



BioGeoSCAPES: South Africa National Report 2024

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Introduction

On the 25th November an online workshop was held to consolidate responses to the following questions which were drafted by the BioGeoSCAPES International Implementation Committee Leadership Team.

1. How can South Africa best contribute to the BioGeoSCAPES program?
2. What are South Africa's best collective strengths and/or resources?
3. What are the key infrastructure and training barriers for South Africa's participation in the BioGeoSCAPES program?
4. What would need to be changed to help South Africa participate in the BioGeoSCAPES program?
5. What funding opportunities exist to support BioGeoSCAPES activities in South Africa?
6. What meetings/ activities are needed to promote BioGeoSCAPES community building and collaboration in South Africa?
7. What are the most important BioGeoSCAPES priorities for South Africa in the next 10 years?

The responses to these questions were collected during the online workshop and through a survey sent prior to the meeting for those who were unable to attend. The summarised responses and priorities highlighted are provided here.



1. How can South Africa best contribute to the BioGeoSCAPES program?

- South Africa's coastal waters offer a unique opportunity for marine research, particularly in the Benguela upwelling region and the Agulhas current.
- South Africa's geographic proximity to the Southern Ocean is also advantageous.
- The country's local knowledge of biogeochemical processes and marine biodiversity can enhance understanding of these ecosystems and their role in climate regulation.
- The country is actively involved in international research collaborations, contributing samples and expertise in 'Omicss, nutrients, trace metals, isotopes, phytoplankton pigments, and aerosols.
 - For example: A multi-Omicss approach is being utilized to understand the complexities of nutrient cycling in the Benguela region. Multi-omicss approaches along with trace metal and phytoplankton data were also taken on several Southern Ocean cruises.
 - The new Schmidt Sciences-funded project (WAM, focused on the west African margin) being led by UCT and CSIR in South Africa will employ many of the approaches of the BioGeoSCAPES program. There is additionally an opportunity, as this project has just begun and will last five years, to align the activities more closely with any BioGeoSCAPES program (national or international) that develops.
- While microbial research is relatively new in South Africa, it has gained momentum and has the potential to contribute significantly to global understanding.

2. What are South Africa's best collective strengths and/or resources?

- Field observations in the Benguela region, the Agulhas current and the Southern Ocean were highlighted as the best collective strengths.
- There are some limited laboratory experiments ongoing.
- Ecosystem modelling expertise is not well coupled to BGC-Earth system modelling efforts.
- Cellular scale modelling is not currently carried out in South Africa.
- Some efforts on rates and processes, but so far limited to very few groups.

3. What are the key infrastructure and training barriers for South Africa's participation in the BioGeoSCAPES program?

Key issues include:

- **Equipment and Infrastructure:** A need for more high-performance computing (HPC) capacity, and too few opportunities for dedicated scientific expeditions on our oceanographic vessels.



- **Expertise and Training:** Expertise in bioinformatics, molecular biology, 'Omics data and isotopic rates measurements is spread rather thin. A need for more training opportunities to expand capacity in these techniques.
- **Collaboration and Integration:** A siloed research environment, with a need for better integration of research priorities across the community.
- **Modeling Capacity:** Limited expertise in cellular-scale modeling and biogeochemical modeling, particularly in the Southern Ocean.
- **Specific Resource Gaps:** A need for standardized operating procedures (SOPs) for key variables, and improved access to various analytical facilities.

4. What would need to be changed to help South Africa participate in the BioGeoSCAPES program?

- Funding is a major concern for the BioGeoSCAPES program in South Africa.
 - **Human Capacity:** the lack of permanent positions for graduate students to occupy means skill sets are often lost and not transferred. PIs are not always available to continue to train every generation.
 - **Research Outputs:** many researchers either rely on soft money or small research grants which limits the scope of outputs that can be produced.
- Collaboration and integration are also identified as key areas for improvement.
 - There is a need for better integration across institutions, particularly between research institutes and government departments.
 - The current approach to research is seen as siloed, with individual expertise operating independently.
 - Creating open dialogue and increasing access to infrastructure would improve collaboration amongst the various research groups.

5. What funding opportunities exist to support BioGeoSCAPES activities in South Africa?

Funding is primarily limited to the research grants provided by the National Research Foundation, which are investigator specific. There are no current funding mechanisms to support program level research such as BioGeoSCAPES. However, there are mechanisms where the community can solicit additional funding for dedicated research cruises which could be used to achieve BioGeoSCAPES objectives.



6. What meetings/ activities are needed to promote BioGeoSCAPES community building and collaboration in South Africa?

The top priority identified was to host an in person national workshop that includes researchers from coastal to open ocean domains, from academic to government institutions. The goal of this workshop would be to focus on skills and infrastructure available, rather than on scientific discovery. This was considered as a high priority item to identify:

- Gaps in infrastructure which could be delivered to SAPRI, South African Polar Research Infrastructure, and SMCRI, Shallow Marine and Coastal Research Infrastructure, the organisations currently responsible for enhancing the research communities' access to infrastructure.
- Identify which skill sets are currently available in South Africa, to take advantage of local knowledge when preparing proposals and only seek international collaboration for skill sets which do not exist. This aligns with the proposed franchise model that BioGeoSCAPES envisages.

Above and beyond this would be regular webinars to bring the two communities closer together, as national conferences for the polar and coastal communities do not offer many opportunities for collaboration.

7. What are the most important BioGeoSCAPES priorities for South Africa in the next 10 years?

The most important BioGeoSCAPE priorities for South Africa over the next 10 years can be split into capacity building and ecosystem assessment.

- Key recommendations for capacity building include:
 - Investing in research infrastructure.
 - Expanding training and capacity in areas such as Omics, Biogeochemistry, Rate measurements and modelling.
 - Fostering global partnerships and international collaboration
- South Africa has the potential to make significant contributions to marine research, by continuing its on focus on the following regions:
 - Benguela Upwelling Region
 - Agulhas Current
 - Southern Ocean

By characterizing the baseline of microbial communities in this region and their sensitivity to change will be essential for understanding and addressing environmental challenges.

