



MANGROVES AND CLIMATE CHANGE

BACKGROUND BRIEF

In the context of reducing emissions from deforestation and forest degradation (REDD+), a great deal of emphasis has been placed on evaluating and monitoring the role of traditional, inland forest cover, especially tropical forests across Latin America, Africa and Asia. However, recent developments in research and climate change science have found that other sources of carbon sequestration and storage can have an important impact on mitigation and adaptation.

One major ecosystem that has become a subject of interest in combatting climate change is that of mangrove forests. These coastal ecosystems are considered important in terms of carbon sequestration potential and adaptation to climate change impacts. Consequently, work is underway by the international environmental community to incorporate mangroves into climate considerations, including in regards to REDD+.



As understanding around mangroves and their role in climate change grows, they are also being incorporated into another category referred to as “blue carbon.” Blue carbon refers to carbon captured by living organisms in coastal and marine ecosystems, including (but not limited to) salt marshes, mangroves and sea grass beds. As opposed to forest carbon, where the storage mostly takes place in aboveground biomass, the majority of blue carbon is found in soil. These ecosystems play an important role in carbon sequestration and storage, and some studies estimate that blue carbon has an annual sequestration rate two to four times greater than tropical forests.

This issues brief seeks to provide basic background information and overviews of some of the major players, institutions, initiatives, organizations and projects that are working with mangroves specifically, and blue carbon more generally. It is important to note that there is some overlap between these two areas of research. Links are provided throughout that contain more detailed information, written reports, and references.

INSTITUTIONS, ORGANIZATIONS AND PROJECTS WORKING IN THE FIELD OF MANGROVES

- 1) United Nations Environment Programme (UNEP): Regional Seas Program
 - a. Report (in English and French): [Mangroves of Western and Central Africa](#)
 - b. UNEP prioritizes Coastal Zone ecosystems and their management, and has developed guidelines for [Integrated Coastal Area Management \(ICAM\)](#), which includes considerations about mangroves.
- 2) United Nations Framework Convention on Climate Change (UNFCCC)
 - a. In coordination with IUCN and the Ramsar Secretariat, the Clean Development Mechanism (CDM) Executive Board of the UNFCCC has developed methodology guidelines for [‘Afforestation and reforestation of degraded mangrove habitats.’](#)
 - b. Some CDM Projects have already been submitted to the UNFCCC that deal with mangrove restoration, including a [project in Senegal](#).
- 3) Food and Agriculture Organization of the United Nations (FAO)
 - a. Published a report in 1994 titled [“Mangrove forest management guidelines”](#)

