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Value chains for bio-carbon sequestration services: Lessons from contrasting cases in Canada, Kenya and Mozambique

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ABSTRACT

One way to mitigate greenhouse gas emissions is to provide incentives to forest and farm mangers for adopting practices that store greater amounts of carbon in trees and soils. There is strong interest in the use of carbon finance in agriculture and forestry, particularly in developing countries where large proportions of total emissions are land-based, and where there is good technical potential to turn carbon sources into carbon sinks. The development of mechanisms to incentivize bio-carbon storage is limited, however, by the dearth of working examples. In Africa, for example, the few bio-carbon projects that have been put in place have been financed through the voluntary market or the World Bank BioCarbon Fund. One of the few compliance-based offset programs in the world that allows bio-carbon offsets operates wholly in the province of Alberta, Canada. In this paper we draw lessons from a comparative analysis of the Alberta experience with projects in Mozambique and Kenya. The analysis is based on a conceptual framework of actors, functions and incentives in the bio-carbon offset value chain. We identify key success factors in the three cases and conclude that scaling up of successful project experience will require reliable sources of carbon finance, clear institutional frameworks, and much greater participation by both public and private-sector actors in all phases of the bio-carbon value chain.

Introduction

It has long been known that the world's trees, forests and soils store large amounts of carbon. Depending upon their use and management, those bio-carbon stores can be expanded or contracted, sequestering or releasing large amounts of carbon to the global atmosphere. Pan et al. (2011) estimate that between 1990 and 2007, deforestation of tropical forests was the source of 2.9 billion tonnes of carbon emissions per year, while re-growth of tropical forests sequestered 1.6 billion tonnes of carbon emissions per year, resulting in net emissions of 1.3 billion tonnes per year. This is a large proportion of the global total emissions. During the same period, total emissions from fossil fuel and cement were estimated to be 6.9 billion tonnes per year.

Until recent years, the sequestration, storage and loss of bio-carbon was of scientific interest, but was given insufficient attention by the climate policy community. In fact, the Clean Development Mechanism of the Kyoto Protocol (CDM) placed severe limits on the amounts of carbon credits that could be generated through afforestation and re-forestation, while the European Union Emission Trading Scheme (ETS) continues to deliberately rule out the possibility of bio-carbon credits. In the much smaller voluntary carbon offset market, by contrast, bio-carbon offsets account for a significant proportion of all offsets (Peters-Stanley et al., 2011).

Deliberate avoidance of bio-carbon offsets began changing in climate change policy debates in 2005. Since the 11th meeting of the UNFCCC Conference of Parties in December 2005, the policy community has increasingly focused its attention on the possibility of performance-based payments to developing countries that Reduce Emissions from Deforestation and forest Degradation, and enhance forest carbon stores through forest conservation and re-forestation (REDD+). Interest in REDD+ was bolstered in 2006 when the influential Stern Commission Report on the economics of climate concluded that reduced emissions from deforestation would be a relatively inexpensive and immediate approach to reducing net greenhouse gas emissions to the global atmosphere (Stern, 2006).

Support for REDD+ has been near-unanimous among UNFCCC Parties and international organizations since 2009. While there were few tangible products from the 15th meeting of the Conference of Parties in Copenhagen in 2009, there was resounding support for early international action on REDD+. An inventory compiled by Cerbu et al. (2011) found 100 REDD demonstration activities and 79 REDD readiness activities as of mid-2010. Corbera and Schroeder (2011) and Angelsen et al. (2009) have outlined the institutional dimensions of REDD+ while Peters-Stanley et al.

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(2011) report that credits from REDD+ are now the largest component of the voluntary carbon market. As of the end of COP17 in December 2011, the main outstanding issue regarding the long-term future of REDD+ in the UNFCCC process was how to secure adequate long-term financing from markets and/or funds. The REDD+ Partnership of national investors in REDD+ has made some headway in mobilizing financial support where eight countries together contribute nearly 4 billion directly to developing country governments and $4 billion to institutions involved in REDD+ (http://reddpluspartnership.org/en/, http://reddplusdatabase.org/ accessed December 15, 2011).

The attention given to REDD+ has spilled over to reconsideration of mitigation in the whole agriculture, forestry and land use sector (AFOLU). Policy processes are now giving serious consideration to possibilities for compensating farmers for undertaking practices that reduce emissions and sequester carbon in soils, within the context of Nationally Appropriate Mitigation Actions (UNFCCC, 2010, Section IIIB). Soil scientists such as Lal (2004) and Smith et al. (2008) have highlighted the problem of soil carbon loss in developing countries, the large untapped potential for changes in agricultural practices to rebuild soil carbon while mitigating CO_2 emissions, and the potential beneficial effects of enhanced soil carbon on agricultural production. Conservation agriculture and agroforestry are practices frequently associated with soil carbon sequestration, although scientific knowledge about the potential for carbon sequestration in different agricultural systems and contexts is still very incomplete (Nair et al., 2009; Govaerts et al., 2009). An attempt to redress this information gap is the Global Research Alliance on Agricultural Greenhouse Gases, which supports collaborative research on the potential mitigation impacts of agricultural practises (http://www.globalresearchalliance.org/, accessed December 15, 2011).

