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Linking Mitigation and Adaptation in Carbon Forestry Projects: Evidence from Belize

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Summary. — Committed action to deal with climate change requires reducing greenhouse gas emissions, i.e., mitigation, as well as dealing with its ensuing consequences, i.e., adaptation. To date, most policies and projects have promoted mitigation and adaptation separately, and they have very rarely considered integrating these two objectives. In this article, we develop a multi-dimensional framework to explore the extent to which climate mitigation forestry projects bring adaptation concerns into their design and implementation phases, using three Belizean projects as case-study material. We demonstrate that linking mitigation and adaptation has not been possible, because the mandate of forest carbon markets does not incorporate adaptation concerns. The projects' contribution to forest ecosystems' adaptation, for instance, by reducing human encroachments and by increasing ecosystem connectivity, has been limited. The projects' contribution to improve local livelihoods has also been limited, and projects have even been contested by neighboring communities on the grounds of tenure conflicts and food security concerns. Furthermore, the projects' mitigation potential is constrained by their poor additionality and lack of rigorous enforcement. We then conclude that the integration of mitigation and adaptation in Belize's carbon forestry projects remains a laudable but elusive goal. Consequently, we request climate change donors to refrain from providing support to narrowly designed projects and we urge them instead to promote more holistic and territorial-based approaches targeting both mitigation and adaptation goals.

Key words — climate change, REDD+, validation, additionality, livelihood, development

1. INTRODUCTION

The latest IPCC report (2014) states that both mitigation and adaptation actions are required to respond effectively to climate change. In some instances, adaptation measures can purposively or indirectly foster mitigation, or vice versa, resulting in positive outcomes regarding both objectives and contributing to climate resilient pathways (Denton *et al.*, 2014; Fleurbaey *et al.*, 2014). However, mitigation and adaptation measures often differ in both sector and scale of implementation, as well as in assessment periods and metrics. For example, while emission-reduction projects and programs are often targeted at energy-intensive activities, with impacts expected in relatively short periods of time, adaptation actions can be more diverse in their aims, expectations, and evaluation criteria, with varying degrees of involvement by public, private, and civil-society sectors, as with the construction of sea defenses or the take-up of drought-resistant seed varieties by local farmers. These differences explain why mitigation and adaptation have traditionally been distinguished as separate domains (Klein *et al.,* 2005; Swart & Raes, 2007; Tol, 2005).

Integrating mitigation and adaptation should nonetheless remain a relevant concern in forestry and agriculture, where combining them appears to be essential in order to prevent 'maladaptation' and 'malmitigation' and produce synergies instead (Kongsager *et al.,* in press). Forestry projects are relevant to both mitigation and adaptation, with potential synergies or trade-offs (Illman *et al.*, 2013; Locatelli *et al.*, 2011; Matocha *et al.*, 2012; Ravindranath, 2007). Concerning mitigation, land-use changes contributed to 12.5% of global carbon emissions from 1990 to 2010, mainly through tropical deforestation (Houghton *et al.*, 2012). Regarding adaptation, measures are needed to adapt forests to future climates, since forest ecosystems can be vulnerable to climate variability and climate change (Keenan, 2015; Reyer *et al.*, 2009). In addition, forests contribute significantly to rural livelihoods in many countries (Angelsen *et al.*, 2014) and so are central to the adaptive strategies of local communities. For example, forests provide ecosystem services that reduce the vulnerability of local communities and the wider society to climate variations (Pramova *et al.*, 2012).

However, Kongsager *et al.* (in press) show that linking mitigation and adaptation in agriculture and forestry projects worldwide has not yet been realized in practice, even though approaches to 'climate-smart' development are proliferating (Someshwar, 2008). Research to establish the conditions under which mitigation and adaptation can be effectively integrated is required (Dang *et al.*, 2003; Duguma *et al.*, 2014; Locatelli *et al.*, 2011; Verchot *et al.*, 2007), but case studies of the actual or potential integration of mitigation and adaptation in land-use projects are lacking. Knowledge is thus needed to contribute to the growing number of studies documenting

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the outcomes of projects and programs under the Reducing Emissions from Deforestation and forest Degradation initiative, including the enhancement of carbon stocks and of sustainable forest management (REDD+) (Caplow *et al.*, 2011; Merger *et al.*, 2012; Murdiyarso *et al.*, 2012; Mustalahti & Rakotonarivo, 2014).

In this article we look at carbon forestry projects through the lens of adaptation, examining in particular the linking of mitigation and adaptation in three projects in Belize. The adaptation lens was chosen because a lack of social and ecological adaptation is likely to limit the mitigation success of forest carbon projects (Reyer *et al.*, 2009). Here we develop an analytical framework to study mitigation and adaptation linkages, relying on both qualitative and quantitative data from project documents and interviews to inform our research. We hypothesize that the separation of mitigation and adaptation in policies and funding is mirrored at the project level and that there is great potential for increasing this integration, but that incentives to harness synergies and avoid trade-offs between mitigation and adaptation may be insufficient. Hence, we aim to understand: (1) if adaptation is relevant in forestry carbon sequestration projects in Belize; (2) if such projects include adaptation in their design and implementation; and 3) what the motivations are for including or excluding adaptation concerns.

