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TOPIC 01

Relationship between Herbaceous and trees species in Miombo Forest : A preliminary study in the Mikembo Reserve

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TOPIC 02

SEOSAW-GGG Herbaceous Protocol Field Workshop, 15-25 March 2022

TOPIC 03

Future Ecosystems for Africa programme launched

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NOTE FROM THE STEERING COMMITTEE

This marks the first issue of our network newsletter which seek to keep network members updated of activities and opportrunities across the region in hopes of fostering greater collaboration and engagement among members.

The Steering Committee would like to thank members who have made contributions to this issue and encourage all members to share their activities and programmes with us for inclusion into the future issues!

Funding Opportunities

This has been compiled specifically for WITS, but the information may be useful to the MN members, especially the funding opportunities for International Students: https://www.wits.ac.za/media/wits-university/study/fees-and-funding/documents/WitsFundingOpportunities.pdf

Relationship between Herbaceous and trees species in Miombo Forest : A preliminary study in the Mikembo Reserve

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Introduction

Nowadays, biodiversity management has become a major concern for all countries and societies involved in the sustainable development process. This requires a certain amount of knowledge about how forests function on the part of those responsible for forestry issues.

Currently, the change in forest cover in Haut-Katanga is mainly due to anthropogenic deforestation motivated by urbanisation, agriculture, mining activities, bush fires and charcoal burning (Kabulu et al., 2008 ; Chidumayo, 2005 ; Luoga et al., 2000 ; Mwampamba, 2007).

The area occupied by Miombo forest in the Lubumbashi region has decreased over the years. It occupied 85% of the territory in 1956, 20% in 1984 and 12% in 2009 and savannahisation is the most dominant transformation dynamic. The major causes identified for this are rapid population growth, urbanisation, and mining and shifting agricultural (Munyemba and Bogaert, 2014).

The Miombo forest ecosystem is home to a very important biodiversity from several points of view, to the point that it is a significant resource for the populations living in the Zambezi region. Thus, understanding its regeneration dynamics is a major asset for sustainable management (Malmer, 2007).

The phytosociological study of herbaceous vegetation under the forest can offer better perspectives for understanding the mechanisms of natural regeneration of tree species (Mbayngone, 2008), therefore orienting the policy of setting aside that should underpin forest conservation programs.

It is obvious that the abusive exploitation of Miombo leads to the loss of biological diversity while affecting the regeneration process of tree species. This abusive exploitation has various determinants, including setting early or late fires to the forests.

The main objective of this preliminary study is to investigate the regeneration of tree species in relation to the herbaceous stratum within the Miombo open forest.

The study has the following specific objectives : (i) to identify the biological types of herbaceous species and (ii) to explore herbaceous' influence on the natural regeneration of trees seedling.

Methods

The Mikembo sanctuary is a forest reserve, serving as a reference area for the ecological and dynamic study of a number of Miombo species. The site is located 33 km from the city center northeast of Lubumbashi city, near the village Kinsangwe, on the Kasenga route in the province of Haut-Katanga, Democratic Republic of the Congo. The site is located at 11°28'36.43'' S; 27°39'58'' E and at an altitude of 1181 m. It has been under protection for 17 years. Mikembo, like the surrounding area of Lubumbashi, belongs to the dry tropical climate type CW6 according to Koppen's classification. It is characterised by two alternating seasons, the rainy season (November to March) and the dry season (May to September). April and October are transitional months. Relative humidity varies according to rainfall during the year (Bruneau, 1992).The sampling consisted of floristic plots. Fifteen (15) 10 m × 10 m plots were randomly arranged for the purpose of analysing the herbaceous vegetation. In the same plots, all trees and shrubs were also surveyed. These plots were placed in the centre of each large 0.25ha plot in the large Mikembo plot.

Data collection was carried out by stratum within each plot, starting with herbaceous species and then arborescent species. All plants were identified to species level in order to compile a floristic list.

The survey of the tree layer consisted of identifying mature and regenerating woody species. Dendrometric measurements were taken on all woody species (adults and juveniles) found in the 10 m × 10 m plot. Heights were taken with a clinometer and the tape measure was used to measure circumferences. Diameters at breast height (DBH) were deduced from the circumference measurements by dividing by the factor pi (=3.14).

Herbaceous data

After identifying all herbaceous species, two types of observations were made : frequency of occurrence and the species' biological types. Herbaceous plants were studied in 18 randomly selected 100 m² plots within 10 ha of the large Mikembo PSP. Biological types are important characteristics for the description of vegetation. They take into account the biological organ that serves to bring the plant to renewal (the bud) and its anchorage in the soil (Descoing, 1975).
According to the position of the buds during the bad season, Raunkiaer (1934) distinguishes 9 main biological types (figure 1) among wich :

Cryptophytes: Plants with persistent buds located in the ground (geophytes) or in the water (hydrophytes).

