CoForFunc

Improving transnational monitoring of biodiversity and ecosystem change for science and society

DURATION
1/04/2024 – 30/06/2027

BUDGET
211 055 €

PROJECT DESCRIPTION

The expected climate, demographic, and economic changes in Central Africa threaten the sustainability of the ecological, social, and economic services that the Congo Basin Forests (CBF) provide to humanity. In addition to deforestation, human-induced environmental impacts will cause dramatic changes in the functional composition of forest trees, with potentially harmful feedbacks on carbon and water cycles, among other services.

Our project aims to develop an integrated approach for monitoring the functional diversity of trees in the Congo Basin Forests in order to support a biome-scale assessment of their vulnerability to global changes. Achieving this goal presents several challenges that define the specific objectives of the project: (1) Collect, harmonize, and share existing data to provide reference estimates of the multiple dimensions of tree diversity in the CBF. (2) Connect existing forest plots to develop a regional network of observatories to enable consistent monitoring of functional dynamics. (3) Characterize variations in the functioning of canopy species along environmental gradients by combining proximal sensing of tree phenology and ground-based ecophysiological and functional trait measurements. (4) Develop an upscaling chain from field data, using proximal and intermediate high-resolution satellite data (Sentinel-1 and Sentinel-2) and low-resolution satellite data captured by time series from various types and resolutions provided by recent and future Earth Observation Systems, to quantify biome-scale Essential Biodiversity Variables (EBVs). (5) Combine biome-scale EBVs with environmental drivers to assess the vulnerability of the CBF to expected changes (based on trend analyses and space-for-time substitution approaches). (6) Disseminate the project's results to forest stakeholders through technology transfer and capacity building for students and staff in the project's self-financed African partner institutions, both academic and operational.

Our new consortium brings together four renowned research teams, each with complementary and essential expertise: two teams (IRD-AMAP, France and ULiège, Belgium) of tropical forest ecologists with extensive experience and partnerships in Central African countries, where some of the participants are currently based; one team of ecophysiologists (CREAF, Spain) with considerable experience in the functioning of trees and forests and their response to environmental changes, focusing on vegetation water use and drought responses; and one team of remote sensing specialists (MPI-BGC, Germany) with expertise in monitoring ecosystem functions from space to improve our understanding of biogeochemical cycles. The project also involves three self-financed partners in Cameroon and Congo, the UNESCO ERAIFT center of ULiège in the DRC, and a Research Network (R2FAC) composed of researchers from major forest science institutions in the region, which serves as a scientific advisory board for the Commission of Central African Forests (COMIFAC), responsible for coordinating CBF policies.

Through a unique European research partnership and transnational collaborations with experts from Central African countries, CoForFunc aims to develop an integrated approach for monitoring the functional diversity of trees in the Congo Basin Forests (CBF) in order to support a biome-scale assessment of their vulnerability to expected climate change and human-induced transformations.

Such monitoring requires (i) initiatives that go beyond national scales, and (ii) variables derived from primary observations that inform the state and dynamics of Essential Biodiversity Variables (EBVs). This goal aligns with the post-2020 objectives of the Convention on Biological Diversity, which calls for improved integration of biodiversity data to support management, conservation, and restoration actions. It also reflects the COP15 commitment to achieve 30% protected areas globally by 2030, which must be meaningful for both biodiversity and people, and account for their vulnerability to ongoing global changes.

Achieving a biome-scale monitoring of biodiversity faces several challenges that define the following specific objectives:

- SO1. Collect, harmonize, and share existing data to provide reference estimates of the multiple dimensions of tree diversity in the CBF;
- SO2. Connect existing forest plots, distributed across forest types and along gradients of dry season intensity and forest degradation, to develop a regional network of observatories for consistent monitoring of functional dynamics in the CBF;
- SO3. Characterize variations in the functioning of canopy species along environmental gradients by combining proximal sensing of tree phenology (repeated drone surveys) and ground-based ecophysiological and functional trait measurements;
- SO4. Develop an upscaling methodology to quantify biome-scale EBVs from these observational data by combining regional forest inventories and time-series satellite data of various types and resolutions, provided by recent and upcoming Earth Observation Systems (such as the EU Copernicus program and the ESA Biomass mission);
- SO5. Combine biome-scale EBVs and environmental drivers to assess the vulnerability of the CBF to expected changes (based on trend analyses and space-for-time substitution approaches);
- SO6. Disseminate the project results to forest stakeholders by working with R2FAC (Research Network on Central African Forests), which serves as a scientific advisory board to COMIFAC (Central African Forests Commission), and through technology transfer and capacity building for students and staff in the project's self-financed academic and operational partner institutions.

CONTACT INFORMATION

General coordinator

Raphaël Pélissier
French National Research Institute for Sustainable Development (IRD)
raphael.pelissier@ird.fr

Belgian contribution

Jean-François Bastin
Université de Liège (ULiège)
Gembloux Agro Bio-Tech
jfbastin@uliege.be

Partners

Grégory Duveiller
Max Planck Institute for Biogeochemistry, Jena
gduveiller@bgc-jena.mpg.de

Jordi Martinez-Vilalta
Ecological and Forestry Applications Research Centre, Barcelona
jordi.martinez.vilalta@uab.es

LINKS

https://coforfunc.eu/