



CGIAR systemwide program on
COLLECTIVE ACTION AND
PROPERTY RIGHTS

CAPRI Working Paper No. 107

October 2012

INSTITUTIONS FOR AGRICULTURAL MITIGATION: Potential and Challenges in Four Countries

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Cite as:

Bryan, E., A. De Pinto, C. Ringler, S. Asuming-Brempong, M. Bendaoud, L. Artur, N. Givá, D. T. Anh, N. N. Mai, K. Asenso-Okyere, D. B. Sarpong, K. El-Harizi, T. van Rheenen, and J. Ferguson. 2012. Institutions for agricultural mitigation: Potential and challenges in four countries. CAPRI Working Paper No. 107. Washington, D.C.: International Food Policy Research Institute.
<http://dx.doi.org/10.2499/CAPRIWP107>.

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ABSTRACT

The agriculture sector has great potential to contribute to the mitigation of greenhouse gas emissions through changes in agricultural management and land use. However, the technical potential for agricultural mitigation has yet to translate into actual emission reductions due to considerable constraints to the generation of emission offsets through agricultural projects. These constraints include national and subnational policies and institutional structures as well as institutional and resource constraints at the local level, such as lack of knowledge, organizational capacity, and start-up finance. This paper explores the institutional barriers to agricultural mitigation in four developing countries: Ghana, Morocco, Mozambique, and Vietnam. The findings show that the institutional environment greatly influences the capacity to engage in agricultural mitigation activities. In particular, the centrally planned system in Vietnam provides little space for local, community-based organizations to act collectively around issues of mutual interest, making it difficult to engage numerous smallholders in agricultural mitigation projects. At the same time, government-led mitigation projects may be more feasible in Vietnam compared to the African case studies, where the governments lack well-defined and coordinated strategies and regulations to support mitigation. Governance of contractual obligations is also a challenge to agricultural mitigation. While several organizations in the case study countries have relevant experience for organizing smallholder farmers, most of these organizations lack technical expertise in carbon markets, have limited knowledge of strategies for agricultural mitigation, and lack resources needed for start-up and implementation of mitigation projects.

Keywords: climate change mitigation, agriculture, institutions, Ghana, Morocco, Mozambique, Vietnam

ACKNOWLEDGMENTS

The authors gratefully acknowledge the generous funding from the International Fund for Agricultural Development (IFAD) in support of this research. This project was conducted under the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

Table of Contents

1. Introduction	1
2. Institutions for agricultural mitigation	3
3. Framework for evaluating institutional potential for agricultural mitigation in case study countries	6
4. Case Studies.....	9
5. Conclusions	31
Appendix 1: Summary Table of Institutional Potential for Agricultural Mitigation ..	33
Appendix 2: Guiding Questions for the Assessment of Organizational Capacity	37
References	41

INSTITUTIONS FOR AGRICULTURAL MITIGATION:

Potential and challenges in four countries

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1. INTRODUCTION

While market-based climate change mitigation efforts have focused on the energy, transport, and industrial sectors, numerous studies in recent years have touted the potential for agricultural mitigation through carbon markets (Smith et al. 2007, Bryan et al. 2010; Lipper, Dutilly-Diane, and McCarthy 2010). Agriculture not only contributes 15 percent of global emissions of greenhouse gasses (28 percent when land-use change and forestry are included) (WRI 2011), but also has the capacity to absorb or “sink” carbon emissions through the adoption of a range of management practices and crop choices. Opportunities for agricultural mitigation fall into 3 categories: reducing emissions, avoiding or displacing emissions (such as avoiding the expansion of agricultural lands through intensification practices), and enhancing removals of carbon from the atmosphere (Smith et al. 2008).

Sequestering carbon in agricultural soils through cropland management strategies, such as nutrient management, tillage/residue management, and use of improved crop varieties, is one of the most promising methods for agricultural mitigation, accounting for around 90 percent of total mitigation potential (Smith et al. 2007; Smith et al. 2008). Grazing land/pasture management strategies such as optimal grazing intensity, fire management, and grass species introduction as well as livestock management (destocking, breed/species selection, and feeding practices) and manure management strategies can also reduce emissions (Reid et al. 2004; Smith et al. 2008; Thornton and Herrero 2010; Fornara et al. 2011). The restoration of degraded lands, for example, through reforestation/agroforestry practices, re-vegetation, and applying nutrient amendments, also offers an important source of agricultural mitigation (Smith et al. 2008) as do efforts to reduce methane emissions from rice production (Wassmann, Papen, and Rennenberg 1993; Towprayoon, Smakgahn, and Poonkaew 2005; Yagi 2006).

At the same time, agriculture is particularly vulnerable to climate change impacts and adaptation of the sector is imperative to ensure food security and protect the livelihoods of poor producers in developing countries. Fortunately, many of the management practices for agricultural mitigation also provide significant benefits to smallholder farmers and pastoralists by increasing resilience to climate change and variability, productivity, and in some cases even net profits from agricultural production (Lal 2004; La Rovere, Avzaradel, and Monteiro 2009; FAO 2009; Lipper, Dutilly-Diane, and McCarthy 2010; Bryan et al. forthcoming).