Phanerophytes: plants with aerial persistent buds located at a significant distance from the ground, up to 25 cm above the ground. During the bad season, some plants lose their leaves and others keep them. Chamephytes: plants with persistent aerial buds located less than 25 cm above the ground. Hemicryptophytes: plants with persistent buds at ground level. Therophytes: annual or very short-lived plants whose survival is ensured by seeds.

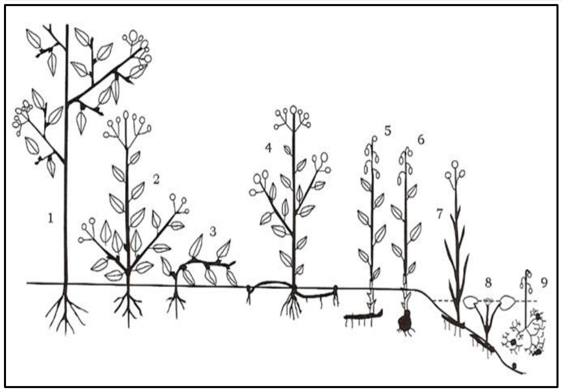

Figure 1. The biological types of Raunkier's classification : 1-Phanerophyte, 2/3-Chamaephyte, 4-Hemicryptophyte, 5/6-Geophyte, 7-Helophyte, 8/9-Hydrophyte

Table 1. Biological spectrum of herbaceous diversity in the permanent plots of Mikembo

Types biologiques	Specific richness	freq, %
Geophyte	24	26,4
Hemicryptophyte	7	7,7
Therophyte	60	65,9
Total	91	100,0

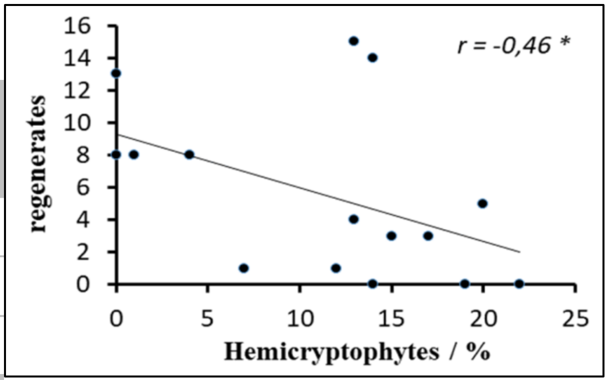

Figure 2. Pearson correlation (p value ≤ 0.1) between biological type (Hemicryptophyte, %) and number of juveniles (regenerates) per 10×10 m² plot

Data analysis

In order to analyse the data, the first step was to present the characteristics of the vegetation. For this purpose, the abundances of species and families have calculated as well as their frequencies of occurrence in the plots.

In the woody stratum, we analysed the characteristics of the plots by determining the number of individuals and the species richness. To understand the influence of the herbaceous layer on the regeneration of trees under the forest canopy, we calculated the Pearson correlation.

Results

The biological spectrum of vegetation

The species richness and abundance were presented for both the tree and shrub strata. The result of the floristic survey in the 15 plots shows that out of a total of 191 individuals inventoried, 31 woody species were identified in 24 genera and 17 families. The most abundant species were *Julbernardia paniculata* (26.2%), *Julbernardia globiflora* (11%), *Diplorynchus condylocarpon* (8.4%), *Brachystegia wangermeana* (6.3%) and the least abundant were *Anisophyllea boehmii*, *Combretum molle*, *Parinari curatellifolia* and *Erythrophloeum africanum* with a proportion of 0.5% for each of the last four species.

At the level of the herbaceous stratum, the results of the floristic surveys in the 15 plots show that 91 herbaceous species were inventoried. They are distributed in 68 genera and 29 families. The most diverse biological type was the therophyte followed by the geophytes. However, the number of woody regenerates was not related to the frequency of biological types. Furthermore, the number of regenerates varied from plot to plot.

Hemicrytophytes are the least diverse. The 7 species of hemicryptophytes are grouped into 3 families, namely: Poaceae (4 species), and Cyperaceae, Pteridaceae with one species each. Moreover, the geophytes are dominated by 24 species divided into 15 families, among which the Zingiberaceae and the Lamiaceae have 3 species each, while the two species represent the Acanthaceae. As for the therophytes, they are represented by 60 species distributed in 19 families, among which Asteraceae are the richest in species with 19 species, followed by Fabaceae, Acanthaceae, Commelinaceae with respectively 8, 6 and 4 species.

Influence of the herbaceous layer on the regenerates

The analysis of the correlations between the three biological types recorded in the different plots showed (figure 2) that only the relative frequency of hemicryptophytes is negatively correlated with the number of regenerates. The other correlations simply show non significant negative trends between the number of regenerates and the relative frequency of geophytes. The most abundant hemicryptophytes found were Eragrostis racemosa and Panicum maximum.


