POLICY BRIEF

A new biosphere reserve in Democratic Republic of Congo: *The case for Mabali*

THIS BRIEF

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KEY POLICY RECOMMENDATIONS

- Upgrade the Integral Wildlife Flora Reserve (Mabali, DRC) to a Man and Biosphere Reserve as it offers unique opportunities for conservation efforts, scientific discoveries and the development of local populations.
- Create increased capacity towards climate change monitoring and the maintenance of permanent sample plots within the Biosphere Reserve.

INTRODUCTION

The importance of tropical forests

- Tropical intact forests account for about half of the terrestrial sink in established forests (Brienen et al., 2015; Lewis et al., 2009), storing about 55% of terrestrial carbon (Pan et al., 2011), yet covering only 7 to 10% of the global land area (Lewis et al., 2009). The carbon sink in undisturbed African forests is about 0.66 tonnes of carbon per hectare per year and has been fairly stable until recently (Hubau et al., 2020). Sequestration of carbon emissions by tropical forests is declining as a consequence of lower carbon absorption in intact forests (more outspoken in the Amazon than in the Congo Basin), deforestation and degradation and rising emissions.

- Tropical forests continue to occupy a key position for the mitigation of climate change and for economic development. They are carbon stocks and sinks that are vital for the planet and have a more profound influence on weather patterns, freshwater, natural disasters, biodiversity, food, and human health than any other terrestrial biome (Brandon, 2014).

- **The Central-African tropical dense moist forests play a key role in buffering global climate changes**. Their conservation and sound management depends largely on scientific knowledge, technical skills and respectful implication of local communities.

The role of MAB

- The MAB Programme considers Biosphere Reserves as **live laboratories** for climate change research and sustainable development. Biosphere Reserves are internationally recognized sites, promoting solutions reconciling the conservation of biodiversity with its sustainable use. They provide local solutions to global challenges, and **play a crucial role as monitoring sites for the effects of climate change and climate mitigation and adaptation strategies.** They can be seen as **'science for sustainability support sites'** – special places for climate change research and testing interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems, including conflict prevention and management of biodiversity.

- According to the Lima Action Plan 2016-2025 (A1, UNESCO), Biosphere Reserves are recognized as models contributing to the implementation of the Sustainable Development Goals (SDGs) and Multilateral Environmental Agreements (MEAs). This involves making Biosphere Reserves priority sites/observatories to conduct research on climate change, monitor it, limit it and adapt to it, in particular in support of the UNFCC COP 21 Paris Agreement (A1.4 in Lima Action Plan).

THE RESEARCH CENTER ON ECOLOGY AND FORESTRY

The Research Center on Ecology and Forestry (CREF) is located in Mabali (Democratic Republic of the Congo) and was founded by the Institute for Scientifc Research in Central-Africa (IRSAC). The scientific mission of the CREF lies in a better knowledge and understanding of the dynamics of forest ecosystems and the interactions between their components.

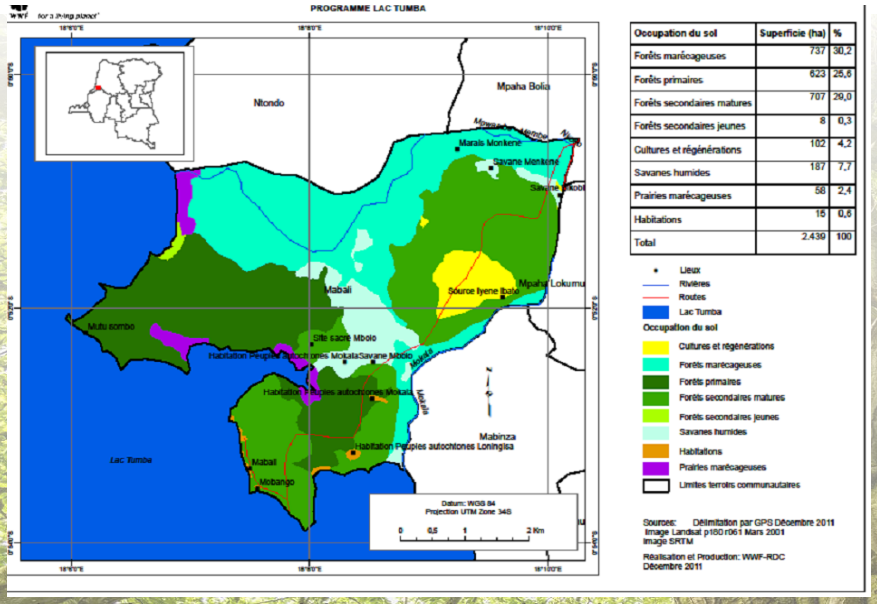
This within the perspective of reconciling their conservation and the rational use of their provided resources. The presented scientific activities take place in two Natural Science Reserves

