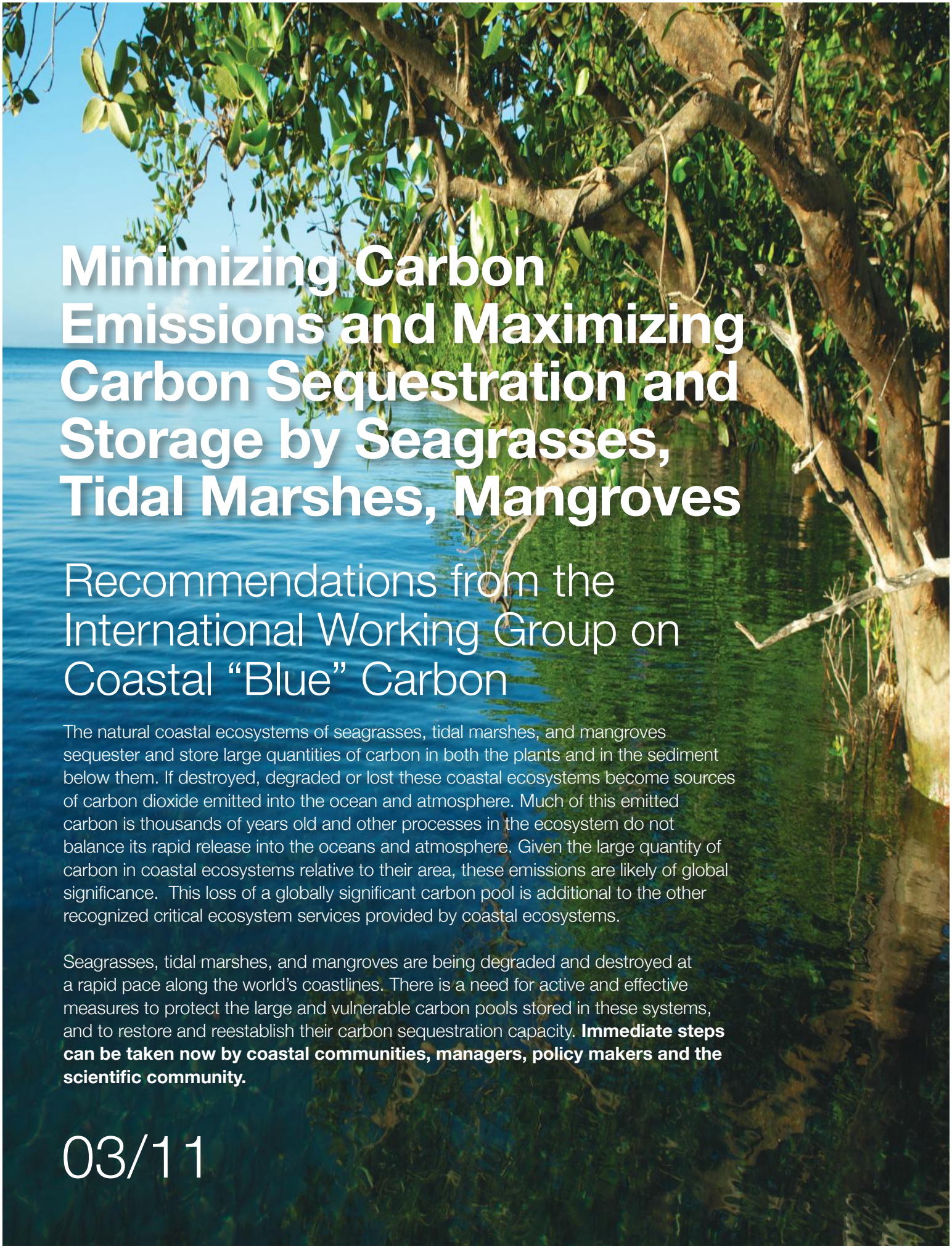

# Minimizing Carbon Emissions and Maximizing Carbon Sequestration and Storage by Seagrasses, Tidal Marshes, Mangroves

## Recommendations from the International Working Group on Coastal "Blue" Carbon

The natural coastal ecosystems of seagrasses, tidal marshes, and mangroves sequester and store large quantities of carbon in both the plants and in the sediment below them. If destroyed, degraded or lost these coastal ecosystems become sources of carbon dioxide emitted into the ocean and atmosphere. Much of this emitted carbon is thousands of years old and other processes in the ecosystem do not balance its rapid release into the oceans and atmosphere. Given the large quantity of carbon in coastal ecosystems relative to their area, these emissions are likely of global significance. This loss of a globally significant carbon pool is additional to the other recognized critical ecosystem services provided by coastal ecosystems.

Seagrasses, tidal marshes, and mangroves are being degraded and destroyed at a rapid pace along the world's coastlines. There is a need for active and effective measures to protect the large and vulnerable carbon pools stored in these systems, and to restore and reestablish their carbon sequestration capacity. **Immediate steps can be taken now by coastal communities, managers, policy makers and the scientific community.**

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# Enhanced national and international research efforts

## Building on existing scientific data, analysis, and available technologies, a coherent and programmatic global data gathering and assessment effort is needed.