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Despite these multiple benefits, carbon markets have not yet brought the technical potential for agricultural mitigation to fruition due to constraints on both the demand and supply side in terms of limited market opportunities and constraints to project implementation. Experts commonly see carbon markets as having the potential to mobilize public and private capital to help the promotion of green growth policies and facilitate the adoption of agricultural practices and inputs that cause a net reduction in GHG emissions (FAO 2009; Tubiello et al. 2009; Burns, Guimaraes, and Streck, 2012). Carbon trading can take place in the several different markets that have developed both within and outside the Kyoto Protocol. These schemes use market-based mechanisms that allocate and trade carbon credits, which represent a reduction of GHG emissions. Project-based transactions mainly take place under the Clean Development Mechanism (CDM) of the Kyoto Protocol as well as in several voluntary markets, for example the Voluntary Carbon Standard (VCS), the Gold Standard, and the American Carbon Registry.

Agricultural mitigation is often viewed as too complicated to include in many markets due to concerns about permanence, additionality, measurement uncertainty, leakage and high transaction costs, among others (Smith et al. 2007; Murphy et al. 2009). Thus, little demand for agricultural mitigation exists, leading to a concentration of efforts in the energy, transport, building, and industry sectors.

Furthermore, the politics of agricultural mitigation are complex. In recent years, many developing countries and even local communities have begun to push for incentives and assistance to participate in climate change mitigation. At the same time, other groups have argued that smallholder producers should not be asked to bear the burden of climate mitigation, which diverts attention from the need for adaptation; and that revenues from carbon markets would not reach small farmers (Climate Justice Now 2012; ActionAid 2011). However, this argument fails to recognize the multiple benefits of many agricultural mitigation efforts in terms of adaptation, mitigation, and the profitability of agricultural production discussed above. Negotiations over expanding opportunities for agricultural mitigation have intensified as a result of these discussions (Dodman and Mitlin 2011).

On the supply side, there remain considerable constraints to the generation of emission offsets through agricultural projects (Lichtenfeld 2007). These include national and subnational policies and institutional structures as well as institutional and resource constraints at the local level, such as lack of knowledge, organizational capacity, and start-up finance.

The agricultural sector must overcome these barriers if it is to contribute to climate change mitigation. While developing countries do not bear the responsibility for the current climate trajectory, they need to be part of the solution, including through changes in agricultural management, in order to achieve this goal.

There are many benefits of including agriculture in climate change mitigation efforts. Changes in land use and agricultural management provide low-cost mitigation opportunities. Furthermore, agricultural mitigation practices are in many instances superior, in terms of productivity and profitability, to conventional practices (Paustian et al. 2006, World Bank 2010) and could reduce encroachment on forested areas (Burney, Davis, and Lobell 2010; Thomson et al. 2010). Climate change mitigation in developing countries also has the potential to promote economic development when properly designed and implemented (Corbera, Brown,

and Adger 2007; Corbera, Gonzales Soberanis, and Brown 2009; Corbera and Brown 2010).

Studies report that weak legal institutions limit the possibility to implement carbon contracts and hinder farmers' participation in mitigation efforts and carbon markets (Antle and Diagana 2003). Lack of coordination and cooperation among different institutions and actors can cause conflicts and duplication of actions (Zhang et al. 2008). Furthermore, institutional mechanisms are needed for improved conflict management and negotiations among decisionmaking agents at multiple levels as well as for protection of marginalized group interests (Roncoli et al. 2007) and to limit the implementation costs of mitigation projects.

This paper explores the institutional framework for agricultural mitigation in four developing countries: Ghana, Morocco, Mozambique, and Vietnam. Section 2 reviews the literature on institutions for agricultural mitigation and discusses institutional constraints. Section 3 describes the framework used to assess the potential of local level institutions to facilitate agricultural mitigation. Section 4 applies the framework to the case study countries and Section 5 concludes.

2. INSTITUTIONS FOR AGRICULTURAL MITIGATION

Institutions are essential to translate technical potential for agricultural mitigation into actual mitigation services. The definition of institutions varies by discipline (Baker et al. 2006). In economics, institutions are viewed as the social, cultural, political, and economic structures that govern human interaction (Klein 2000). Institutions include both formal organizations as well as informal social and cultural norms of behavior (North 1990; Ostrom 2005). Williamson (2000) describes four levels of institutions: customary institutions (such as cultural norms and traditions), statutory institutions (such as environmental agreements, laws, and formal property rights), governance of contractual relations (meaning contracts translate formal rules into transactions), and incentive alignment.

Customary institutions, such as the degree of social capital, social customs, and norms, are more deeply ingrained in society than formal ones and change more slowly. For example, in Mozambique, although the government is attempting to formalize the country's traditional institutions by integrating local chiefs into the state administration and by enacting laws to prevent discrimination based on gender, religion, party affiliation, or social status, traditional social norms still dictate the general pattern of social exclusion and power relations to a large extent (Forquilha and Orre 2011; Machoche 2011).

Like customary institutions, statutory institutions influence the behavior of economic actors. These are the formal rules that make up the institutional environment at multiple scales. At the global level these include environmental conventions, such as the UNFCCC and the Global Environmental Facility (GEF 2011), and market mechanisms for trading emissions offsets. These institutions shape international engagement in mitigation activities and set the rules influencing supply of and demand for carbon offsets (Lauterbach 2007). At the regional, national, and subnational levels, policies and institutions further influence mitigation efforts (Smith et al. 2007). These include policies that directly aim to encourage mitigation such as the Nationally Appropriate Mitigation Actions (NAMAs) as well as other nonclimate policies that influence mitigation, including property rights

regimes (Markelova and Meinzen-Dick 2009), agricultural input and output price policies, and energy policy.

