Boost ecosystem resilience
To realize the benefits of low emission development

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Key messages

- Low emission development measures have the potential to increase resilience to climate change, especially in developing countries that are already suffering significant losses from climate change impacts.

- Actions to protect and restore ecosystems that store and sequester carbon, for example, not only avoid greenhouse gas emissions but also strengthen people's and communities' resilience to climate change impacts and contribute to human wellbeing and biodiversity conservation.

- Protecting and restoring carbon rich ecosystems such as forests and mangroves maintains and enhances natural carbon storage and sequestration. These ecosystems also provide numerous benefits, or ecosystem services, that enhance people's resilience to the impacts of climate change.

- Ecosystem services are essential for climate change adaptation in communities around the world. They provide flood control, clean air and drinking water, coastal protection from storms and sea level rise, and habitats for numerous species that are important for local livelihoods and food security.

How is low emission development linked to ecosystem protection?

Ecosystems such as forests, coastlines, and oceans are natural carbon sinks that store carbon from the atmosphere in vegetation, soil, water, and living organisms. This process, known as carbon sequestration, is key to avoiding and reducing greenhouse gas emissions that lead to climate change. The world's forests, for instance, store more carbon than exists in the entire atmosphere,[1] and mangroves can store more than twice the amount of carbon as a terrestrial forest of the same size.[2] The destruction and degradation of forests and coastal ecosystems, however, releases this stored carbon into the atmosphere, contributing at least 11% of global greenhouse gas emissions annually.[3]

Low emission development strategies for the land use sector that prioritize the protection of carbon rich ecosystems not only reduce emissions, but also protect biodiversity, safeguard local livelihoods, and reduce rural poverty, all of which can lead to more climate resilient systems. REDD+ and blue carbon initiatives are among the measures available to conserve, sustainably manage, and restore these carbon rich ecosystems, which are crucial for natural carbon storage and sequestration, and for building climate resilient communities.

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Series editor: Natalie Harms, Energy research Centre of the Netherlands (ECN)

How can ecosystem approaches to low emission development contribute to climate resilience?

Climate resilience is the capacity of a community and the ecosystems upon which it depends to absorb stresses and maintain functions in response to climate change impacts, and to adapt in ways that improve the sustainability of the system for future impacts. Healthy natural ecosystems are crucial for climate resilience, as they have an important role in buffering the impacts of climate change. Forests provide increased flood control, clean air and drinking water, and income generation opportunities from sustainable forest products. Coastal ecosystems, including mangroves, tidal marshes, and seagrasses, support water quality and provide coastal protection against floods, storms, and sea level rise. Protection of coastal ecosystems is also crucial for safeguarding livelihoods, as mangroves are estimated to be worth at least US$1.6 billion globally each year in ecosystem services such as healthy fisheries.[4] Low emission development strategies (LEDS) that integrate measures to protect and restore ecosystems can yield sustainable development and resilience benefits for people who rely on them for their incomes and livelihoods.

REDD+ refers to reducing emissions from deforestation and forest degradation, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks, creating a financial value for the carbon stored in forests.

Blue carbon is the carbon stored in coastal and marine ecosystems—mangroves, tidal marshes, and seagrasses. These ecosystems sequester and store large quantities of blue carbon in the plants themselves and the sediment below.[5]

Planting mangroves (Photo credit: Jon Lecuyer)

Integrating ecosystem based approaches into low emission development policies and planning

To leverage the potential of natural ecosystems in strengthening climate resilience and benefiting low emission development, governments can create policies and regulations to incentivize ecosystem based activities through a range of existing mechanisms. The design of Nationally Determined Contributions (NDCs) and the plans supporting their implementation are crucial entry points for the inclusion of natural ecosystem based approaches into LEDS. As of 2015, 40 countries have placed ecosystem based activities in a prominent position in their NDCs. These measures, primarily from developing or emerging countries, most frequently include forest activities such as restoration, conservation, and avoiding deforestation, as well as measures to protect and restore watersheds and coastal ecosystems. Some recommendations to strengthen mitigation commitments and enhance resilience include:

- **Incorporating REDD+ and blue carbon in NDCs:** REDD+ is reflected in a separate article of the Paris Agreement and can serve as a crucial component to meet national emission reduction targets. Similarly, blue carbon has significant potential as part of NDCs, Nationally Appropriate Mitigation Actions (NAMAs), and domestic policies or greenhouse gas accounts.
- **Implementing regulatory and fiscal policies, engaging the private sector:** The right mix of regulatory and fiscal policies and market transformation will ensure that deforestation-free investments and supply chains are prioritized, providing a framework for the private sector.
- **Aiming for integrated mitigation and adaptation through landscape approaches:** Integrating ecosystems into larger scale land use strategies at the landscape level is one of the most effective means to address complex, cross sectoral mitigation and adaptation challenges.
- **Cooperation across sectors:** Development practitioners should be included in NDC design and implementation processes, and likewise climate practitioners should be included in LEDS design and implementation. This will facilitate integration of climate change mitigation and adaptation responses and sustainable development activities across multiple sectors.

Methodology and tools

A number of tools and guidelines exist to help decision makers and practitioners to assess climate related risks and prioritize actions that promote climate resilient development, such as USAID's *Climate-Resilient Development Framework*.[6] Integrating REDD+ into NDCs will require design and implementation of readiness activities at local, regional, and national levels. The Alliance for Global REDD+ Capacity's manual[7] serves as a reference for government officials, practitioners, and community members to acquire these design and implementation skills.