- The Integral Wildlife Flora Reserve situated in Mabali (Figure 1), Bikoro territory, in the lake Tumba/Equator region and
- The Luo Scientific Reserve in Wamba, Djolu/ Equator territory, famous the presence of bonobo populations.

In practice, the CREF mission should translate into:

- The development of knowledge through research projects.
- The effective transfer of this knowledge to people who are in need, in particular through the organization of symposia, workshops, conferences and forums during which the results and merits of the research are presented as well as its implication in the everyday live of the populations living in and/ or around the Reserve (the aim here is to make the research activities visible).
- The dissemination of skills (lobbying through study trips, awareness-raising activities with populations and other partners …).
- Training researchers and collaborating with academic and scientific institutions.

This policy brief focusses on the Reserve situated in Mabali (1) and will make the case to upgrade this Reserve into a Man and Biosphere Reserve.



Occupation du sol	Superficie (ha)	%
Forêts marécageuses	737	30,2
Forêts primaires	623	25,6
Forêts secondaires matures	707	29,0
Forêts secondaires jeunes	8	0,3
Cultures et régénérations	102	4,2
Savanes humides	187	7,7
Prairies marécageuses	58	2,4
Habitations	15	0,6
Total	2.439	100

Figure 1: The Reserve in Mabali (Democratic Republic of the Congo).

THE RESEARCH FOCUS IN THE LAC TUMBA REGION

In accordance with the new vision and strategical development of the scientific research within the DRC, the research by the CREF is structured around the following thematic program: "The preservation of the Congolese rainforest for the ecological balance of the world." Out of this theme, an action plan was developped titled "Global Study of the Tropical Environment of the lake Tumba Region". This action plan lead to the following research focus and aimed realisations around the lake Tumba region:

1. **Forest vegetation:**

- Development of the Mabali Scientific Reserve for rational scientific exploitation.
- Reforestation of the islets of lakeTumba ceded to CREF.

2. **Big mammals, and specifically primates living in these forests, which provide a refuge and ideal environment for their preservation and conservation:**

- Studies of the behavior of diurnal monkeys in the Mabali Scientific Reserve.
- Identification of different groups of monkey species in the Mabali Scientific Reserve.
- In collaboration with the NGO "Bonobo Conservative Initiative" (BCI), monitoring and attempts to accustom the populations observed from the Bonobos to Botwali and Mbia-e-Mokeli.

3. **Climatological characteristics to predict their influence on the biological components of the region:**

- Collection and basic processing of meteorological data in the Mabali region.
- Monitoring of the impact of changing climatic parameters on the ecosystems of the lake Tumba region and their diversity.

4. **Aquatic ecosystems, specifically limnological and biological studies of coastal areas:**

- Updating the list of fish species in Lac du lake Tumba
- Complementary inventories of fish species from lake Tumba
- Ecological and biological studies of lake Tumba:
  - Characterization of physical fish habitats in coastal areas.
  - The biological functioning of the littoral zone of lake Tumba : the relationships between fish species and their environments (habitats); particular emphasis will be placed on the evolution of the chosen habitat variables (the water level of the lake, the bottom of the lake and the vegetation).
  - Assessment of the impact of fishing methods / techniques and tools on fish productivity in lake Tumba.

5. **Types of soil and vegetation :**

- Vegetation
  - Update of annotated listings of plant species conserved at the Mabali Herbarium.
  - Rehabilitation of the Mabali Herbarium and its digitization.
  - Complementary inventories of the flora of the Mabali Scientific Reserve.
  - Inventory of tree species (based on DBH greater than 10cm and total height)
  - Phenology of flagship plant species.Inventories of medicinal plants.
- Soils
  - Characterization of the soils of the Mabali Scientific Reserve.

6. **Human behavior with the concept of biodiversity conservation (anthropological research) :**

- Studies of the perceptions by the populations living in and/or around the Reserve, in particular women and young people as well as indigenous peoples, on the conservation and protection of natural resources and of their use for their survival.

