

4 x PhD and MSc opportunities in Blue Carbon Ecosystem Research at Stellenbosch University

ABOUT THE PROJECTS

We are looking for two PhD and two MSc students interested in blue carbon research to join us at Stellenbosch University from 2027. The projects all broadly fall within our seagrass and salt marsh blue carbon/restoration work, but there is some flexibility. All projects are based across multiple departments and universities.

PhD 1: Biogeographic patterns of blue carbon (BC) in salt marsh ecosystems: South Africa hosts ~14700 ha of intertidal and supratidal salt marsh which contribute the largest fraction of 2676 Gg C (67 %) of the country's blue carbon storage while showing the best potential for restoration among the BCEs. However, these estimates are based on three estuaries in the warm-temperate biogeographical region. Work on seagrass from von der Heyden lab has shown that there is high variability at local scales and with biogeographical regions influencing carbon stocks. As such, available estimates of carbon storage for salt marshes may be inaccurate as they do not take into account the species composition and do not account for biogeographical variability. This project focusses on plugging the gap in BC storage estimates from salt marsh ecosystems, whilst testing hypotheses on species-specific traits and extending knowledge on how biogeography drives coastal patterns of BC that can support restoration and conservation efforts.

PhD 2: Developing a SNP library for monitoring genomic diversity of *Z. capensis*

This project will utilise all the genomic information available from previous work to identify 200 SNPs (both neutral and outlier), which will be used to generate a 'SNP chip' for Genotyping in thousands (GT-seq), to provide baseline genomic data (focusing on nucleotide diversity, allelic richness, clonality and private SNPs) for all 37 known *Z. capensis* populations in South Africa. Given that genomic diversity is a crucial aspect of biomonitoring by detecting changes in genomic diversity and potentially evolutionary resilience, biomonitoring of genomic diversity is widely acknowledged as an important facet of monitoring population demographic change, as evolutionary diversity may signal potential species extinction, but is rarely utilized for natural populations. Therefore, this project is not only directly applicable to the conservation of *Z. capensis*, but presents a unique example of biomonitoring genomic diversity that can be applied to species globally.

MSc 1: Upscaling seagrass restoration: a multi-population approach

Ex situ seagrass mariculture currently provides our best option for an ecologically sustainable mechanism to optimize and upscale seagrass restoration by increasing the amount of plant material available for transplantation, which is particularly important for *Z. capensis* given that restoration efforts are solely reliant on donor material from intact meadows. We have successfully demonstrated that *Z. capensis* can be grown from small cores with an increase of >160% under aquarium conditions, but this was only done for plants from Langebaan Lagoon and there have been no other studies that have grown *Z. capensis* in an aquarium setting. As such, there is a real paucity of knowledge on the potential of *ex situ* mariculture of seagrasses in South Africa. As we do not know whether plants from other seagrass populations will respond differently to mariculture conditions, this project will provide much needed data for the mariculture of key seagrass populations.

MSc 2: Investigating novel ways of carbon fractionation

This project will identify a cost-effective and high-throughput method to isolate organic matter (OM) into functional fractions of varying turnover rates (labile vs stable) in the sediments of the three classical BCEs (seagrass, salt marsh and mangrove). The two most common methods for fractionation are the particle size (PS) and the particle density (PD) method, both well-established in the soil science literature (Poeplau et al., 2018). The PS method separates particulate organic carbon (POC) and mineral-associated organic carbon (MAOC) (Just et al., 2021), while the PD method identifies free-light POC, occluded POC, and mineral-bound MAOC. The choice of method depends on the type of soil, but the PD method is generally more expensive due to the use of Sodium Polytungstate (SPT) and Sodium Iodide (NaI) (Smith et al., 2020). Therefore, there is a

need for a cost-effective PD method based on less expensive alternatives such as KI and CaCl₂ but these have not been investigated for BCE sediments. The method developed in this study could provide insights into carbon stability in BCEs, enabling improved estimates of long-term carbon storage and their role in climate change mitigation.

OUR LAB

The successful student will work in the lab of Prof. Sophie von der Heyden at Stellenbosch University and will be co-supervised by Dr Andrew Ndhlovu at the School for Climate Studies, as well as collaborators from partner institutions. Our lab is one of Africa's leading marine research groups with a focus on large, collaborative projects on the ecology, conservation and restoration of South Africa's seagrasses and salt marshes. Our work spans evolutionary and molecular ecology, ecological genomics, blue carbon science marine, microbial ecology, conservation and restoration and the impact of climate and anthropogenic pressures on aquatic systems. We are a dynamic and diverse lab, with a strong emphasis on research excellence and pride ourselves in our student training and support. You can find out more about the von der Heyden lab and our research at : www.vonderheydenlab.com or www.facebook.com/vonderheydenlab.

THE CANDIDATES

Applicants for the positions will hard-working, enthusiastic and independently motivated, able to fit into a fun and diverse lab. For both MSc and PhD projects, you will need to show some experience/knowledge in blue carbon or broader marine ecology. We provide training in all aspects of the projects, so this is a great opportunity for students wishing to gain exposure across diverse research fields.

Requirements for PhD: You will need an average of at least 65% for your MSc (or equivalent) degree and have strong written, verbal and numerical skills, including an undergraduate or postgraduate module in statistics. For PhD 2, evidence of ecological genomics and strong bioinformatic skills is required. Candidates with evidence of publications in internationally accredited journals and broader involvement in academic activities, such as conference attendance and presentations is welcome.

Requirements for MSc: You will need an average of at least 65% for your Honours (or equivalent) degree and have strong written, verbal and numerical skills, including an undergraduate or postgraduate module in statistics.

HOW TO APPLY

Direct all enquiries to Prof Sophie von der Heyden, svdh@sun.ac.za. For applications to be considered, include your most recent academic transcripts, CV and details for one (MSc) or two (PhD) academic referee/s. For the PhD position include a cover letter outlining your interest in the position and relevant experience.

The closing date for applications is **15th June 2026**.

Note that successful students will need to independently apply for bursary funding through the National Research Foundations (NRF) Postgraduate bursary scheme. Support throughout the application process will be provided. Additional funding opportunities exist through the Stellenbosch University Postgraduate research and the Stellenbosch Faculty of Science bursary programmes. Please contact Prof. von der Heyden for more information.