome. Both of these biomes are transformed and fragmented by cultivation, forestry, urbanisation and mining. Topographic maps of different years (1945, 1995 and 2006) were used to map the different land use types (urban, cultivation, wetlands and natural grasslands). The percentage coverage of the land-use types were calculated for each time period. The results showed an overall increase in both urban and cultivated areas between 1945 and 1995 with a consequent reduction in wetlands and natural grasslands. Between 1995 and 2006 there was an even larger increase in urbanization, but a decrease in cultivation. The increase in urbanization and cultivated areas has greatly transformed 4 endangered vegetation types (more than 50% transformed). This elucidated the lack of conservation areas within the TMA, as there is only one formal conservation area (Boskop Dam Nature Reserve) and a proposed Highveld National Park. However, none of them includes any of the 4 identified endangered vegetation units of the Grassland biome. The remaining vegetation types are less than 25% transformed. Results of the time series maps were used to quantify the supporting ecosystem services of natural grasslands, and provisioning services as delivered by cultivated areas and wetlands.

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Human population density correlates with phylogenetic diversity and plant vulnerability in southern Africa

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Identifying the services natural ecosystems are providing to humanity is a primary step towards their sustainability. These services termed 'ecosystem services' are generally regarded as primarily linked to species diversity. Using a molecular phylogeny reconstructed based on plant DNA barcodes; we show that human population density in southern Africa correlates better with phylogenetic diversity than with species richness. This finding indicates that the evolutionary processes that create variation between living organisms might be providing key services - 'ecosystem services' - for humanity. Of concern, however, is the observation that distribution of threatened species also strongly correlates with human population density, even after correcting for distribution of species richness. Distribution of humans in sub-Saharan Africa has therefore been shaped by the evolutionary history of its flora, but represents a significant threat to its evolutionary future. Our study links evolutionary processes, ecosystem function and human population density in Africa. We therefore suggest that conservation planning should shift considerably from preserving species diversity to preserving evolutionary history, if we are to ensure full benefits for future generations.

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Twentieth century changes in distribution of indigenous forest in TMNP: The role of land use and climate change

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Indigenous forests only cover 0.01% of the total land area of South Africa. Its highly fragmented distribution and historically extensive exploitation has led it to be perceived as one of the country's most vulnerable vegetation types. Despite this, forest remains one of South Africa's most under-researched ecosystems. This research examines changes in the distribution of Southern Coastal Forest and Southern Afrotropical Forest in Table Mountain National Park (TMNP), through the use of historical aerial photos and ground-based repeat photography. Distribution change is investigated alongside associated environmental drivers and this leads to a new classification of forest types within TMNP. A total of 172 patches of forest have been identified within TMNP. Both the repeat photography and aerial photography datasets show an overall increase in forest cover within TMNP from 1900–2012. This increase is predominantly visible within the Cape Peninsula's Southern Afrotropical Forest and the highest expansion rates have been recorded in Orange Kloof and Blinkwater Ravine. In addition to these changes in forest distribution an increase in vegetation biomass has occurred at all sites. Further research is required to determine whether this biomass increase has caused a decrease in fynbos species diversity. In contrast, there has been relative stasis at most Southern Coastal Forest sites. Housing and infrastructure development has contributed significantly to forest degradation and in many areas only a few fragments of formerly more extensive coastal forest remain. It is thought that decrease in fire frequency is the main driver of forest distribution change within TMNP. However, historical land use practices, such as firewood collection, as well as increases in CO₂ may also account for the changes observed in the historical photographs. These results hold significance for the ecological management of TMNP in the face of changing climate.

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Montane wetlands of the Eastern Cape: An investigation of plant biodiversity and vegetation community types

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Over the past two decades, mountains have received increasing attention within scientific and political spheres. Mountains have gained recognition as being water towers, which emphasises the importance of mountains as providers of freshwater to surrounding downstream areas. The Great Escarpment Mountain Range of South Africa has been identified as an essential water resource contribution area. Mountain wetlands in this region play an important role in the provision of water to the surrounding environments, and wetland health is essential for the South African economy. Montane wetlands have been largely understudied, especially in the Eastern Cape region. In the past this region has been considered as dry, supporting fewer and smaller wetlands compared to other regions such as the Highveld and KwaZulu-Natal. The extent of montane wetlands in the Eastern Cape, however, appears to have been underestimated. The biodiversity, and community types of montane wetlands in the Eastern Cape are investigated using a phytosociological approach. Environmental variables and soil composition are used to identify possible drivers of wetland plant distribution. Apart from filling a gap

in our knowledge on South African montane wetlands, our results will be of value to landowners as we can increase awareness about the value of wetlands and encourage their effective management and conservation.