- b. Along with ISME and ITTO, FAO published a “World Atlas of Mangroves” in 2010, which includes 600 full-page maps and a comprehensive country-by-country assessment (The document is not accessible for free, must be purchased via Earthscan).
- 4) United Nations Forum on Forests (UNFF)
- a. Released an [educational video](#) on mangroves on YouTube in May, 2013
 - b. Initiated by the Government of Nicaragua, the UNFF is implementing the [Regional Initiative for the Transfer of Environmentally Sound Technologies for the Sustainable Management of Mangrove Ecosystems in Latin America and the Wider Caribbean](#).
- 5) International Tropical Timber Organization
- a. Manages the [Global Mangrove Database and Information System](#) (GLOMIS)
 - b. [Project portfolio](#)
 - i. Currently in Phase II of a Mangrove project along the Pacific Coast of Panama, implementing rehabilitation activities and training communities to proactively manage their mangrove forest resources
 - ii. Manage a number of mangrove projects in the Asia-Pacific region that are linked directly to tsunami relief and recovery, in Thailand, China, etc.
 - iii. Africa: sustainable community management mangrove ecosystem project with the government of Ghana; conservation and mangrove rehabilitation study in Togo
- 6) Global Environment Facility (GEF)
- a. Launched a [\\$24 million project in India](#) in 2011 to promote CBNRM and mangrove conservation in the Godavari River Estuary
 - b. Along with the UNDP, implementing the “[Effective Conservation and Sustainable Use of Mangrove Ecosystems in Brazil](#)” Project
 - c. In a project with the World Bank, AusAID and the New Zealand Aid Programme, have planted 37,000 mangrove seedlings on Pacific islands such as Arunaka, Tarawa and Kiribati.
- 7) The World Bank
- a. [Bangladesh Mangrove Afforestation Project](#): 6 year, \$11 million project in the 1980s covering plantation costs and support services for residents living near the plantations
 - b. [Vietnam Coastal Wetlands Protection and Development Project](#): 8 year, \$65 million project from 1999-2007 that provided seedlings, civil works and other inputs for planting and rehabilitation of mangrove forests in the Mekong delta
- 8) World Conservation Monitoring Center (WCMC)
- a. Implemented by UNEP, the WCMC develops data sets to support ecosystem conservation around the world, including information on mangroves distribution data from various sources
 - b. WCMC has developed an [online tool](#) that maps mangrove distribution and location across the African continent.
 - c. The WCMC and IUCN’s World Commission on Protected Areas jointly created and manage the [World Database on Protected Areas \(WDPA\)](#), an online resource that shares information about conservation data, deforestation and other tools. The WDPA lists several mangroves and wetlands areas, and also integrates data with Ramsar sites.
- 9) International Society for Mangrove Ecosystems (ISME)
- a. Comprised of over 1000 individual members and 40 institutional members, ISME coordinates with other international bodies working on mangroves (UNEP, FAO, etc.) to develop resources and publications that facilitate proper management and conservation of the ecosystem.
 - b. Finalized in 1992, ISME produced a [World Charter for Mangroves](#) to complement the UN’s World Charter for Nature.
 - c. Most documents are not free to the public, but can be ordered on their [website](#).
- 10) Mangroves for the Future (MFF)
- a. MFF is an initiative implemented by IUCN and UNDP, created largely in response to the 2004 tsunami in India, and fueled by the Clinton Global Initiative’s goal to improve human livelihood via coastal restoration

- b. The organization's action plan is implemented jointly by IUCN and UNDP, along with the regional country partners, and partner institutions including CARE, FAO, UNEP and Wetlands International. Its goals include knowledge building and sharing, strengthening local institutions charged with managing coastal ecosystems, and improving ecosystem governance.
 - c. Their [website](#) contains over 200 documents covering various regional and technical topics.
- 11) The Mangrove Alliance
- a. [Initiated in 2010](#) with support from the Conservation Leadership Programme and the US Forest Service, with funding from the MacArthur Foundation
 - b. Awarded first grant to BirdLife in the Dominican Republic to “catalyze community-based mangrove conservation in the Insular Caribbean
 - c. Also commissioned several [case studies](#) with other BirdLife partners in Latin America and Caribbean
- 12) The Global Aquaculture Alliance
- a. Has published a [white paper](#) on Mangroves, and conducts analysis of other institutional assessments of mangroves, including critique of National Geographic's assertion that global shrimp farming threatens mangroves
- 13) Wetlands International
- a. Have a program called [Mangrove Capital](#), which hopes to increase the value of mangroves on a widespread, institutional and governmental level
 - b. Several mangrove restoration projects across West Africa and Southeast Asia
 - c. Also operate a [sustainable shrimp production project](#) in Indonesia (2010-2014) in partnership with IUCN and Oxfam