The third institutional level is represented by the governance arrangements required to implement economic actions within the framework of the institutional environment. In the case of agricultural mitigation, contracts are designed and implemented to compensate farmers for the opportunity costs involved in adopting a set of agricultural practices for climate change mitigation. These activities introduce additional costs to agricultural mitigation projects—transaction costs—which are likely to be significant. For example, Wunder and Alban (2008) estimate that transaction costs for monitoring, promotion, certification, and administration comprise 25 percent of reoccurring costs for a reforestation project in Ecuador.

The fourth level in Williamson's framework represents individuals responding to economic incentives. In the case of agricultural mitigation, farmers adopt mitigation practices when these practices maximize their benefits (Antle and Diagana 2003; Antle and Stoorvogel 2008). However, when the adoption of mitigation practices implies forgoing returns from more profitable activities, some form of compensation could be made available to farmers (Antle and Diagana 2003). For example, Gonzales et al. (2008) show that the inclusion of carbon payments makes the adoption of management strategies for agricultural mitigation more attractive for some farmers in the Upper West region of Ghana who would be unlikely to adopt such practices in the absence of these payments.

The literature on climate change mitigation projects in the agricultural and forestry sectors, climate change response capacity, and payments for environmental services highlights the potential institutional constraints to agricultural mitigation at each of the levels in Williamson's framework. At the first level, for instance, a community may have a low degree of social capital, little experience with collective action, and social norms which exclude certain segments of the population from decisionmaking. These constraints make organizing members of the community to act collectively and equally distributing benefits more difficult and costly. In other words, they increase the transaction costs involved in agricultural mitigation. While social change is possible over the long term, there is little that can be done in the short- to medium-term to change customary institutions (Williamson 2000). Therefore, mitigation schemes will necessarily have to take into account whatever customary institutions are found to exist, and to work with local institutions to carry out mitigation activities.

Numerous factors, international and national, influence the way in which societies respond to climate change, and the degree of emphasis on agricultural mitigation versus other priorities (Tompkins and Adger 2005). These include financial incentives (such as public and private investments, regulatory and voluntary markets, and certification schemes); climate and environmental policies; and nonclimate policies such as property rights regimes. Because global carbon markets have excluded many project classes related to agriculture, forestry and other land uses (AFOLU), many developing countries have found it difficult to participate in climate change mitigation efforts (Bryan et al. 2010). This is true especially for the regulatory markets under the Kyoto Protocol compared to the voluntary markets, which tend to permit a larger range of project types.

The degree to which policies in the agricultural, financial, and environmental sectors facilitate the flow of finance from the public and private sectors toward

agricultural development is also important (FAO 2009). In many developing countries, investments in agricultural development—such as extension and information services, the generation and dissemination of technologies, and the provision of key inputs—are insufficient to facilitate agricultural mitigation. Therefore, poor smallholder farmers lack the resources and support to engage in mitigation activities. Land tenure insecurity is also a critical issue that often deters adoption of practices for agricultural mitigation or prevents communities from benefitting from carbon offset projects (Corbera, Kosoy, and Martinez Tuna 2007; Markelova and Meinzen-Dick 2009; Corbera and Brown 2010).

Constraints to agricultural mitigation are also present in the type and size of economic incentives put in place to induce the adoption of agricultural mitigation practices. In some cases carbon payments are insufficient to cover the opportunity costs involved in changing practices. Even in cases where practices for agricultural mitigation increase net profits, farmers may still be unwilling or unable to adopt them. In developing countries, smallholder farmers must make decisions with incomplete information and limited access to resources, such as capital and inputs (de Janvry, Fafchamps, and Sadoulet 1991; Barrett 2008). In addition, evidence suggests that smallholder producers are not fully profit-maximizing but rather factor other considerations such as risk aversion (Binswanger 1980; Eswaran and Kotwal 1986; Carter and Barrett 2006) and consumption preferences (Singh, Squire, and Strauss 1986; Delforce 1994) into their production decisions. Moreover, farmers may not be willing to make medium- or long-term commitments if they perceive that the institutional framework, on which compensations are based, is unreliable.

Numerous barriers also exist at the third level of Williamson's framework. The activities involved in organizing, negotiating, managing, monitoring, and enforcing contracts for agricultural mitigation introduce significant transaction costs and act as potential barriers to the implementation of projects (van Kooten, Shaikh, and Suchanek 2002), particularly given weak international agreement on methods for measuring and monitoring offsets from agriculture, especially soil carbon (Torres, et al. 2010). Transaction costs increase the overall costs of engaging in agricultural mitigation and reduce the net benefits accruing to the individual farmers, thus affecting the overall feasibility of the project. However, while opportunity costs are often factored into economic analysis of mitigation activities (for example, Gonzales et al. 2008), transaction costs are more difficult to quantify and are often overlooked (Antle and Stoorvogel 2008). Transaction costs can be particularly high for annual crops and smallholder farmers. Projects for soil carbon sequestration require large areas and repeated implementation of the same agricultural and management practices over many years, thus increasing transaction costs.

While data on the start-up and implementation costs are limited, project-level data suggest that the transaction costs involved in agricultural mitigation projects are considerable. For example, FAO (2009) reports upfront costs ranging from \$12 to \$600 per hectare. In a review of the literature that reports CDM transaction cost estimates, Cacho (2009) finds that ex ante fixed costs vary from \$34,000 to \$280,000 (negotiation and project approval) and that ex post costs vary from some \$6,000 to \$280,000 (project monitoring, verification, and insurance).

