

# Project *brief*

Thünen-Institute of Climate-Smart Agriculture

2020/26a

## SEACRIFOG – Supporting EU-African Cooperation on Research Infrastructures for Food Security and Greenhouse Gas Observations

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- Knowledge about sources and sinks of greenhouse gases on the African continent is scarce.
- A continental greenhouse gas monitoring system can fill this knowledge gap for deriving measures to reduce emissions and for fostering Climate-Smart Agriculture.
- An efficient greenhouse gas monitoring system in Africa must be secured professionally, politically, financially and by well-trained specialists. Existing structures need to be included.

### Background and aims

The current knowledge about Africa's sources and sinks of greenhouse gases is mainly based on estimations and only to a small extent on observations or direct measurements.

Within the SEACRIFOG project, we developed a roadmap for establishing an efficient greenhouse gas monitoring system in Africa, which can be used to implement mitigation measures and Climate-Smart Agriculture.

The envisioned observation system follows a holistic approach for the atmospheric, terrestrial and oceanic domain.

### Approach

The project lays the foundation for the design of a comprehensive greenhouse gas observation system.

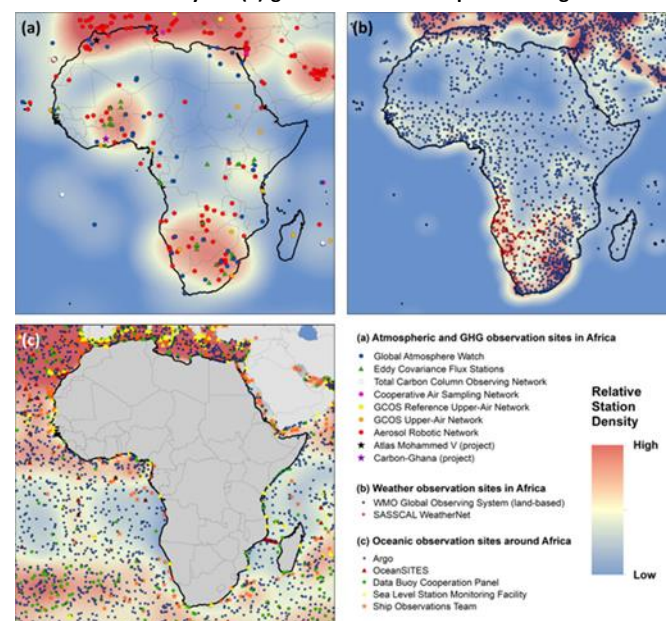
The design study is based on intensive stakeholder involvement, in-depth pre-studies on existing research infrastructures in Africa, robust cost analysis and policy work.

### Key findings

As a main output of the project, the SEACRIFOG inventory tool was developed. It serves as an open database to access and find data on greenhouse gases and related topics in Africa. Also, locations and coverage of existing datasets, measurement infrastructures and networks are mapped in the database (see picture 1). The inventory tool can be accessed under: <https://seacrifog.saeon.ac.za>

The envisioned greenhouse gas observation system would not only pave the way for producing harmonized measurement data in Africa, but also for a high-quality research environment with corresponding employment opportunities.

Picture 1: Environmental monitoring stations of selected networks and their relative density for (a) ground-based atmospheric and greenhouse



gas measurements, (b) ground-based meteorological and (c) oceanic observation on and around the African continent.

Source : López-Ballesteros et al. (2018).

The project results indicate that there is need for more education programs in Africa to fill such future positions. Within the cost analysis, the estimates show that more than half of the overall estimated budget is needed for capacity building and education.

First steps of capacity building were already made during the Project. These included the organization of four training workshops and supporting one further workshop on topics such as oceanic, atmospheric, or terrestrial greenhouse gas measurements and data processing. Moreover, the project contributed to the development of a master's degree program on oceanic sciences on Cape Verde, in cooperation with several German institutions and the West African science program [WASCAL](#).

The envisioned observation system is an effective tool for evidence-based policies related to greenhouse gases and climate. The foundations for political cooperation, acceptance and support to build a greenhouse gas observation system were laid through workshops and networking with high-ranking representatives from research, politics and the private sector. The project is a first step to create EU-African cooperation on greenhouse gas monitoring and mitigation. Further cooperation is intended.

#### Advice for policy-makers

We derive the following recommendations for further action:

- In-depth networking is key for all existing greenhouse gas monitoring systems and stations in Africa. Gaps in the spatial coverage of monitoring systems should be filled by the establishment of new structures on a mid-term basis.

- African national and regional representatives must be closely involved in the further process.
- It is important to promote measures for the training and further education of scientists and technical personnel in Africa for greenhouse gas monitoring and related disciplines.
- Long-term financing sources must be allocated for a comprehensive greenhouse gas monitoring system.

**Picture 2: Measurement tower for greenhouse gases in Eastern Karoo, South Africa**



Source: Thünen-Institute AK/Eva Falge

## Further Information

### Contact

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**Greenhouse Gas Observation  
& Climate-Smart Agriculture**

### Partners

CMCC Foundation – Euro-Mediterranean Center on Climate Change,  
 CzechGlobe,  
 GEOMAR - Helmholtz Centre for Oceanic Research Kiel,  
 ICOS ERIC- Integrated Carbon Observation System,  
 ILRI - International Livestock Research Institute,  
 INDP- National Fisheries Development Institute,  
 Lund University,  
 NORCE Norwegian Research Centre AS,  
 SAEON- South African Environmental Observation Network,  
 SASSCAL- Southern African Science Service Centre for Climate Change and Adaptive Land Management,  
 Trinity College Dublin (TCD),  
 TROPOS- Leibniz Institute for Tropospheric Research,  
 UIB- University of Bergen,  
 WASCAL- West Africa Science Center on Climate Change and Adapted Land Use,  
 WITS- University of the Witwatersrand Johannesburg

### Duration

02.2017-08.2020

### Project-ID

1835

### Publications

**Nickless et al. (2020)** Greenhouse gas observation network design for Africa. Tellus Ser B 72(1):1-30, DOI:10.1080/16000889.2020.1824486  
**López-Ballesteros et al. (2018)** Towards a feasible and representative pan-African research infrastructure network for GHG observations. Environ Res Lett 13:085003, DOI:10.1088/1748-9326/aad66c

### Support



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730995