INSTITUTIONS, ORGANIZATIONS AND PROJECTS WORKING IN THE FIELD OF BLUE CARBON

- 1) The Blue Carbon Initiative
- a. Coordinated by IUCN, CI, and UNESCO's Intergovernmental Oceanographic Commission, the [Blue Carbon Initiative](#) promotes conservation management and financing for blue carbon ecosystems by working with local, national and international governing bodies
 - i. The initiative is divided between two working groups, The [International Blue Carbon Policy Working Group](#) and the International Blue Carbon Scientific Working Group. Both meet several times per year and coordinate to produce scientifically sound policy recommendations
 - ii. The initiative has a number of [field projects](#) under implementation, including:
 - 1. Banten Bay, Indonesia: performing field studies to collect data on sequestration rates, ecosystem loss and other factors
 - 2. L'Océanum de Dakar, Senegal: working with local communities to restore mangroves and improve coastal ecosystem management
- 2) GRID-Arendal
- a. A research center that collaborates with UNEP, [GRID- Arendal](#) is involved with the [Blue Carbon Portal](#), a web resource that aims to create more information sharing between projects and organizations working on blue carbon issues
 - b. GRID has also begun a [West Africa Blue Carbon Initiative](#), which hopes to develop an issues paper on blue carbon issues for the region, and establishing a blue carbon stakeholder working group
 - c. GRID, along with the World Conservation Monitoring Centre, is funding a [Blue Carbon Demonstration project](#) through the Abu Dhabi Global Environmental Data Initiative
 - i. The project hopes to increase local capacity to monitor changes in carbon stock and sequestration in coastal habitats
 - ii. The Initiative will be releasing a report in March 2013 titled “Building Blue Carbon Project – An Introductory Guide”
- 3) The Ocean Foundation
- a. [The Ocean Foundation](#) has two distinct programs that focus on blue carbon issues, the SeaGrassGrow program, and the Blue Climate Solutions project
 - b. SeaGrassGrow
 - i. The program is designed to generate and sell voluntary ocean-based carbon credits

- ii. [SeaGrassGrow's](#) website offers a [Blue Carbon Offset Calculator](#), which allows companies or individuals to determine how much blue carbon credits would be required to offset their current emissions
 - iii. The program has worked with Seagrass Recovery [on two restoration projects in Florida](#), raising a combined total of over \$900,000.
 - c. Blue Climate Solutions
 - i. A project housed within The Ocean Foundation, [Blue Climate Solutions](#) aims to develop policies that incorporate ocean ecosystems into climate change mitigation
 - ii. The project helped to create the [Blue Climate Coalition](#) in 2009, a group of over 100 conservation organizations and other stakeholders
 - 1. The group helped lobby and petition US Congress to include marine conservation as part of the solution to climate change in the American Power Act
 - 2. The group continues to work with other national governments and international arrangements such as the UNFCCC to advance ocean considerations in climate change policy
 - iii. Blue Climate Solutions also manages the [Blue Carbon Blog](#), which collects and shares updates occurring in the field
- 4) Commission for Environmental Cooperation
 - a. An intergovernmental organization that complements the environmental provisions of NAFTA, the [CEC](#) is based on coordination between Canada, the US and Mexico
 - b. The CEC is currently seeking consultants for a project titled [North America's Blue Carbon: Assessing the Role of Coastal Habitats in the Continent's Carbon Budget](#)
 - c. The project aims to compile geographic data and generate new maps of coastal vegetated habitats in North America
- 5) National Oceanic and Atmospheric Administration (NOAA)
 - a. [NOAA's work on blue carbon](#) is divided into three strategic pathways:
 - i. Incorporating coastal carbon considerations into federal marine policies and other environmental programs (such as the National Environmental Protection Act, which currently does not explicitly consider carbon sequestration as an ecosystem service)
 - ii. Address needs and gaps in scientific understanding of blue carbon and coastal ecosystems' potential for climate change mitigation
 - 1. NOAA's [Pacific Marine Environmental Laboratory \(PMEL\)](#) is responsible for conducting research on air-sea carbon exchange patterns, ocean circulation patterns, and other phenomena that impact blue carbon sequestration
 - iii. Developing voluntary carbon markets for blue carbon, working to direct private funding resources to conserve coastal habitats
- 6) World Wildlife Fund
 - a. In 2012, WWF released a report titled [Blue Carbon: A new concept for reducing the impacts of climate change by conserving coastal ecosystems in the Coral Triangle](#)
 - b. The goal of the report is to provide a scientific and policy incentive for climate practitioners to incorporate coastal ecosystem habitats into carbon sequestration planning and implementation
 - c. Specifically, the report focuses on opportunities for climate change mitigation in the Coral Triangle, encompassing coastal habitats throughout Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands and Timor-L'este

