PhD and MSc OPPORTUNITIES

The **South African Environmental Observation Network** (SAEON) is a research platform funded by the Department of Science and Technology and managed by the National Research Foundation. SAEON is mandated to establish and manage long-term environmental observatories; maintain reliable long-term environmental data sets; promote access to data for research and informed decision-making; and contribute to capacity building. The mandate is executed through seven geographically distributed nodes that are coordinated by the SAEON National Office in Pretoria.

The SAEON Fynbos and Ndlovu Nodes have developed a collaboration with researchers at Rhodes University and the University of Cape Town, and provincial conservation agencies to develop rapid and repeatable tools for monitoring and mitigating global change impacts on natural resources using open science and reproducible research principles. We seek suitably qualified and enthusiastic candidates to appoint to posts for one PhD and two MSc students in the following projects:

1. **Developing repeatable methods for classification of alien and native vegetation in montane grasslands**

   This project is in collaboration with the Mpumalanga Tourism and Parks Agency, the Kruger-to-Canyons Biosphere Reserve NPO, and the Association for Water and Rural Development (AWARD). In the high altitude grasslands encompassed by the Mariepskop Forest Reserve, Mariepskop State Forest, and the Blyde River Canyon Nature Reserve in the northern Drakensberg, local agencies have mapped a significant proportion of existing forest plantations, forestry exit-areas and surrounding natural grasslands and afromontane forest. The project will use these data and further field observations to create a database of high quality reference sites to calibrate/validate land cover maps based on multispectral data from the Sentinel 2 mission, with classes described in terms of the relative dominance of plant functional types, the abundance of native and alien species, and various dimensions of vegetation structure. We may also explore sites at Haenertsburg on the Wolkberg for which we have good historical data.

2. **Detection and mapping of invasive alien plants in the Western Cape Water Supply System (WCWSS)**

   This project is in collaboration with CapeNature and UCT and will build on initial successes mapping dense stands of invasive alien tree species within mountain catchment regions of the Fynbos using very high resolution multispectral imagery. The availability of higher resolution multispectral imagery and advances in machine learning and the application of convolutional neural networks for pixel-based land cover mapping suggest that improvements are possible. The project involves a pixel-based classification of the extent of invasion by alien trees in selected mountain catchments of the Fynbos using high resolution ~1m multispectral imagery, which we will compare with classification based on 3m imagery from Planet Labs. These classifications will be repeated at three separate dates, allowing for extensive comparison, and for generating estimates of the rate of expansion of alien plant invasions over two consecutive years. Field data collected within a short time period of image acquisition will be used to train and validate classification algorithms.

3. **Near-real time change detection in the Thicket Biome**

   This project is in collaboration with Rhodes University and the Department of Economic Development, Environmental Affairs & Tourism of the Eastern Cape (DEDEAT). It aims to perform biome-scale analyses to identify areas with high rates of change that merit focused attention in the Thicket biome, and implement fine-scale change detection tools to identify clearing in near-real time within preselected focal areas. The project will build on and use an existing database of the locations and dates of known land transformation activities to calibrate and validate methods to detect thicket clearing within days of it's occurrence using spatial and temporal resolution satellite data from Planet Labs.

All projects are available at either a PhD or MSc level, and we may mix and match aspects from the different projects depending on the skills and interests of the successful applicants.

All projects will be implemented in adherence with open science (https://en.wikipedia.org/wiki/Open_science) and reproducible research (http://ropensci.github.io/reproducibility-guide/sections/introduction/) principles, meaning that all data, methods and products will be made freely available for public use and further research.

Requirements for an MSc:

- A BSc(Hons) or equivalent in Ecology, Biological Sciences, Statistics, Computer Science, Geography, Environmental or Earth sciences
- Applicants should be competent in GIS and statistical analyses

- Experience in remote sensing and the use of R, Python or JavaScript programming languages is an advantage
- A South African drivers licence is an advantage

Requirements for the PhD:

- An MSc or equivalent in Ecology, Biological Sciences, Statistics, Computer Science, Geography, Environmental or Earth sciences
- Applicants should be competent in GIS and statistical analyses
- Experience in remote sensing and the use of R, Python or JavaScript programming languages is an advantage
- A South African drivers licence is an advantage

General conditions and application procedure

The PhD position is offered as a fixed three year bursary contract, subject to attainment of agreed annual performance targets. A tax-free grant of R140 000 pa is available to the PhD student. The MSc positions offer a fixed two year bursary contract, subject to attainment of agreed annual performance targets. Tax-free grants of R110 000 pa are available to the MSc students. Students will likely be based at The University of Cape Town or Rhodes University, depending on project requirements.

Candidates should be available to start on or before the 1st March 2019.

Applicants should submit a detailed CV, the names and contact details of three references, a copy of their SA ID document or passport, university transcripts and other qualifications, theses and publications, and a covering letter summarising the reason for applying and motivating why they are well-suited to take up the position, to Dr Jasper Slingsby (jasper@saeon.ac.za). Candidates may indicate interest in more than one position, but should clearly indicate which positions they are applying for.

Closing date: 31 January 2019

SAEON: http://www.saeon.ac.za

SAEON is committed to employment equity and redress, and these positions are subject to the conditions of the National Research Foundation. There is preference for South African citizens or South African permanent residents, and individuals from previously disadvantaged backgrounds. SAEON reserves the right not to make an appointment to the position as advertised. Only short-listed applicants will be contacted.