Campbell (2009) summaries progress with REDD+ and cautions that there may be unintended negative effects associated with payments for carbon sequestration in agriculture. Expansion of agriculture remains the main source of deforestation pressure in much of the developing world, especially in Africa: interventions that enhance the profitability and productivity of agricultural systems can have the unintended consequences of encouraging greater deforestation. Others, such as FAO (2010) propose that carbon finance could be used to motivate farmers to invest in 'climate-smart' agricultural systems that increase productivity, improve resilience, reduce greenhouse gas emissions, and enhance soil carbon. Agroforestry and conservation agriculture are again noted as the main examples of climate-smart agriculture. Concerns about the relatively weak knowledge base regarding the technical opportunities for carbon sequestration in agriculture are still a major constraint to agricultural bio-carbon being embraced by the EU Emission Trading Scheme and the Clean Development Mechanism.

The lack of working models is another important constraint. Until 2011, the province of Alberta, Canada has been the only compliance-based emission offset mechanism that allows soil carbon offsets. In August 2011, the Australian parliament passed legislation establishing a national-level Carbon Farming Initiative to regulate "the creation and trade of carbon credits from farming and forestry" (http://www.daff.gov.au/climatechange/cfi, accessed December 15, 2011). At its COP17 in Durban, the UNFCCC resolved to give agriculture more focused consideration, including the compilation of views, the development of a technical paper, and an expert workshop as input into deliberations by the Subsidiary Body for Scientific and Technical Advise (SBSTA) at its next meeting (UNFCCC, 2011).

At the same time as the climate policy community continues to discuss the technical and economic potential of bio-carbon sequestration in trees and soils, advocacy groups are aligning to either promote or oppose the possibility of using carbon finance to promote bio-carbon sequestration. Many remain concerned that there are too many obstacles to devising the institutional framework that will facilitate compensation mechanisms for bio-carbon that are effective, efficient and fair. Sceptics worry that bio-carbon mechanisms will disenfranchise poor land and forest users on one hand, while reducing the motivations and incentives of those responsible for GHG emissions on the other (e.g. Thompson et al., 2011). Sceptics also worry that farmers will be given financial windfalls and that regulated emitters will choose offsets as an easy way out. Optimists contend that bio-carbon mechanisms can bring new policy attention, resources and transparency to the forestry and agriculture sectors, with multiple benefits for farmers and forest managers (e.g. Kanowski et al., 2011). While sceptics rightly point out that there is scant evidence of functional bio-carbon mechanisms anywhere in the world, optimists tend to find inspiration in the small number of programs and projects that have been implemented. Overall, we contend that too little attention has been given to understanding and analysis of the multiple roles of intermediary and regulatory agencies. Important lessons about the roles of intermediaries can be learned from the small number of functional bio-carbon offset mechanisms.

This paper draws together lessons from three different contexts in which functional mechanisms for bio-carbon have been put in place: one financed through a provincial compliance mechanism in the Canadian province of Alberta, one financed through the international voluntary market in the Sofala province of Mozambique, and one financed through a mix of public and private funding managed by the World Bank BioCarbon Fund in western Kenya. This unorthodox comparison requires a robust conceptual framework. The paper thus makes two contributions to the international literature: an analytical framework that can be used to frame similar studies in other regions of the world and lessons from comparative case studies in sharply contrasting institutional contexts. Information for the cases is drawn from a mix of peer-reviewed papers, project documents and presentations, and the authors' personal knowledge of the three cases. We contend that the three cases together illustrate the design features of a large proportion of the carbon offset mechanisms involving agriculture and forestry anywhere in the world.

Conceptual framework: value chain analysis

Value chain analysis (VCA) is widely used to analyze flows of products in which buyers are willing to pay not just for the functional and visual attributes of the product itself, but also for the way that the product is produced, processed, transported and made available to consumers (Porter, 1985). VCA is most often used to assess the performance of value chains involving physical products such as coffee: coffee value chains differ greatly in the extent to which the product availed to consumers can be traced back to the original suppliers and the production process used by those suppliers. In recent years researchers involved in REDD+ research and development have begun to develop and apply the concept of the REDD+ Value Chain. Bumpus and Liverman (2008) take a VCA approach in their analysis of governance structures in carbon offset markets, particularly the Clean Development Mechanism and the voluntary carbon offset market. Suyanto et al. (2009) also took a value chain approach in their analysis of 'fair and efficient REDD value chains' in Southeast Asia, while Schneider et al. (2010) use VCA to analyze the structure of value chains and business models of organizations involved in Clean Development Mechanism projects. Schneider et al. (2010) analyze data from the CDM Bazaar and semi-structured interviews to identify seven major functions performed in offset value chains as well as nine business models of businesses