2. A FRAMEWORK FOR EXPLORING ADAPTATION IN LAND-USE CARBON SEQUESTRATION PROJECTS

In the early 1990s, the United Nations Framework Convention on Climate Change (UNFCCC) laid the foundations of carbon markets and promoted the idea that carbon emitted in developed countries could be offset by emission reduction projects in developing countries. The UNFCCC Activities Implemented Jointly pilot phase represented a learning-by-doing period in the implementation of carbon offsetting projects, which increased in number and scope with the enactment of the Kyoto Protocol's Joint Implementation and Clean Development Mechanism (CDM) programs and the emergence of voluntary carbon markets (Corbera *et al.*, 2009). Project development in both markets has been refined over time, and project developers have increasingly adopted independent standards either to inform the development of their projects, particularly in the voluntary market segment, or to reinforce their environmental and social value in the CDM market.

The most commonly applied standards used in marketing carbon credits from forestry projects are the Verified Carbon Standard (VCS) and the Climate Community & Biodiversity Standard (CCB) (Kongsager *et al.*, in press). These standards add value to the offsetting activities supported voluntarily by private and public companies or individual citizens. A combination of VCS and CCB is preferred today in voluntary forestry projects that cover a wide range of activities, from avoided deforestation projects that have never been eligible under the CDM to afforestation and reforestation activities (Boyd *et al.*, 2008). In the past, research revealed challenges regarding the potential for leakage, permanence, additionality, reference levels, monitoring, and verification in forestry projects, particularly in those geared at conserving rather than enhancing standing biomass (Angelsen *et al.*, 2014). In the last few years, and in the context of a flourishing REDD+ framework, the adaptation agenda has increased in relevance in the standards' procedures, for example, the CCB now requires social and/or ecological adaptation to be addressed in order to obtain Gold Level certification (Narasimhan *et al.*, 2014). This quest for integration should be seen as a signal that both developers and market players are recognizing that forest ecosystems and communities (inside the project area or in its buffer zones) will most likely need to adapt to climate and other stressors over the project's lifespan.

To investigate the inclusion of adaptation in carbon forestry projects and to investigate systematically which aspects of adaptation are affected by a land use-based carbon forestry project, we have developed an analytical framework (Figure 1) which moderates the aspects from Kongsager *et al.* (in press). The first analytical dimension concerns mitigation activities, understood as anthropogenic interventions to reduce the sources or enhance the sinks of greenhouse gases and to provide global benefits in the long term (IPCC, 2007). Since mitigation is considered the main driver of implementation in carbon forestry projects, it figures superior in our framework. Below mitigation we have clusters of adaptation, understood as adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects to provide essentially local benefits in both the short and long term (IPCC, 2007), as well as broader actions that make ecosystems and societies more robust to changes, including, but not limited to, those caused by climate change (Pielke, 2005; Pielke *et al.*, 2007). In this regard, our framework distinguishes clusters related to (i) ecological adaptation and (ii) agricultural systems adaptation, together with another cluster related to (iii) the livelihood, institutional and well-being aspects of buffering communities (labeled social adaptation). The latter refers to aspects that determine people's potential and willingness to develop mitigation activities, which in turn influences their vulnerability and adaptive capacity to environmental and climate change.

The aspects identified under each of the four clusters correspond to those identified in the literature as activities that can potentially be included or affected by the implementation of land use-based carbon forestry projects. These involve six aspects for mitigation, four for ecological adaptation, four for agricultural adaptation, and ten for social adaptation (see Online Resource 1 for further details of each aspect). The references chosen for each aspect include the two most recent IPCC reports (AR4: 2007 and AR5: 2014) and other published review papers, which were accompanied with a few more specific papers to cover certain topics. For instance, Börner and Wunder (2012) helped substantiate the mitigation effects of different forest and agriculture conversion opportunities, while Ravindranath (2007) provided evidence of the mitigation, biodiversity, and socio-economic impacts of 24 different activities, practices, and management systems in the forest sector.

It is well known that land-use mitigation activities can result in both additional benefits and in costs for social-ecological systems. For instance, agroforestry activities can contribute to reducing emissions by sequestering carbon dioxide while promoting landscape biodiversity and resulting in socio-economic benefits for land managers (e.g., Ravindranath, 2007, p. 847). In contrast, other forest conservation activities can also result in positive ecological outcomes, such as avoiding soil erosion or conserving certain species, but they can be detrimental for local populations if they restrict access to land and resources and increase people's vulnerability (Pramova *et al.*, 2012, p. 590). Forest plantations, in turn, can reduce groundwater availability and increase soil pollution, but simultaneously also result in jobs and increased income for local populations. These interactions are indicative of the fact that the mitigation activities considered by our framework might not result in positive outcomes across the three adaptation dimensions and their constitutive elements. These outcomes are likely to be moderated by the