The transaction costs are considerable because governance of agricultural mitigation projects, especially soil carbon sequestration, is particularly complex given the need for coordination from the local to the global level (Minang and McCall 2008), organizational capacity, collective action, institutional support, and resources, which often come from multiple sources (Lichtenfeld 2007; Shames and Scherr 2010). That is, agricultural management decisions typically taken at a micro level and over a short time horizon, such as minimum tillage or soil fertility management, must be adopted over a larger area of land and a longer time frame and involve a large number of farmers when implemented for agricultural mitigation in a developing country context.

Therefore, agricultural mitigation projects require organizational structures with significant technical and organizational capacity to aggregate a large number of smallholder producers, act as intermediaries between sellers and buyers, conduct baseline assessments, facilitate monitoring and verification of emission offsets, secure start-up finance, and ensure the equitable flow of sufficient benefits within the community (Dulal, Brodnig, and Shah 2011).

It is also important to keep in mind that transaction and opportunity costs as well as benefits vary across locations and institutional and environmental conditions (Tschakert 2004; Smith et al. 2008; Smith, Grant, and Desjardins 2009; Bryan et al. *forthcoming*). For example, a carbon project in Chiapas, Mexico, estimated that the socio-technical costs of capacity building varied from \$52 per hectare in communities with experience with community-managed projects to \$325 per hectare in communities with a high degree of communal divisions and social conflicts (de Jong et al. 2000). This suggests that projects for agricultural mitigation require different strategies, approaches, and institutional arrangements tailored to the local environment in which the projects operate (Quinn et al. 2007). Projects that may be economically viable in one location will be infeasible in another.

Since significant amounts of mitigations services are provided only over long periods of time, projects must also provide other benefits in terms of climate change adaptation, increasing productivity, and rural development in order to ensure sustainability over the long term (Laukkonen et al. 2009; Swart and Raes 2007). Long-term sustainability also depends on the degree of involvement of the community in the design and implementation of the project, the legitimacy and effectiveness of community representatives in securing sufficient benefits for the producers, and the degree to which the project meets the needs of the community, beyond market-based incentives (Pagiola et al. 2005; Boyd et al. 2007; Corbera, Brown, and Adger 2007; Corbera, Soberanis, and Brown 2009).

3. FRAMEWORK FOR EVALUATING INSTITUTIONAL POTENTIAL FOR AGRICULTURAL MITIGATION IN CASE STUDY COUNTRIES

In order to assess the potential for agricultural mitigation through carbon markets in the four case study countries, a set of indicators of institutional potential for agricultural mitigation were developed (Table 1). The analysis focuses on the institutional environment and governance arrangements (levels 2 and 3 of Williamson's framework) as these are areas that can be influenced more easily by policy and organizational changes. (A table in Appendix 1 summarizes the results for each country based on the set of indicators in Table 1.)

Table 1: Indicators of institutional potential for agricultural mitigation

Institutional environment	Regulatory institutions for environmental issues National strategies addressing climate change (adaptation/mitigation) Coordination among ministries System of property rights Availability of resources for climate change response Degree of investments in agriculture from government, NGOs, other sources Provision of inputs, such as equipment, fertilizer, labor and outputs Presence and effectiveness of extension and other advisory and information services
Governance	Technical capacity in Sustainable Land Management (SLM) and other strategies for agricultural mitigation Carbon technical capacity (aggregation, Monitoring Reporting, and Verification (MRV), establishing baseline, legal/contracting, and so on.) Organizational/management capacity Linkages with local communities/local legitimacy Ability to manage participatory design and implementation of projects Potential for securing upfront finance Long-term finance available

Source: Authors

The analysis of governance arrangements concentrates on the degree to which organizations already operating within the country have the capacity to address institutional constraints and to carry out the functions involved in designing and implementing agricultural mitigation projects and facilitating access to carbon markets. These functions were identified by Shames and Scherr (2010), based on an inventory of 81 agricultural greenhouse gas (GHG) mitigation projects in 24 countries in Sub-Saharan Africa. The authors identify governance structures for agricultural mitigation and the types of organizations filling the various roles (Table 2).

Organizational capacity was assessed using the conceptual framework provided by Lusthaus et al. (2002), which focuses on strategic leadership, structure, human resources, financial management, infrastructure, program management, process management, and inter-organizational linkages. A series of questions on climate change and market access were developed around each of these 8 focal areas and key informant interviews were carried out with those organizations considered to be most relevant in each country (see Appendix 2 for details on guiding questions used). There is some discrepancy in the methodology used to carry out the country analyses because the research in Vietnam was carried out at an earlier time than in Ghana, Morocco, and Mozambique.

Table 2: Agricultural GHG Project Institutions: Key Actors and their Functions

Actors	Examples	Roles/Functions
Credit/buyer	Individual air travelers US utilities for precompliance offsets Agribusiness to reduce carbon footprint Host country benefiting from NAMA credit	Create demand for carbon offsets
Project developer/investor	Development agencies (for example, World Bank Biocarbon Fund) International carbon development companies (for example, TIST) International NGOs (for example, Conservation International) International agribusiness companies (for example, Nestle, ECOM)	Identify carbon project opportunity Provide initial investment for a project Identify field project manager (FPM) (in some cases also serve as FPM)
Field program manager	National and International NGOs (for example, Ecotrust Uganda, Vi Agroforestry) Local companies (for example, NOVCAL) Local ministries of agriculture	Manage interactions with farmers and/or farmers organizations Implement training on SLM and carbon practices Manage payments to farmers/communities
Sustainable land management technical capacity providers	Research organizations (for example, ICRAF, ICRISAT) Ministries of agriculture Universities National agricultural research institutes	Source of knowledge on innovative SLM practices Training of program management staff on SLM practices Source of knowledge on inputs for SLM practices
Carbon technical capacity providers	Development agencies (for example, World Bank Biocarbon Fund) Private firms (for example, The Earth Providers, Unique Forestry Consultants) International NGOs (Katoomba Group Incubator)	Feasibility and baseline studies MRV technology Legal/contracting
Farmers	National farmers unions Farmer cooperatives/associations Producer cooperatives/associations	Credit aggregator Trains farmers in SLM or carbon components (sometimes acts as FPM) Negotiates on behalf of farmers