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Botanical aspects of culturally important or vegetation types sites in Ndlambe Village, Eastern Cape, South Africa

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The cultural importance of the Albany thicket and other vegetation types to local communities of the Eastern Cape has recently been recognized. An investigation of the cultural as well as botanical attributes of different vegetation types found in Ndlambe village was undertaken in order to try and understand how cultural values relate to botanical aspects. This was done through interviews to explore the values associated with sites differing in their vegetation, and field data collection to determine woody plant composition and structure. We found that people recognized and appreciated different vegetation types surrounding their communities. The vegetation types recognized by people were Igquba, partial forest (Ihlathana) and "true forest" (Ihlathi). The Ihlathana and Ihlathi vegetation types further away from the village had cultural value associated with them and had a high density of woody species. Ihlathi had the tallest and densest vegetation and was characterised by the presence of tree euphorbias. The Igquba vegetation type found close to the village had more open and lower vegetation and had no cultural value associated with it. Since taller thicket further from the village is both culturally important and less heavily utilised, there is opportunity for locally relevant conservation measures to protect it. The Noorsveld vegetation in the lowlands closer to the village, on the other hand, suffers greater impact and is not considered to be culturally important. Measures to manage its utilisation and protect its biodiversity will require a different motivation, such as the need to sustainably use species important for people's livelihoods.

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The fragility of mesic C4 grasslands in South Africa

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Grasslands are often ignored, viewed as secondary vegetation derived from felling of forests and therefore suitable targets for afforestation rather than conservation. However, the mesic grasslands of southern Africa are now thought to be ancient, and much more extensive in the last glacial. They are very rich in perennial forb species, many of which have large underground storage organs and seldom recruit from seed. We studied the diversity of pristine grasslands and compared them with restored grasslands after different forms of disturbance, including afforestation and ploughing. Natural succession in restored grasslands failed to restore the diversity of forbs, with very poor recovery even decades after removal of plantation forests. Thus primary grasslands appear to be at least as fragile as primary forests and may take decades to centuries to recover from major disturbance. We explore obstacles to

the restoration process by investigating various restoration methods and discuss the results thus far.

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A baseline database for *Aloe pillansii* in southern Africa to enable quantitative conservation status assessments

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Concerns about the future persistence of *Aloe pillansii* was mainly based on observational subjective opinions and spatially limited qualitative data. The aim of this study was to obtain more quantitative baseline data for improved objective conservation status assessments. Field data was collected across the distribution range of *A. pillansii* recording population size, quantitative and qualitative sub-sample demographic data, categorical health status data and real time climatic data. Spatial data analyses revealed that the extent of occurrence amounted to 632.56 km² (area of occupancy = 0.025 km²) consisting of three geographical distinct regional populations. About 46% of the total population occurs within the stable northern population, also having the densest population (14.59 indiv. / km²). Only 16% of individuals occur within the most sparsely populated (4.14 indiv. / km²) central population while the growing southern population included ca. 38% of the total population. Contrary to suggestions that climate change causes northern populations to experience heat stress, the northern population occurs within the coolest habitat, while the southern population experiences the warmest summers. Significant correlations between slope, aspect and elevation suggest that climate does influence habitat preference. Given the bi-modal size class frequency curve of the global population and the good physical health recorded, our perception of the species' status is changing and knowledge about its habitat is improving.

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Conservation: Principles to guide a Land Optimisation Strategy in Mpumalanga

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Mpumalanga Tourism and Parks Agency (MTPA) manages a diversity of land and functions. Land has come from different sources, including other departments and old Homelands. There are difficulties in affording the costs of the land, so two extreme approaches to rationalisation would be to alienate land that does not have conservation value or to alienate land that does not earn enough through tourism. We propose some principles to guide the development of a more integrated Land Optimisation Strategy for MTPA. Land is an asset and alienating any land may be a short-sighted strategy. State-owned land belongs to the people of South Africa - it should not be sold, traded or given away in order to meet short term debts and access should be broad-based, as long as this does not impact