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Miombo Woodlands in a Changing Environment: Securing the Resilience and Sustainability of People and Woodlands

Editors: (view affiliations) Natasha S. Ribeiro, Yemi Katerere, Paxie W. Chirwa, Isla M. Grundy

Offers a socio-ecological management and policy analysis of the Miombo ecosystem in the global change context

Provides a new framework for a better socio-ecological understanding of the Miombo woodlands

Includes case studies which reflect the Miombo woodland management and conservation strategies

Is academically rigorous and easily accessible by academics, decision-makers, and general readers

https://link.springer.com/book/10.1007/978-3-030-50104-4

Conclusion and research perspectives

The present study was carried out to investigate the regeneration of woody species in relation to the herbaceous stratum in the Miombo open forest.The results also show that the richest biological type is the therophytes followed by the geophytes. A negative correlation was detected between the frequency of occurrence of hemicryptophytes and the number of woody regenerates. This leads us to say that an increase in the frequency of hemicryptophytes would prevent the regeneration and growth of young plants in the forest understory. It should be noted, however, that this work was carried out on a small sample of 15 plots and in a single site. It would therefore be interesting to (i) to increase the sample size, (ii) to explore other sites and (iii) to measure functional reproductive traits to try to understand the reproductive and propagation strategy of the herbaceous layer in the understorey layer of Miombo in Haut-Katanga

JOIN THE OPEN ECOSYSTEMS NETWORK (OpEN)

To promote the conservation, restoration, and sustainable management of savannas, grasslands, and shrublands, the Open Ecosystems Network (OpEN) draws on the expertise of its affiliated scientists to foster understanding—among policymakers, practitioners and the public—of the value and contribution of open ecosystems to the Earth system, global biodiversity, human livelihoods, and cultures.Open ecosystems together cover 50+% of all land and span the temperate and tropical realms of the planet. Open ecosystems are home to a unique and ancient biodiversity that supports and enriches the functioning of our planet while also being of immeasurable value sustaining livelihoods and cultures. Open ecosystems support sun-loving biodiversity where over millions of years natural processes related to fire and animals have been central to the formation and dynamics of these ecosystems globally. Here is a link to a form where you can sign up:

https://docs.google.com/forms/d/e/1FAIpQLSfd3Tac9ViW9YhMzvRwjbxXU0j6I9t2dNTz7Ab-E7C6TSurcQ/viewform

Future Ecosystems for Africa programme launched

The Oppenheimer Generations Research and Conservation in partnership with the University of Witwatersrand and the University of Exeter launched the **Future Ecosystems for Africa programme (FEFA)** at the Origins Centre museum at Wits University in Braamfontein.

The **FEFA programme** is an African-wide initiative that aims to identify African ecosystem vulnerabilities and tipping points while leveraging African-informed transformative change opportunities. It supports research to address conservation and development issues across the continent, identifying that Africa has a unique, but temporary opportunity to guide development onto nature-supporting, rather than nature-eroding paths. The overarching aim of the **FEFA programme** is prioritising ecosystem-based interventions in Africa, this includes what to protect and how, plus what to rehabilitate, and identifying whose voices need to be included in this decision-making. Through this programme, Wits University Professor Sally Archibald and Associate Professor Laura Pereira are working with project partners from across the continent and the globe to drive research that can feed into policy strategies that enhance the resilience of African ecosystems and the wellbeing of its people. This approach to developing resilient African Future Ecosystems will build on findings from the IPBES (Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services) regional assessment for Africa that emphasised Africa's rich bio-cultural heritage and diverse value perspectives for nature needed to be brought more strongly to the fore in science and decision-making.

https://futureecosystemsafrica.org/

SEOSAW-GGG Herbaceous Protocol Field Workshop, 15-25 March 2022

SEOSAW (Socio-ecological observatory for the study of African woodlands - seosaw.github.io), a Miombo Network activity, ran a Herbaceous Protocol Training Workshop in Morogoro, Tanzania at the Kitulangalo Forest Reserve plots,15-25 March 2022. The training covered how to sample grasses and other non-woody vegetation according to the GGG (Global Grassy Group - globalgrassygroup.github.io/) protocol. The GGG protocol is a standardised method of collecting herbaceous species composition and functional attributes. SEOSAW also trialled herbaceous biomass, and shrub protocols. These protocols have all been designed as complementary to the SEOSAW tree, regeneration, and coarse woody debris protocols for a full estimation of vegetation biodiversity and biomas on SEOSAW plots. This field workshop was hosted by TAFORI (Tanzania Forestry Research Institute), University of the Witwatersrand (South Africa), and the University of Edinburgh (UK). SEOSAW also spent time with students from Sokoine University of Agriculture who joined us in the field to learn about herbaceous sampling methods.

This training brought together early career foresters and ecologists from TAFORI (Tanzania), Dar es Salaam University (Tanzania), Forestry Training Institute-Olmotonyi (Tanzania), SAEON (South Africa), Kenya Forest Service, Forestry Commission of Zimbabwe, East African Herbarium-National Museums of Kenya, and Karatina University (Kenya) to learn new skills which they can utilize at their own sites as well as fostering new and existing collaborations.

https://seosaw.github.io/