Source: Shames and Scherr (2010)

The next section presents each of the case studies. For each case study, we identify the most promising possibilities for agricultural mitigation and determine the degree to which constraints exist to the implementation of mitigation projects. This analysis draws on an assessment of the organizations operating in the country and their potential to carry out the functions needed for agricultural mitigation and to overcome institutional constraints to project implementation. Lessons from previous projects are drawn where relevant.

4. CASE STUDIES

Ghana

Technical Potential for Agricultural Mitigation

The activities showing the greatest potential for reducing anthropogenic greenhouse gas emissions and expanding carbon sinks in Ghana include afforestation/agroforestry and land-use and management changes (EPA 2011). Specific activities related to forest management include encouraging the sustainable use of forest resources by local communities, reforestation of degraded forest, and management of protected areas.

At the farm level, smallholder farmers could undertake several measures to contribute to agricultural mitigation, including zero or minimum tillage, use of soil amendments, compost management, management of crop residues, changes in water management, crop rotation, and restoration of cultivated organic soils and degraded lands. These activities could increase the yield of the land and enhance climate change mitigation and also reduce the vulnerability of farm households. Moreover, Ghana produces several tree crops such as cocoa, mango, oil palm, rubber, and cashew, which provide carbon sequestration benefits. Therefore, the expansion of production of these crops could be linked to carbon markets. However, many of these activities do not qualify for inclusion under the CDM and limited attempts have been made to access the voluntary markets due to a number of constraints which will be discussed below.

Institutional Environment

The government of Ghana views the issue of climate change as critical for policymaking, particularly in terms of how international commitments are translated into national measures and strategies for mitigation and adaptation and their effects on economic growth and development. The government is developing a low carbon emissions growth plan, focused on the industrial, transportation, and energy sectors, which will anchor Ghana's sustainable development agenda (EPA 2011). Ghana also plans to establish a climate fund that will support national mitigation and adaptation actions, and the government is prepared to cut down on deforestation and forest degradation by 40 percent (statement by the Minister for Environment, Science and Technology, Hon. Sherry Ayitey, on 12 January 2010). However, little attention is paid to integrating agricultural mitigation efforts into mitigation plans at the national level.

Ghana signed the UNFCCC in June 1992 in Rio de Janeiro and ratified the Kyoto Protocol in 2002 (Agyeman-Bonsu, 2007b). The Environmental Protection

Agency (EPA) of Ghana has been designated as the national authority to oversee the Kyoto Protocol's Clean Development Mechanism (CDM). National CDM approval guidelines have been developed to assist in assessing how CDM projects contribute to sustainable development (Agyeman-Bonsu, 2007d).

The EPA also coordinates the activities of working groups and climate change study teams to support the implementation of climate change project activities. The EPA produced Ghana's first national communication to the UNFCCC in 2000, which covered greenhouse gas emissions from 1990–1996; a vulnerability and adaptation assessment for water resources, the coastal zone, and agriculture (cereal production); and climate change mitigation options in the energy and forestry sectors. Climate scenarios were also developed using baseline data (1960–2000) with projections to 2080 for all agroecological zones.

Major mitigation activities in Ghana have been scaled up. For example, climate change is featured in the Ghana Shared Growth Development Agenda (the country's main development framework) and the Ministry (MEST) through the National Climate Change Committee is coordinating the development of a National Climate Change Policy Framework (NCCPF). In addition, NCCPF will provide strategic direction and national framework to addressing climate change comprehensively in Ghana. Moreover, a policy brief on Nationally Appropriate Mitigation Actions (NAMAs) has been prepared. Ghana is also leading the facilitation of ECOWAS NAMA program (ECOMA), and developing a National Action Plan on NAMAs (NAP-NAMAs) as part of the readiness activities.

Other key government ministries have begun to develop and integrate climate change plans into their operations. A national committee on climate change is housed by the Ministry of Environment, Science, and Technology. This committee reviews policies and programs to complement national priorities and contribute to reduction of greenhouse gas emissions and an increase in carbon sinks, and is the focal point for UNFCCC activities (Agyeman-Bonsu, 2007a). The ministry will also establish a climate fund to support actions to mitigate the effects of climate change at the local level focusing on providing assistance to vulnerable groups including women and children.

The Forestry Commission is implementing the Natural Resources and Environmental Governance Program (NREG). NREG is designed to provide annual sector budget support and to sustain the implementation of a broad program of natural resources, governance and environmental reforms, and innovation for the Government of Ghana. The NREG program is also tasked with development of a climate change strategy and training staff at the Forestry Commission on climate change with emphasis on Reduced Emissions from Deforestation and Degradation (REDD) and adaptation measures.

The Water Resources Commission is implementing climate change adaptation projects aimed at raising awareness of climate change and variability and supporting communities to reduce livelihood vulnerability, and develop adaptive and coping strategies in water resources use through integrated water resources management (IWRM).

