

Carbon Dynamics (Stocks and Flows) in Mangroves of Mexico

Summary

The wide coverage of Mexican mangroves make them to be positioned in fourth place worldwide. Its multiple ecosystem services are recognized but also show high rates of deforestation. Assessments elsewhere in the world highlight the role that mangroves have in the carbon cycle, mainly as storage of organic carbon (Corg) in sediment, and exporters of dissolved and particulate Corg. Nevertheless, to know how mangroves contribute to local, regional and country level strategies such as Reduced Emissions from Deforestation and Degradation (REDD+), it is essential to determine Corg storages as baseline emissions. In this investigation, an extensive literature review was carried out about stocks and fluxes of carbon in mangroves of Mexico through different sources of information. From all studies (more than 200), only 48 contained data, or useful information, to make a review on the knowledge about stocks and fluxes of Corg in the mangroves of Mexico. Regionally, the Central Pacific zone counted with less information and the Yucatan Peninsula is where more studies were found. The higher total storages are located in the Gulf of Mexico and the mangroves of riverine type ($> 1,200 \text{ Mg C ha}^{-1}$). Less information exists about fluxes of Corg, mostly related to litter fall. In the South Pacific zone and in the riverine mangroves higher values were observed. The extension and variability of conditions of Mexico mangroves are an opportunity for develop multiple research topics, emphasizing the characterization of landscapes and cover local maps related with water variables (hydroperiod), land (topography) and microbiological processes. The extent and distribution of mangroves in Mexico is an opportunity to develop research groups at the regional scale, and approach consensual studies under a methodological strategy interoperable.

Introduction

Mangroves are coastal ecosystems located in the intertidal zones of tropical and subtropical regions of the planet. Mexico has approximately 775,555 hectares of mangrove, representing 5% of global coverage. These ecosystems are dominated by species adapted to fluctuating salinity conditions, anoxic soils, and periodic flooding. The four main mangrove species in Mexico are: red mangrove (*Rhizophora mangle*), white mangrove (*Laguncularia racemosa*), black mangrove (*Avicennia germinans*) and button mangrove (*Conocarpus erectus*).

Mangroves provide diverse ecosystem services, including coastal protection against storms and hurricanes, habitat for numerous commercial and endangered species, and carbon sequestration. This last service has gained relevance in the context of global climate change, since mangroves are recognized as one of the ecosystems with the greater carbon storage capacity per unit area.

Methodology

For this study, a comprehensive revision of available scientific literature on carbon stocks and flows in Mexican mangroves was realized. The sources consulted included:

1. Scientific articles published in national and international indexed journals
2. Bachelor's, master's and doctoral thesis from Mexican universities

3. Technical reports from government agencies and NGOs
4. Databases of specific blue carbon projects in Mexico

Specific criterias were established for the selection of studies, including the availability of quantitative data on carbon stocks (above-ground biomass, below-ground biomass, soil carbon) and/or carbon flows (litterfall production, decomposition, net ecosystem exchange). Studies were classified according to their geographic location in 5 regions: Gulf of Mexico, Yucatan Peninsula, North Pacific, Central Pacific and South Pacific.

Index words: environmental services; mangrove deforestation; soil organic carbon; carbon storage; climate change.

Reference

Herrera-Silveira, J. A., Camacho-Rico, A., Pech, E., Pech, M., Ramírez-Ramírez, J., & Teutli-Hernández, C. (2016). Dinámica del carbono (almacenes y flujos) en manglares de México. *Terra Latinoamericana*, 34(1), 61-72.