CONSERVATION AND SUSTAINABLE DEVELOPMENT PROGRAMS

The current conservation program

The entire Reserve is the subject of conservation with the goal to preserve the natural resources found there. The modus vivendi of this conservation is based on the knowledge and respect by the local populations for conservation laws, which would push them to the voluntary abandonment of the practice of poaching in the Reserve (in particular by trapping in cable or nylon, hunting with a rifle or poisoned arrows). The final result of the program would be to enable the reproduction of animal species in the region and a natural and cyclical repopulation of the surrounding forests.

The conservation program consisted out of three stages:

1. The process of delimiting the Mabali Scientific Reserve; which makes it possible to materialize its limits. Today the CREF has a reliable map which makes it possible to organize the surveillance of the Reserve without ambiguity.

2. The training of eco-guards in paramilitary techniques and the application of the law on the conservation of biodiversity. For the moment, the monitoring team includes 20 CREF officers trained but not equipped to protect the conservation area. CREF is intensifying the search for partners to equip and provide the eco-guards with relevant and adequate working tools.

3. The integration of the Mabali Scientific Reserve into the network of protected areas recognized by the Congolese Institute for Nature Conservation (ICCN). This to involve the CREF in the process of developing and implementing strategies to facilitate the conservation of the ecological heritage and natural resources of the Democratic Republic of the Congo.

The sustainable development programs

In view of demographic growth both inside and outside of the Reserve, the increasing human incursions into the Reserve result in major challenges to the conservation of the Mabali Scientific Reserve and its rich biodiversity. Access to natural resources, especially water and food, remains the basis of economic or social development for rural people, and lack of it can have negative repercussions on cultural life. The local populations consume agricultural products, fish, game and non-wood forest products. However, the pressure they exert on the Reserve can be curbed by means of development programs.

The current vision of scientific research in the Democratic Republic of Congo is that it is the engine of sustainable development. In this context, the CREF intends to carry out programs related to agriculture so as to contribute on the one hand to the regression of the expansion towards the forest environments and, on the other hand, to the qualitative and quantitative improvement or even an increase in income. This agricultural program will be developed on the basis of the seed program entitled “seed production in a rural environment”.

Furthermore, the CREF is wants to:

1. Make a positive contribution to the sustainable development of the region. For this, the CREF must become a veritable crossroads for scientific and cultural exchanges.

2. Encourage and create around CREF a collective and sustained interest in the production and dissemination of appropriate information on the ecology of the humid tropical region of the Central Basin.

3. To develop a spatial framework that will allow it to integrate into networks of forest studies, conservation and protection of forest heritage. It intends to share the knowledge that indigenous populations have of their environment.

TOWARDS A MAN AND BIOSPHERE RESERVE

The Luki and Yangambi MAB reserves are geographically located far from each other (northeast to west). Placing a new MAB reserve between the two MAB reserves would fill a research gap in terms of location and types of vegetation.

This project would be considered as a new extension of the application of the integral conservation of natural resources (including ecological and socio-economic sustainability). There are two types of ecosystems (terrestrial and lakeside) in the Mabali Reserve with varied animal and aquatic biodiversity. Although in different environments, the research themes being carried out in Mabali are closely related or almost similar to the research themes carried out in other MABs in the DRC and around the world.

In addition, the Mabali Reserve offers the possibility of serving as a model for other Central African countries to engage in the creation of second generation Biosphere Reserves like other countries in the AFriMab region

The Mabali Reserve has the assets to fulfill the three functions of a Biosphere Reserve:

It is made up of strictly protected ecosystems and contributes to the conservation of forest landscapes and species. This makes it possible to monitor the dynamics of forests due to the growth, regeneration and mortality of trees, which is strongly linked to the dynamics of forest carbon.

- It is provided with a research infrastructure to serve as a basis for the research and education function, and to become a real crossroads for scientific and cultural exchanges.
- It is surrounded by several riverside villages including the indigenous peoples who live and harmony with the local populations for multiple decades. This human presence engaged in alternative activities to conservation and climate change makes it possible to operate the economic and human development function and sustainable environmental education on the socio-cultural and ecological level.

In short, the recognition of Mabali as a Man and Biosphere Reserve makes it possible to integrate it into the World networks. It will be a new and active laboratory for research on climate change and sustainable development through forestry studies, biodiversity conservation, monitoring of forest heritage and other fields related to the human sciences.