

BSc Opportunity Internship

Project: "Vegetation Community – Composition, Abundance, and Landscape Changes over Time"

Project description:

In any ecosystem, vegetation forms one of the pillars on which the complex food-web rests. A healthy ecosystem is not sustainable without a healthy vegetation base and monitoring it is therefore essential. Vegetation follows numerous cycles of varying length, from daily cycles of photosynthesis and annual cycles of growth to lifetime cycles from seed to adult. Vegetation monitoring in the bushveld needs to include both the woody and the herbaceous layers (Eckhardt, 2010). This makes the monitoring much more complex and very little practical methods have been available so far. The rise of advanced software however allowed the development of simple and efficient methods, such as fixed-point photography. Fixed-point photography (FPP) is a method of data collection which requires recording images at a predefined location, at regular intervals, over a long period of time. Each picture is taken from the same position and angle so that the recorded data is of the same physical area in every picture. Each picture can be analysed to determine structure and composition of the vegetation (Trollope et al. 1998, Masubelele et al. 2015), and to estimate phytomass, animal impact (Masubelele et al. 2013), erosion, bush encroachment (Ward et al. 2014), and tree recruitment. By correlating this data temporally with rainfall data, shifts and trends in phenology can be detected (Sparks et al. 2006). This method has been implemented in Olifants West Nature Reserve since 2019, with pictures being taken monthly at 20 locations. This includes sites monitored in the annual phytomass and vegetation surveys, and a number of sensitive areas, such as seasonal and perennial water sources and a sodic site. Two sites were also selected in the bufferzone as controls, to identify the impact of large wildlife on vegetation changes.

This research seeks to analyse the data collected via Fixed Point Photography since 2019 and aims to achieve the following objectives:

1. Identify trends in vegetation phenology, composition and abundance in Olifants West Nature Reserve based on the FPP data.
2. Identify potential abiotic and biotic factors that may explain the observed trends, based on literature and available data.

The research will follow a systematic approach comprising the following steps:

1. Methodology redaction:

Conduct a brief literature review to better understand the context of the project and identify an appropriate methodology to identify trends in vegetation phenology, composition, and abundance, based on FPP data (photography analysis). The data extracted from the FPP surveys may be supplemented with other remote sensed data, such as Google Earth. The identified methodology must be rigorous, consistent, and scientific, and be supported by relevant statistical tests. Identify relevant factors in the literature that may explain the observed trends (or

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absence of changes). Compile a shortlist of the most important factors identified for which data are available.

2. Fieldwork – Data collection:

Contribute to the ongoing collection of data using the FPP method in the field. Increase the dataset available for your own internship and gain fieldwork experience while contributing to a long-term project. All the fieldwork will be conducted in Olifants West Nature Reserve (OWNR – 9,000 hectares of Big5 area), in the Greater Kruger Park, South Africa, and its bufferzone.

3. Data analysis & interpretations:

Analyse the data collected using the identified method, appropriate statistical tests, and the factors shortlisted in Step 1, to identify trends in vegetation phenology, composition, and abundance, based on FPP data, and identify potential factors of importance in explaining the observed trends. Interpret the ecological implications of the results and, where appropriate, suggest potential conservation actions and strategies to ensure the sustainability of healthy functional plant communities in the reserve.

4. Extended outcome – Presentation of the knowledge acquired to the relevant stakeholders – Applied Science & Conservation (if time permits):

Present the results and guidelines to relevant stakeholders to share the knowledge gained during the project, through a presentation or a poster. Contribute directly to the monitoring and protection of vegetal communities in the lowveld savanna in the Greater Kruger Park.

Transfrontier Africa NPC:

Transfrontier Africa (TA) is a non-profit environmental conservation organisation founded in 2006. The organisation aims to improve wildlife conservation and ecosystem sustainability by combining research, ecological monitoring, landscape security, community and women empowerment, and environmental awareness. TA is based in Olifants West Nature Reserve, in the Greater Kruger National Park and extends its actions to the Blyde Olifants Confluency Conservation Area and neighbouring communities.

For more information, please visit our website: <https://transfrontierafrica.org/> and consult the attached Interns / Students Information Package.

Position Details

Role title: BSc Intern.

Reporting to: Paul Allin, Research Coordinator, and Elwenn Le Magoarou, Research Assistant.