While agricultural mitigation is not addressed directly by any of the national ministries or strategies, several initiatives of the Ministry of Food and Agriculture (MoFA) could support the development of future projects for agricultural mitigation. For instance, the MoFA promotes sustainable land management (SLM) practices to

increase environmental resilience and agricultural productivity. A challenge will be to strengthen rural services, such as agricultural extension, particularly in the three Northern regions. However, in general, public funding for agriculture is limited—in 2006, agriculture’s share of total public spending was less than 2 percent (not accounting for donor funding) (Fan, Omilola, and Lambert 2009)—and subsidies for fertilizer and other inputs declined since the period of structural adjustment in the 1980s (Braimoh 2009).

Another challenge relates to the system of property rights in Ghana. In Ghana, customary land laws are legalized, whereby land is allocated and disputes are regulated by the local chief. Who ends up farming a specific plot is the result of a complex process of negotiation. Moreover, farming any given plot may or may not be associated with other rights such as the right to make production decisions or rent the land (Goldstein and Udry 2008). Therefore, mitigation efforts are unlikely to be successful if they do not consider the reality of local tenure arrangements.

Governance

Organizations operating within the country have some potential to carry out the functions needed for agricultural mitigation such as aggregating and organizing smallholder farmers, project development, and implementation. The main constraints to developing agricultural mitigation projects are lack of technical capacity and knowledge about carbon markets and lack of resources available to finance start-up costs and implementation.

As discussed above, a number of organizations exist at the national level whose mandates and activities include climate change mitigation issues, including the Ministry of Environment, Science and Technology, the EPA, and the Forestry Commission (FC). These agencies could provide support for project development and carbon accounting. However, they would have to overcome several constraints, mainly regarding lack of funding for mitigation activities.

While the EPA has the Climate Change Unit (CCU) dealing with adaptation and mitigation programs, implementation faces several constraints including lack of funding for these activities or for staff training, lack of equipment (such as computers, communications technologies, and vehicles) to support climate change work, and lack of decentralization in decisionmaking. Furthermore, the influence of the EPA’s CCU is limited given that the national climate change committee of the Ministry of Environment, Science, and Technology takes decisions on climate change issues that are national in scope. Strengths include that policy formation on climate change in the CCU is guided by research evidence and engagement with expert groups and the wider stakeholder community, and that staff have received training in carbon markets and GHG inventories.

The FC has a climate change unit and an organizational strategy (the REDD+ Readiness Preparation Proposal (R-PIN)) for climate change that is updated regularly. The strategy has been formulated both with staff and other key external stakeholders such as CSOs, forestry communities, and the research and academia fraternity. The staff is well qualified to design and implement policies and programs on climate change and have participated in trainings on MRV and resource governance that were funded by donors. While monetary flows from donors for climate change activities have been increasing over time, the budget for many climate change activities is inadequate. Unlike the EPA, the climate change unit of

the FC has the necessary facilities and vehicles to support work on climate change. However, additional technologies, such as computer hardware and software and communications equipment, would facilitate their work. The FC's process for designing policies on climate change is participatory and consultative, and the FC has also developed and maintains partnerships and networks with important stakeholders involved with climate change.

The main organizations operating at the local level include farmer-based organizations (FBOs), nongovernmental organizations (NGOs), and public agencies such as the national producer associations. The ability of these organizations to organize and carry out agricultural mitigation projects depends on their organizational, management and technical capacity, local legitimacy, and access to financial resources among other factors.

At the community level, a number of FBOs could facilitate the organization and aggregation of smallholders for agricultural mitigation activities when linked with organizations that possess the knowledge to link with carbon markets and technical capacity to carry out offset projects. Cooperative societies used to be strong farmer groups in Ghana during the early years before and after independence, but these have become weak and defunct in several areas in the country. Today informal groupings (such as the "nnoboa" system found in several communities) are usually organized by farmers themselves on a temporary basis from season to season. These multipurpose associations or groups are generally made up of a range of diverse community-based organizations (CBOs) or groups. The purpose of these groups is mainly to facilitate the mobilization of smallholder farmers at the community level either to receive support and/or assistance from government agencies, NGOs, financial institutions, development projects, and so on, or for collective action around issues of common interest. These organizations include various commodity-based groups such as maize farmers associations, village-based cocoa farmers' societies, trader, seed growers, vegetable farmers, and poultry farmers associations.

However, FBOs lack sufficient knowledge of the potential for agricultural mitigation and capacity to implement agricultural mitigation projects. Key informant interviews with 10 FBOs as part of this study revealed that only two had strategies for climate change and these strategies are very recent. There is a dialogue mechanism between the leaders of these two FBOs and the Vision 2050 Forestry Program, a community-based NGO that was established two decades ago in the Kwaebibrim District of Ghana and supports afforestation, among other activities. Some farmers are now planting trees on their farms but only 2 of the FBOs interviewed promote afforestation.

None of the FBOs contacted has any provision, facilities, or specific resources devoted to addressing climate change issues, nor do they have any activities that target climate change issues directly. Therefore, FBOs in Ghana are not yet ready to enter the carbon markets and participate in the mechanisms for the payment for ecosystem services without technical and financial assistance from intermediary organizations, such as international NGOs. However, FBOs already possess the capacity for organizing and implementing activities for agricultural mitigation and considerable experience with collective action in pursuit of other interests, such as accessing agricultural inputs and credit facilities. FBOs also benefit from local legitimacy among farmers, ensuring that contracts negotiated for agricultural

mitigation involving FBOs would have the support and participation of the community.

