

Notes From The Field

Including mangrove forests in REDD+

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Key Messages

- REDD+ preparations have focused on forests on dry land, but recent studies show the carbon sequestration potential of mangrove forests in coastal swamps.
- Mangroves also benefit coastal communities, particularly the fishing trade. Yet few carbon certification schemes under REDD+ are open to mangrove forests due to a lack of carbon models for their deep sediment.
- This policy brief, based on findings from a project in Kenya, suggests that existing social carbon standards are suitable for mangrove forest REDD+ projects.

Reduced Emissions from Deforestation and Degradation (REDD+) aims to give developing countries a financial incentive to protect their forest and lower their greenhouse gas (GHG) emissions. REDD+ discussions and preparations have, until recently, centred on terrestrial forests. A recent study, however, showed that mangrove forests in coastal swamps may contribute up to 10% of total global deforestation emissions, despite covering just 0.7% of tropical forest area.

Despite their impact on emissions, there are few REDD+ mangrove projects in preparation at national or sub-national scale. Their inclusion in REDD+ mechanisms is now being promoted by a number of organisations, including the United Nations Development Programme, Danone, Wetlands International, the International Union for Conservation of Nature and Ramsar through the Wetland Carbon Partnership.

There are several barriers to the inclusion of mangroves in REDD+. One is the lack of carbon accounting methodologies that could cater for the unique nature of mangrove forests under the various certification schemes.

Using Kenya as a case study, this paper examines the challenges of including mangroves in REDD+ and highlights emerging opportunities and their implications for coastal communities that have been by-passed by REDD+ preparations.

Key Terms

REDD+	Reduced Emissions from Deforestation and Forest Degradation, plus carbon stock enhancement, conservation of forest carbon stock and sustainable forest management
Mangrove	A tree or shrub that grows in tidal, coastal swamps in the tropics and subtropics, with many tangled roots that grow above ground and form dense thickets
GHG	Greenhouse gas
CDM	Clean Development Mechanism – one of the carbon trading mechanisms of the Kyoto Protocol

Mangrove forests: future potential and current benefits

Mangrove cover has fallen in the last 50 years as a result of coastal development, aquaculture, agriculture expansion, and the logging of mangroves for timber. In 2006, the Stern Review on the Economics of Climate Change estimated that global emissions from changes in land use changes (primarily deforestation) account for 18% of total GHG emissions (Office of Climate Change, 2006). A recent study suggests that up to 10% of these global forest emissions come from deforestation and degradation of mangrove forests, even though these cover just 0.7% of tropical forest area (Donato et al., 2011). Reversing mangrove deforestation and degradation is, therefore, vital to achieve forest-related emissions reductions, and to meet REDD+ objectives.

The protection of mangrove forests could have additional benefits. These coastal ecosystems provide ecosystem services for coastal communities, particularly for fisheries, as mangroves create a wide diversity of habitats for feeding, breeding, spawning and hatching. They are nurseries for fish and crustaceans that have commercial value, and their trees provide firewood, charcoal, timber and raw materials for paper and chipboard. Mangrove forests provide other socially and economically important materials such as medicines, dyes and fodder for livestock. They also act as important biological filters and as a sink for pollution.

Kenya, mangroves and REDD+

Mangroves are an important resource in coastal Kenya for timber and non-timber products (Kairo *et al.* 2001). Their timber is used for firewood, construction materials and charcoal.

Even though the mangroves of Kenya became official government reserves in 1932, they are under threat from resource extraction and from tree-felling to clear areas for agriculture, aquaculture, salt-production, urban development and the diversion of freshwater. Kenya saw a 15% loss in mangrove coverage between 1981 and 2000.

A pilot mangrove REDD+ project at Gazi Bay, 60km south of Mombasa, provides insights into whether mangrove-based REDD+ projects are feasible and their potential benefits for surrounding communities. This is a relatively small area of mangrove forest (600 hectares) but an important one, with many households reliant on the income generated from mangrove timber and other products (Rönneback et al., 2007). This policy brief is informed by the project's findings and progress in achieving certification under Plan Vivo, a certification scheme available within the voluntary carbon markets (Box 1).

