

CARBON POOLS AND MULTIPLE BENEFITS OF MANGROVES IN CENTRAL AFRICA

Assessment for REDD+







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FOREWORD

Since 2000, Central Africa has been losing its carbon-rich mangroves at a rate of 1.77 per cent per year; an estimated 77,100 hectares were lost across the region over a period of just one decade.

Mangroves are threatened by deforestation due to urban development and coastal infrastructure, unsustainable timber extraction for fish smoking, degradation due to pollution from pesticides and fertilizers, and from hydrocarbon and gas exploitation. Clearance of mangroves for oil palm plantations, rising sea levels and erosion and increased sedimentation are also causing mangroves to recede in Central Africa.

However, mangroves provide essential ecosystem goods and services, from carbon sequestration potential to biodiversity conservation. These ecosystems nurture and enrich coastal fisheries; they trap nutrients and sediments and provide shoreline stabilization, thus protecting coastlines and coastal dwellers from tropical storms, flooding and erosion. Coastal mangrove ecosystems play a critical role in global climate change adaptation and mitigation strategies. Their high carbon storage and sequestration potential, and the high value of the multiple benefits they provide make them important coastal habitats which warrant protection and conservation.

The report confirms that mangroves are among the most carbon-rich ecosystems in the world and seeks to provide the basis for their sustainable management, conservation and restoration. It highlights the high ecological and economic values of mangroves, and the threats that exist across the region. Where not already the case, it encourages countries to develop a national definition of forests that explicitly includes mangroves, paving the way for mangrove ecosystems to be eligible for inclusion in national strategies for reducing emissions from deforestation and forest degradation (REDD+). Beyond the potential for additional finance, REDD+ can leverage action to protect mangroves by fostering multistakeholder dialogues and offering a framework for comprehensive policy and cross-sectorial approaches to tackle the drivers of deforestation.

The report is published at a time when REDD+ under the United Nations Framework Convention on Climate Change is coming into its own. New methodologies for carbon accounting are being developed to increase the profile of mangroves in REDD+ and the UNFCCC. The "Wetlands Supplement" to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories was published earlier this year, providing guidance on how to report on mangroves - whether included as wetlands or forests. It is my hope that, in addition to conserving mangroves for future generations, the additional guidance from the IPCC and the important findings of the current report will encourage Central African Governments to begin including mangroves in their greenhouse gas inventories and their National Communications to the UNFCCC.

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PREFACE

Mangroves are among the most productive ecosystems in the world and are important breeding and spawning grounds for most tropical fish species.

They actively contribute to maintenance of biodiversity, climate stabilization and sequestration of carbon dioxide emitted from natural or industrial sources.

Indeed, the oceans and seas occupy three quarters of the globe, and this tidal marsh ecosystem occupies nearly 18.1 million ha in the world, with 3.2 million ha (19 per cent) in 26 countries in Africa and 195,000 ha on the 402 km shoreline of Cameroon. Mangroves effectively protect us from two of the main climate-related risks of coastal areas, namely erosion and flooding. It has been established that carbon sequestration is higher in mangroves than other types of tropical forests and that the protection of these ecosystems provides multiple benefits (environmental, economic, social, cultural) that should be promoted and managed in a sustainable manner. However, it is regrettable that the level of knowledge about changes in coverage and degradation of mangrove ecosystems is low and that the accounting of carbon stocks is still in the embryonic stage.

This report, by the quality of its results on the impressive rate of carbon sequestered and the multiple benefits provided by mangroves of Central Africa, is a plea for the introduction of mangroves to be included in the process of climate change mitigation and REDD +.



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ABBREVIATIONS

AGB	Above Ground Biomass
AGC	Above Ground Carbon
BEF	Biomass Expansion/conversion Factor
BGB	Below Ground Biomass
BGC	Below Ground Carbon
CFA	Central African Franc
COP	Conference of Parties
CWCS	Cameroon Wildlife Conservation Society
Dbh	Diameter at breast height
DRC	Democratic Republic of Congo
FAO	Food and Agriculture Organization
g	tree basal area
h	tree height
ha	hectare
HE	Highly Exploited
IPCC	Inter-Panel for Climate Change
ISH	Institute of Fisheries and Aquatic Sciences, University of Douala (Yabassi)
IUCN	International Union for Conservation of Nature
KMFRI	Kenya Marine and Fisheries Research Institute
ME	Moderately Exploited
ND	Undisturbed
NGO	Non-Governmental Organisation
PSP	Permanent Sample Plot
REDD+	Reducing Emission from Deforestation and Forest Degradation and Enhanced Forest Stocks in Developing Countries
RoC	Republic of Congo
SE	Standard Error
UNEP	United Nations Environment Programme
UNFCCC	United Nation Framework Convention on Climate Change
USD	United State Dollar
WCMC	World Conservation and Monitoring Centre
WRM	World Rainforest Movement
WWF	World Wide Fund for Nature

EXECUTIV SUMMARY

This report presents the results of a study carried out to assess the carbon pools, ecosystem services and multiple benefits of the mangroves in the Central African countries of Cameroon, Gabon, Republic of Congo (RoC) and Democratic Republic of Congo (DRC).

Mangroves are among the most carbon-rich ecosystems in the world, and also provide valuable ecosystem goods and services such as fisheries production, shoreline stabilization, nutrient and sediment trapping as well as biodiversity habitats. Their high carbon storage and sequestration potential, and the high value of the multiple benefits they provide make them important coastal forest ecosystems to consider including in national REDD+ strategies. This is the first study on carbon stocks, sequestration rates and possible emissions resulting from degradation that has been undertaken for mangroves of the Central African region. The This report has found that mangrove ecosystems in Central Africa are highly carbon rich. We estimate that undisturbed mangroves contain 1520.2 \pm 163.9 tonnes/ha with 982.5 tonnes/ha (or 65 per cent of total) in the below ground component (soils and roots) and 537.7 tonnes/ha (35.0 per cent of total) in the above ground biomass. The lowest total ecosystem carbon of 807.8 \pm 235.5 tonnes C/ha (64.1 tonnes C/ha or 7.2 per cent total above ground, and 743.6 tonnes C/ha or 92.8 per cent total below ground) was recorded in heavily exploited sites. Moderately exploited sites recorded total ecosystem carbon of 925.4 \pm 137.2 tonnes C/ha (139.6 tonnes C/ha or 14.1 per cent total above ground, and 785.7 tonnes C/ha or 85.9 per cent total below ground). However, these results should be taken with caution given the relatively low number of samples and the potential variability in the data. This was a first order exploration of carbon stocks in mangroves in Central Africa, and more samples and research are needed in order to refine the data

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