National Associations were formed as “umbrella” organizations for FBOs. Examples are the Ghana National Association of Farmers and Fishermen (GNAFF), which was formed on the initiative of MoFA in 1993, and the Cocoa, Coffee and Sheanut Farmers Association (CCSFA), which functions as a lobbying organization to promote the interest of cocoa farmers. Membership of GNAFF embraces all practicing farmers and fishermen from both cooperative and non-cooperative sectors of agriculture, and its main focus appears to be distribution of inputs, while CCSFA plays a role in the body set up by government to negotiate cocoa prices for farmers each year. However, these groups were organized from the top down and have little influence at the grassroots level. Therefore, they would need to be strengthened considerably to facilitate agricultural mitigation efforts.

Given the apparent weaknesses of government agencies in promoting agricultural development in general and in responding to climate change in particular, NGOs operating in the country have taken on a larger role for promoting agricultural productivity and increasing the welfare of farmers. NGOs work through FBOs to assist smallholder farmers in various ways, including technology generation and transfer, mediating between farmers and public institutions, and providing inputs and credit. The growing role of NGOs in agricultural development also demonstrates significant donor resources being channeled through NGOs instead of public agencies. Therefore, the lack of resources that plague most public institutions in Ghana and constrain their effectiveness does not affect or rather supports operations of NGOs.

In terms of organizational capacity, both local and international NGOs operating in the country have the greatest potential to develop and implement projects for agricultural mitigation. NGOs tend to be well managed, using their resources relatively efficiently. Several NGOs also have climate change experts among their employees, have access to these experts, and/or have separate units dealing with climate change issues. However, the degree to which the organizations emphasize climate change issues varies and few have sufficient resources dedicated to issues concerning climate change.

Therefore, despite the potential, NGOs in Ghana are currently not in a position to assist smallholder farmers to access carbon markets or benefit from payment for ecosystem services without the injection of external financial resources. NGOs face serious budgetary constraints when it comes to addressing climate change issues through training of their own personnel and smallholder farmers.

However, several REDD initiatives are in the initial stages of development by international NGOs including the Cocoa Carbon Initiative, the Nyamkamba Escarpment, the Kuapa Kokoo project, and the Shea Butter Carbon project (Shames and Scherr 2010). While no agricultural mitigation activities have developed to date, these REDD initiatives may offer a model for the development of mitigation projects in the agriculture sector—that is, with assistance from international organizations with the technical capacity and resources for startup and implementation.

Discussion

The development of projects for agricultural mitigation in Ghana faces many hurdles, namely lack of integrated planning and implementation at the national level and limited technical capacity and resources of organizations operating within the country. International expertise and resources are likely needed for the startup and implementation of activities for agricultural mitigation. The development of several REDD initiatives by international NGOs in recent years suggests that this may be a plausible option for projects within the agriculture sector as well.

The benefits of investing in activities for agricultural mitigation extend beyond reducing the impact of climate change. Several of the management practices for agricultural mitigation, such as soil fertility management, have been shown to increase economic returns to smallholders in northern Ghana, even in the absence of carbon payments in many cases (Gonzales et al. 2008) and are important for climate change adaptation. However, adoption of these practices remains low as smallholder farmers in Ghana have limited technical skills and little access to information about production technologies and management practices for agricultural mitigation. Therefore, removing obstacles to the development and implementation of projects for agricultural mitigation would contribute also to the economic development of rural communities while reducing livelihood vulnerability.

Morocco

Technical Potential for Agricultural Mitigation

According to Morocco's second communication to the UNFCCC, the global mitigation potential of the country is 52.9 million equivalent tons of CO₂ by 2030. This could be achieved through the convergence of several sectoral strategies and the completion of specific programs aimed at climate change mitigation. Calculated estimates show mitigation potential of some 57,535 tons of CO₂e annually, at a cost of \$29.6 million, a basic per unit cost (without accounting for other direct costs) of \$25.76 per ton of CO₂e.

Energy contributes 51 percent of the country's GHG emissions, followed by agriculture and forestry with 38 percent (Nbou and Gravel 2009). Thus, agricultural activity represents slightly more than a third of the nation's GHG emissions with soil emissions alone accounting for nearly 70 percent of all agriculture emissions.

Within the agriculture sector, priorities for mitigation measures include: improving the efficiency of agricultural land (intensification), planting olive groves in proximity to the vegetable mills to make the use of water originating from olive crushing possible, and recovering methane from manure and enhanced use of animal dropping for alternative sources of fuel. Compared to the new agricultural policy (Green Moroccan Plan), the oil production plan is of particular interest with regard to mitigation measures. The production of water arising from olive crushing of 80,000 m³ is thought to contribute to the GHG emissions through biodegradable processes. However, this potential for mitigation was not sufficiently taken into account in the GHG inventory in 2007.

Several opportunities are also available for livestock producers in general and dairy producers in particular. Specific measures include adopting conservation agriculture to produce animal feed crops and the management of livestock to

reduce methane emissions (such as reducing livestock numbers and improved feeding practices). Such measures not only contribute to agricultural mitigation but can also increase productivity, reduce production costs, and improve the livelihoods of smallholder producers. Furthermore, the adoption of conservation agriculture practices also has the potential to increase soil organic carbon, soil biodiversity, and the sustainability of the production system.

Institutional Environment

Morocco signed the United Nations Framework Convention on Climate Change (UNFCCC) at the Rio conference in 1992 and ratified it in December 1995. In January 2002, Morocco was also the 46th country to ratify the Kyoto Protocol. Since 1995, Morocco has developed a series of laws and strategies to address climate change.