Box 1: Plan Vivo

Plan Vivo certificates are issued for projects that support the long-term sequestration of carbon dioxide while also providing environmental and social benefits. The scheme was developed by the Edinburgh Centre for Carbon Management as an output of a research project in Mexico in 1994. Plan Vivo projects can undertake the following REDD+ activities: afforestation and agroforestry, forest conservation, restoration and avoided deforestation. The projects are intended solely for community-focused forestry projects, with communities expected to lead project design and implementation. Once a Plan Vivo project is certified, a Plan Vivo certificate is issued and sold on behalf of producers by the Project Coordinator.

Barriers to mangrove inclusion in REDD+

Afforestation and reforestation projects – including those for mangrove forests – are eligible for certification under the Clean Development Mechanism (CDM). There has been a recognised methodology for the inclusion of small-scale mangrove projects under CDM since 2007, and for large-scale projects since 2011. Despite this, as of October 2011 there were no registered mangrove CDM afforestation/reforestation projects. This is the result of a number of key issues.

Lack of appropriate certification methodologies:

REDD+ has the potential to lower emissions by giving developing nations financial incentives to protect their forests. There are many certification schemes and carbon accounting methodologies already certified for terrestrial forest REDD+ projects. However, there is only one REDD+ certification scheme (Plan Vivo - see box 1) that accepts mangrove forest for certification.

Hectare for hectare, the carbon reserves within mangrove forests are thought to be far greater than those within terrestrial forests (Donato et al., 2011), given their deep, carbon-rich sediments. Unfortunately, there is no carbon certification methodology currently available that includes this 'below-ground' carbon in its accounting. Even though Plan Vivo accepts mangrove forest REDD+ projects, it still only includes the value of 'above ground' carbon, which limits the financial incentives that can be achieved.

A complex institutional landscape:

The institutional landscape for mangrove management is often complex. Mangrove management is rarely covered by one specific national policy, with numerous policies covering the various benefits provided. For example, forest policy deals with timber products, fisheries policy deals with aquatic biodiversity, climate change policy will sometimes deal with carbon sequestration potential and ability to absorb sea level rises, and coastal defence policies deal with the shoreline protection provided by mangroves. With no one Ministry taking responsibility for their management, mangrove forests can come under real pressure.

Lack of understanding of mangrove deforestation rates:

As part of national preparedness for REDD+, large investments have been made to assess rates of deforestation to create a baseline for future activities. However, few countries have included mangroves in national baseline inventories or ongoing monitoring, reporting and verification (MRV) systems. As a result,

REDD+ projects in mangrove forests are far more costly, as the MRV of emissions needs to be factored into ongoing management costs.

In Kenya, researchers from the Kenya Marine and Fisheries Research Institute have been using GIS mapping to assess deforestation rates in mangrove forests to create a baseline. This means mangroves can be included under any national REDD+ strategy in Kenya, greatly improving the potential for REDD+ in mangrove forests.

Opportunities to promote REDD+ in mangrove forests

The causes of deforestation and forest degradation are similar in terrestrial and mangrove forests:

Achieving certification under REDD+ requires project developers to have a good understanding of the drivers of deforestation in the target area. REDD+ projects need to show that they can reduce or remove these drivers. In Kenya, the drivers of mangrove deforestation are similar to those for terrestrial forests, with mangrove cover being lost through the legal and illegal extraction of mangrove wood for timber and fuelwood. To achieve Plan Vivo certification, a project must set sustainable extraction levels that are then managed by the forest community. In the case of Kenya, a Community Forest Association will manage the mangrove forest.

REDD+ projects in mangrove forests need to be designed to address the socio-economic context of coastal communities:

Any REDD+ project in a mangrove forest will need to tackle the challenges specific to coastal communities. In Kenya, for example, communities living in and around mangrove forests rely on fisheries for their income. Artisanal fisheries in Kenya are highly seasonal, with stronger trade winds in winter preventing smaller vessels from reaching offshore fishing grounds where larger fish can be caught. Boats are confined to in-shore fishing where catches (and fish) are smaller. As a result, coastal communities experience real highs and lows in their income. Deforestation is linked to these highs and lows, with the poorest households reverting to land-based ways to earn a living during the low season, including destructive activities in the mangrove forest, such as tree-felling for timber and charcoal. This seasonal poverty is also linked directly to the health of fish stocks, both offshore and inshore.