Mainstreaming of ecosystem based climate solutions can be facilitated by calculating the economic value of ecosystems and their services through natural capital accounting methodologies. This allows for the cost–benefit calculations of ecosystems to be included in landscape scale decision making processes for low emission development. The World Wide Fund for Nature has created an operational framework[8] including cost effectiveness analysis and mainstreaming of ecosystem based approaches into national and subnational planning and policies. Blue carbon activities can be integrated into national frameworks and policies, including coastal and marine policies, by first assessing carbon stocks and emissions factors in coastal carbon ecosystems, and then incorporating the economic value of these carbon stocks into national accounting systems. The Blue Carbon Policy Framework[9] can help to mainstream considerations of the value of coastal ecosystems. Further, LEDS GP has developed a toolkit[10] to support the assessment of development impacts of LEDS and NDC actions.

Case Study
Alto Mayo Conservation Initiative, Peru

Conservation International is working with the Peruvian National Park Service and other strategic allies to implement the Alto Mayo Protected Forest Conservation Initiative.[11] The project uses REDD+ and conservation agreements, a pro-poor benefit distribution mechanism, to mitigate climate change by protecting forests while promoting the wellbeing of the community via financial, social, and environmental benefits. This innovative management model is based on the economic valuation of forest services and their incorporation into the local and regional economies.

To date, 235 families have signed conservation agreements pledging not to cut down trees in exchange for agricultural training, medical supplies, and educational materials. The financial sustainability of these conservation agreements will be secured in part by the revenue obtained from selling the REDD+ credits generated by emission reductions from avoided deforestation. Between 2009 and 2012, the Alto Mayo project generated almost 3 million metric tons of emission reductions—equivalent to taking 500,000 cars off the road for a year—and as of 2015, the project has reduced deforestation at the site by 75% from baseline levels. In addition to these climate change mitigation benefits, the participating families are benefiting from increased agricultural productivity that leads to higher incomes. More than 240,000 people in the Alto Mayo basin are indirectly benefiting from the provision of vital forest ecosystem services such as water filtration and the prevention of soil erosion, which contributes to a more climate resilient region.

Alto Mayo, Peru (Photo credit: CIFOR)

Resources

Conservation International: 'Ecosystem-Based Adaptation.'	www.conservation.org/eba
Conservation International: 'Sustainable Landscapes Partnership.'	www.conservation.org/slp
LEDS GP: 'Development Impacts Assessment (DIA) toolkit.'	ledsgp.org/development-impact-assessments-tools

Notes

1. The atmosphere contains approximately 720 Gt carbon [Falkowski, P. et al. (2000) 'The global carbon cycle: a test of our knowledge of Earth as a system.' *Science* 290: 291–296.]; forests contain 861 ± 66 Gt carbon [Pan, Y. et al. (2011) 'A large and persistent carbon sink in the world's forests.' *Science* 333: 988–993.]

2. Stecker, T. and ClimateWire (2012) 'Restoring mangroves may prove cheap way to cool climate.' *Scientific American* 31: July 31.

3. Goodman, R.C. and Herold, M. (2014) *Why maintaining tropical forests is essential and urgent for a stable climate*. Working Paper No. 385. Washington, DC: Center for Global Development.

4. Polidoro, B.A., Carpenter, K.E., Collins, L., Duke, N.C., Ellison, A.M., Ellison, J.C., et al. (2010) 'The loss of species: Mangrove extinction risk and geographic areas of global concern.' *PLoS ONE* 5(4).

5. Conservation International (2014a) *Coastal blue carbon: Methods for assessing carbon stocks and emissions factors in mangroves, tidal salt marshes, and seagrass meadows*. Arlington, VA: Conservation International; IUCN (2012) *Blue Carbon Policy Framework 2.0*. Gland, Switzerland: International Union for Conservation of Nature and Natural Resources

6. USAID (2014) *Climate-resilient development: A framework for understanding and addressing climate change*. Washington, DC: USAID.

7. Conservation International (2014b) *The knowledge and skills needed to engage in REDD+: A competencies framework*. (Also available as an iPad app.) Arlington, VA: Conservation International.

8. WWF (2013) *Operational framework for ecosystem-based adaptation – implementing and mainstreaming ecosystem-based adaptation responses in the Greater Mekong sub-region*. Gland, Switzerland: World Wide Fund for Nature.

9. IUCN (2012) Op. cit.

10. LEDS GP: 'Development Impacts Assessment (DIA) toolkit.'

11. Conservation International (2012) *Alto Mayo Protected Forest Conservation Initiative*. Lima: Conservation International Peru.

Conservation International aims to empower societies to responsibly and sustainably care for and value nature and global biodiversity, for the long term benefit of people and all life on Earth. For nearly 30 years, Conservation International has pursued this goal through science, policy, and partnerships with countries, communities, and companies. The organization employs more than 1,000 people and works with more than 2,000 partners in 30 countries, and has helped support 1,200 protected areas and interventions across 77 countries, safeguarding more than 601 million hectares of land, marine and coastal areas over the years. www.conservation.org

The LEDS GP Benefits Assessment and Communication Working Group focuses on identifying, communicating, and integrating social, economic, and environmental benefits associated with low emission pathways. The group works to advise on development impact assessment to provide tools and exchange knowledge and guidance on how to align development priorities with climate change policies and measures. Contact: benefits@ledsgp.org

The Low Emission Development Strategies Global Partnership (LEDS GP) was founded in 2011 to enhance coordination, information exchange, and cooperation among countries and international programs working to advance low emission, climate resilient growth. LEDS GP currently brings together LEDS leaders and practitioners from more than 160 countries and international institutions through innovative peer to peer learning and collaboration via forums and networks. www.ledsgp.org