Duration of position: 6 months – from June to November 2024.

Application deadline: 15 February 2024.

Location: Transfrontier Africa NPC, Ndlovu Bush Camp, Olifants West Nature Reserve, R40, Hoedspruit 1380, South Africa.

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Accommodation: Shared accommodation with shared chalets in Ndlovu camp (Olifants West Nature Reserve). The price covers three meals per day, snacks and water. Interns have the opportunity to go into town twice a month to buy extra food or personal items, depending on needs and availability of vehicles. Transport from and to O.R. Tambo International Airport (Johannesburg) can be arranged at the expense of the intern.

Cost: R52,725 for 3 months and R13,500 per additional month (prices are indicative and subject to change from April 2024) – Covers accommodation in Ndlovu Bush Camp, three meals per day, snacks, two TA t-shirts, supervision in the field (fuel & labour costs), participation to the fieldwork of other interesting scientific and reserve management projects and internship supervision.

Minimum requirements:

To apply for participation in this research, the minimum requirements include:

- Being registered in a BSc or similar degree in a relevant field, such as Ecology, Wildlife Biology, Conservation Science, Environmental Science, or a related discipline.
- Strong coursework and understanding of ecological principles, with an interest in ecosystem approaches and advanced photographic analysis.
- Prior experience or coursework in ecological research methodologies and data analysis.
- Proficiency in conducting thorough literature reviews to gather relevant information on the research project, mainly on vegetation community evolution in a savanna ecosystem and photography analysis using FPP.
- Familiarity with R statistical software program, or similar statistical software, for data analysis and ability to identify suitable statistical tests under supervision.
- Familiarity with Geographic Information System (GIS) software, such as ArcGIS or QGIS, for basic spatial analysis and mapping is preferred.
- Strong written and verbal communication skills to effectively present research findings in English.
- Ability to write scientific reports or research papers and contribute to project documentation (e.g., poster).
- Ability to work independently as well as collaboratively with research team members as part of a multi-cultural and multi-disciplinary team.
- Ability and willingness to learn independently and proactively acquire new knowledge and skills necessary for the research project.
- Capacity to adapt to new methodologies, software, and analytical techniques as required by the study.
- High motivation and capability of working under remote field conditions.
- Ability to apply safety rules to ensure a safe working environment in the field and research station.

Application:

Application documents, including a Curriculum Vitae and a cover letter, should be submitted before 15 February 2024 to Paul Allin (research@transfrontierafrica.org) and Elwenn Le Magoarou (ecology@transfrontierafrica.org), with the subject 'Application – Vegetation Community – Composition, Abundance, and Landscape Changes over Time'. For any further information, please do not hesitate to contact us. Shortlisted candidates will be contacted for an interview during the week following the application deadline.

References

Eckhardt, H. (2010). Monitoring of bushveld – Structure and composition. In *Bushveld – Ecology and Management* (ed. Van der Walt, P. T.), pp.103–107. Briza publications, Pretoria, South Africa.

Masubelele, M. L., Hoffman, M. T., Bond, W., and Burdett, P. (2013). Vegetation change (1988–2010) in Camdeboo National Park (South Africa), using fixed-point photo monitoring: The role of herbivory and climate. *Koedoe: African Protected Area Conservation and Science* **55**(1), 1–16.

Masubelele, M. L., Hoffman, M. T., and Bond, W. J. (2015). Biome stability and long-term vegetation change in the semi-arid, south-eastern interior of South Africa: A synthesis of repeat photo-monitoring studies. *South African Journal of Botany* **101**, 139–147.

Sparks, T. H., Huber, K., and Croxton, P. J. (2006). Plant development scores from fixed-date photographs: The influence of weather variables and recorder experience. *International Journal of Biometeorology* **50**(5), 275–279.

Trollope, W. S. W., Trollope, L. A., Biggs, H. C., Pienaar, D., and Potgieter, A. L. F. (1998). Long-term changes in the woody vegetation of the Kruger National Park, with special reference to the effects of elephants and fire. *Koedoe: African Protected Area Conservation and Science* **41**(2), 103–112.

Ward, D., Hoffman, M. T., and Collocott, S. J. (2014). A century of woody plant encroachment in the dry Kimberley savanna of South Africa. *African journal of range & forage science* **31**(2), 107–121.