Develop inventory and accounting methodologies for coastal carbon to facilitate their inclusion in incentive agreements for conservation and effective management of coastal systems;

Conduct carbon inventories in coastal areas identified as having likely high carbon storage and sequestration capacity. Include existing and at risk potential areas of high carbon emissions;

Conduct targeted research and monitoring to more accurately quantify the greenhouse gas emissions resulting from degradation, conversion and destruction of all relevant coastal ecosystems;

Establish a network of field projects that demonstrate (1) the capacity for carbon storage in coastal systems and the emissions resulting from degradation, conversion and destruction of those systems and (2) the feasibility of community monitoring approaches, management intervention and providing incentives for maintaining carbon-rich systems;

Conduct research quantifying the consequences of different coastal restoration and management approaches on carbon storage and emissions in coastal and near-shore marine ecosystems; and

Develop standards and methods to translate remote sensing measurements into accurate estimates of carbon in coastal ecosystems, as remote sensing is currently the only method to efficiently map and monitor mangrove and tidal marshes at regional and global scales.

# Enhanced local and regional management measures

## Existing knowledge of the large carbon stocks, sequestration potential, and emissions from degraded or converted coastal ecosystems is sufficient to warrant enhanced management actions now.

Identify and reduce drivers of degradation and destruction of high-carbon coastal systems. Such drivers include:

1. Conversion or loss of coastal ecosystems through urban development, agriculture, aquaculture; and
2. Construction of artificial features that impair natural tidal flooding and other processes resulting in degradation of wetlands, loss of carbon sequestration and release of stored carbon (for example roads, levees, groynes, harbor development, etc.);
3. Watershed changes that result in changes to water and sediment inflow. For example, terrestrial forest clearing can increase sediment loads smothering vulnerable downstream seagrass areas. Conversely, infrastructure that diverts sediment from coastal marshes and mangroves can decrease their ability to accrete carbon rich sediments as sea levels rise;
4. Pollutants and nutrient run-off from land resulting in degradation of seagrass systems as the enrichment of wetlands with nitrogen reduces belowground carbon sequestration, capacity of marshes to keep pace with sea level, and enhance the release of nitrous oxide, a very potent greenhouse gas;
5. Unsustainable/overharvesting of timber and fuel-wood production;
6. Destruction of seagrass beds by dredging, trawling, boating, and other activities.

Strengthen national to local conservation and protection measures of high-carbon coastal systems, while ensuring the social and economic well-being of communities dependant on these systems for other ecosystem services. This should include:

1. Identifying and quantifying national coastal carbon storage and losses;
2. Effective use of mechanisms such as integrated land and marine spatial planning, sustainable management plans, marine protected areas, conservation offsets, Payment for Ecosystem Service agreements, wetland banking, and incentive agreements; and
3. Adaptation measures that account for the impacts of climate change, such as sufficient and appropriate buffer areas that allow coastal ecosystems to migrate inland in response to sea level rise.

Implement site and regional specific ecological restoration of high-carbon coastal systems, including

1. Restoration of natural hydrological patterns and sediment delivery to converted and degraded wetlands by removing levies and dams;
2. Restoration and replanting of seagrass, tidal marsh, and mangrove vegetation.

# Enhanced international recognition of coastal carbon ecosystems

## Current international actions to reduce the impacts of climate change do not recognize the greenhouse gas emissions resulting from the degradation of coastal wetlands or the role of healthy coastal ecosystems in sequestering carbon dioxide.

Engage the United Nations Framework Convention on Climate Change (UNFCCC) and its related processes and mechanisms to account for management of coastal ecosystems, for example:

1. Ensure coastal carbon ecosystems are included and addressed during revision and updating of IPCC technical guidance on GHG emissions reporting, including encouraging peer-reviewed publication of relevant research;
2. Work towards long-term reporting of GHG emissions by sources and removals by sinks by direct human-induced coastal management;
3. Develop financial incentives to compensate for actions leading to reductions in emissions from coastal ecosystems;
4. Include mangrove conservation and restoration activities appropriately in national REDD+ strategies, policies and measures.

*The International Working Group on Coastal "Blue" Carbon was formed in February 2011 to address the global significance of climate change mitigation through the sequestration of carbon by coastal ecosystems – specifically mangroves, tidal marshes and seagrasses. The working group reviews current scientific knowledge of coastal carbon, develops guidelines for maximizing storage and sequestration of coastal carbon and provides recommendations for quantifying and monitoring carbon, and emissions thereof, in coastal systems.*

*The working group is convened by Conservation International, International Union for Conservation of Nature (IUCN), and the Intergovernmental Oceanographic Commission and consists of 22 scientists from around the world. Funding for the group has been provided by the Waterloo Foundation, National Aeronautics and Space Administration (NASA) and the United Nations Environment Programme (UNEP).*

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