Coastal communities in Kenya tend to have a low level of land ownership. As a result, many of the livelihood strategies they use rely on extraction from common, pooled resources (for example the sea), privately owned resources (for example coconut plantations) or state-owned and managed resources (for example the mangrove forest). Incorporating the mangrove forests into a Kenyan REDD+ project will require some balancing of social needs, as there are limited alternative resources available to these communities.

The Kenya case study shows that households that own little or no land have few alternative livelihood strategies and that there is a real risk of the extraction of mangrove wood for firewood and timber following poor fishing seasons. It is largely the poorest households that extract wood at these times, with the timber and charcoal often sold on to richer households.

Social carbon certification schemes appear suitable for assessing social impacts in mangrove communities:

In addition to various certification schemes to assess carbon in forests, there are some standards to secure positive social benefits for local communities through REDD+ certification (such as Climate, Community and

Biodiversity Standards, the Social Carbon Standard and Plan Vivo). The Kenyan case study shows that existing social carbon certification schemes are relevant to mangrove forests, as they are flexible in their approach to assessing social impacts and, as mentioned, the drivers of mangrove and terrestrial deforestation in Kenya are largely the same. These certification schemes do not focus solely on incomes generated from forests, and are, therefore, suitable for mangrove forests.

REDD+ projects can provide social benefits but need safeguards to protect the poorest households:

REDD+ projects implemented in mangroves are expected to provide financial benefits that could, if distributed carefully, deliver wider social benefits such as poverty alleviation within the project area.

In Kenya, the case study project is still in the development stage but is expected to strengthen community resources. For example, the distribution of financial rewards for avoiding deforestation is expected to contribute to common pool resources owned by the community, such as an improved school building, and investment in village infrastructure such as electrification and improved sanitation. This common benefit, however, may not be sufficient to offset the shocks felt at household level, particularly for poorer households that rely on the mangroves for income generated through charcoal and timber extraction. In its current form, therefore, the planned distribution of benefits will not compensate the poorest households for avoiding deforestation.

The poorest households may lose income if the REDD+ project succeeds in implementing strong community governance over the protected mangrove forests. Weak community governance, however, would make it harder for a REDD+ project to reduce deforestation and degradation to target levels, undermining the chances of achieving the expected financial benefits.

Safeguards have been suggested for the Kenya project to avoid these problems. These include: microfinance and/or alternative livelihood schemes to compensate households for loss of income; the integration of customary use into the management plan to allow communities to use the mangroves for firewood extraction; and the introduction of fuel efficient stoves to reduce the community's charcoal needs. Such safeguards could be introduced elsewhere, and are very similar to those introduced in terrestrial REDD+ projects.

The link between destructive activities in the mangrove forest and fish stocks matters:

If poor households can no longer exploit the mangroves (for charcoal and timber for construction) protected under REDD+ in years with poor fishing seasons, their incomes will, almost inevitably, fall. In Kenya, the project team is implementing projects alongside the mangrove REDD+ project, such as casuarinas plantations, to address this issue. These plantations will provide alternative timber for households and, if well managed, could provide sufficient timber for the communities to sell to others outside the project area.

Recommendations

There are existing obstacles to the implementation of REDD+ in mangrove forests including: lack of acceptable carbon accounting; a complex policy landscape; and limited understanding of deforestation in mangroves. However, all of these obstacles can be overcome and, with careful investment, the protection of mangrove forests is possible and has the potential to make a major contribution to lower global emissions from deforestation.

Further research into carbon accounting methods that include the carbon stored beneath mangrove forests could greatly improve the financial incentives available for protection of mangrove forests.

Protecting mangrove forests through their inclusion under REDD+ could provide financial benefits to coastal nations and communities. A greater understanding of the social benefits and impacts of REDD+ in coastal communities is possible through existing social carbon schemes, given their flexibility.

To review risk in a REDD+ mangrove forest project it may be necessary to review the health of fish stocks. Mangrove communities with declining fishing stocks and poor fisheries management are likely to see greater diversification of land-based activities in the future.

In general, Kenya's coastal communities own little land. With limited access to private or communal land, illegal extraction from private or government forests (mangrove and terrestrial) is a common way to earn a living. The implementation of a REDD+ regime must, therefore, take into account the limited access to alternative forms of livelihoods in coastal zones and ensure that communities receive full compensation.

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