INSTITUTIONS, ORGANIZATIONS AND PROJECTS WORKING ACROSS THE FIELDS OF MANGROVES AND BLUE CARBON

- 1) The Ramsar Convention on Wetlands
 - a. Contact person at Ramsar for mangroves: Margarita Astrálaga, astralaga@ramsar.org.
 - b. Ramsar's [Resolution X.24](#) of its 10th COP is titled 'Climate change and wetlands: impacts, adaptation and mitigation'. It calls upon member countries to reduce degradation and promote restoration of wetlands, including mangroves, and urges parties to include wetland conservation in national climate change strategies.
 - c. At its 11th COP, the Ramsar Convention drafted [Resolution XI.14](#). The Convention noted the work being done to incorporate blue carbon into carbon emission and sequestration scenarios. Although they have not reached final consensus, there are a number of provisions regarding REDD+ in the draft resolution. The Convention urges parties to take necessary and appropriate steps to develop

“quantifiable, cost-effective and participatory approaches” for REDD+ and encourages coordination on wetland-based climate mitigation with the UNFCCC’s Ad-Hoc Working Group on Long-Term Cooperative Action (AWG-LCA). The resolution also calls on members to continue conducting thorough research and studies into the role of forested and non-forested wetlands in climate change mitigation and adaptation.

- d. The most crucial of Ramsar’s work on mangroves has been through their procedures for identifying and designating wetlands and coastal zones. The monitoring procedures to assess changes in target ecological areas have set a global example for proper mangrove management.
 - e. [Regional Initiative for the Conservation and Wise Use of Mangroves and Coral Reefs](#)
 - i. This Latin American Regional program aims to transfer broad strategies from Ramsar to mangrove management and preservation, particularly in terms of monitoring and reporting. The initiative is primarily a learning and information sharing platform, where representatives from various countries in Latin America and Caribbean gather to share success stories from mangrove projects and programs.
 - f. Ramsar also maintains a list of ‘Ramsar sites’, or wetland zones of international importance. Updated in 2006, they have a [smaller list of those sites that have significant mangrove components](#).
- 2) The Sustainable Wetlands Adaptation and Mitigation (SWAMP) Program
- a. [The SWAMP program](#) is a collaborative project between CIFOR, USFS and Oregon State University with support from USAID. In fiscal year 2012/2013, the program developed over 50 plots to quantify GHG emissions from wetland forests throughout Indonesia, Thailand, India, Mozambique, the Dominican Republic and Honduras
 - b. SWAMP also conducts training on mangrove/wetlands in relation to climate change mitigation and adaptation, and has been involved in developing new IPCC guidelines that incorporate wetland carbon considerations
 - c. The program has also released a [wide variety of reports](#) that cover protocols for measuring and enhancing carbon storage in wetland and peatland ecosystems
- 3) The Abidjan Convention
- a. The Abidjan Convention covers Western and Central Africa and deals with coastal ecosystem management and preservation, and is one of the UNEP’s six Regional Seas Programs (UNEP is the official secretariat of the Convention)
 - b. In December 2013, they began a series of [climate change adaptation trainings](#) for representatives of member countries to learn about ecosystem management responses to climate threats. Among these are proper conservation of mangrove forests as a way to curb sea level rise and coastal degradation.
- 4) The Nature Conservancy (TNC)
- a. Along with Wetlands International, produced a report on [“The response of mangrove soil surface elevation to sea level rise”](#)
 - b. Working with Grenada Fund for Conservation to incorporate mangroves into climate adaptation strategies
 - c. [Restoration Works](#), a multi-platform initiative of TNC and the National Oceanic and Atmospheric Administration’s Restoration Center, now incorporates mangroves in its programmatic planning
 - d. TNC scientist Elizabeth McLeod published an article in *Frontiers in Ecology and the Environment* titled [The blueprint for blue carbon: toward an improved understanding of the role of vegetated coastal habitats in sequestering CO₂](#) (subscription required)

FCMC Program Chief of Party: Scott A. Hajost, scott.hajost@fcmcglobal.org
USAID Contracting Officer’s Representative: Olaf Zerbock, ozerbock@usaid.gov
FCMC Project Website: www.fcmcglobal.org

This Issues Brief was produced for review by the United States Agency for International Development (USAID). The report was prepared by the FCMC program, and not by USAID. The contents do not necessarily reflect the views of USAID or the United States Government.

FCMC is implemented by Prime Contractor Tetra Tech, along with core partners, including Conservation International, Terra Global Capital, Greenhouse Gas Management Institute and World Resources Institute