With the ratification of the UNFCCC, Morocco consolidated its environmental protection and regulatory agencies into one Department of the Environment, which is responsible for coordinating and implementing national environmental strategies and establishing a regulatory framework for protecting Morocco's environment (USTR 2003). The government also established a number of committees concerning various aspects of climate change and environmental oversight, including a National Committee of Climate Change (CNCC) composed of representatives of ministerial departments and national institutions involved in climate change issues, a Climate Change Unit in charge of coordinating and monitoring Morocco's UNFCCC commitments, and a National Committee for the Clean Development Mechanism (CN-CDM).

The National Action Plan for the Environment includes 25 projects that target the reduction of GHG emissions. The main mitigation project activities relate to renewable energy use, a shift to natural gas in the industrial sector, the rational use of energy in the industrial sector, electricity power production by wind energy, and reforestation. Agricultural mitigation measures included in the Plan are under the mandate of the Ministry of Agriculture and Marine Fisheries (MAMF) and 3 subsidiary agencies: the Agency for Agricultural Development (ADA), the National Institute for Agronomic Research (INRA), and the Department of Irrigation and Agricultural Land Development (DIAEA). Agricultural mitigation plans include projects related to olive reforestation, agricultural yield improvement, manure management, environmental certification, improving energy performance of agricultural equipment, and olive processing improvement (MEMEE 2010).

However, agricultural mitigation projects make up a very small part of the total portfolio. Instead, climate change projects in the agriculture sector focus on adaptation. These projects are part of the government's broad strategy for the agriculture sector called the Plan Maroc Vert (PMV or Moroccan Green Plan) (MAMF 2008). The PMV is an ambitious strategy aimed at restructuring the agricultural sector through investment in high value-added and high-productivity agricultural subsectors and demand-driven efforts to combat rural agricultural poverty through conversion of cropland to high value crops, intensification, and livelihood diversification projects.

Some of the adaptation measures involved in the PMV would also be beneficial for agricultural mitigation, such as promotion of no tillage systems in semiarid areas, agricultural intensification, and the conversion of cereal cropland to

fruit tree plantations. If emphasis was placed on the projects that not only provide adaptation benefits but also generate mitigation services, in presence of functioning carbon markets, adaptation costs would be reduced. Other focal areas of the PMV, such as awareness-raising on climate change, linking smallholders with international markets, strengthening collaboration with FBOs, and public-private partnerships in service delivery, would also facilitate future agricultural mitigation efforts. In addition, the PMV has led to a doubling of overall public investment in agriculture, aimed at providing financial incentives to farmers and rural development services delivered by the MAMF.

However, the policy framework supporting the PMV has lagged somewhat behind. Some of the key policy constraints to successful implementation of the PMV include a lack of comprehensive policies and laws governing land and other natural resources, a limited rural land market, and slow progress on strengthening women's rights and access to and control over assets. Integrating the parallel systems of customary and private land rights is one particular challenge (USAID 2011).

Governance

This section explores the potential of some of the most important Moroccan organizations to facilitate the development and implementation of projects for agricultural mitigation. Direct interviews were carried out with these organizations and used to assess the strengths and weaknesses of these organizations as well as their capacity to perform the functions of aggregating and organizing smallholder producers, implementing strategies for agricultural mitigation, and linking with carbon markets.

Local farmers' organizations have multiplied and blossomed in recent years, providing important services to their members (Mercoiret et al. 2006; Pretty and Ward 2001). A typical example are farmer cooperatives that help smallholder farmers engage in economic activities that they could not implement if they were acting alone due to significant investment requirements and insufficient market power given the small scale of production.

Milk sector cooperatives provide a good example of how cooperatives may be organized to support agricultural mitigation (Faysse, Sraïri, and Errahj 2012). Milk cooperatives fill the gap between an atomistic supply (small scale production) and an oligopolistic dairy industry (mainly constituted by multinational firms) by organizing numerous small dairy producers. Cooperatives could be used in a similar fashion to organize and aggregate the supply of emission offsets from numerous smallholder producers to benefit from carbon markets. Cooperatives are rooted in the communities and benefit from significant local legitimacy. While they currently do not possess the technical knowledge needed for linking with carbon markets (establishing a baseline, MRV, and so on) they could link with other organizations to complement them.

NGOs are also well positioned to aggregate farmers for agricultural mitigation activities. Community-based NGOs contribute significantly to all major areas of agricultural development and protection of natural resources and may play an important role under the PMV. Several NGOs already operating in the country focus on agricultural production and rural welfare improvement and could play an important role in climate change mitigation activities. Significant examples are

Agriculture, Environnement et Développement pour l'Avenir (AGENDA) and Club40, both of which focus on grain production in the Chaouia region.

AGENDA and Club40 have experience aggregating farmers to implement a set of management practices to increase productivity. Specifically, AGENDA aims to promote conservation agriculture (CA) by organizing farmers around service companies who will have the role of "aggregator," enabling farmers without sufficient financial resources to purchase no till equipment, training farmers in CA practices, participating in the development of regional and national CA programs, and introducing incentive schemes to encourage the adoption of CA practices. Similarly, Club40 promotes best practices for grain production (generally two year rotations of clean tillage fallow and wheat) among 200 conventional Chaouia central plain farmers with the stated goal of reaching an average yield of 4 tons per hectare. Expertise in implementing such activities would be useful for agricultural mitigation efforts.

Moreover, NGO missions, activities, and organizational structures, while defined by specific statutes, generally tend to be simple and straightforward. They usually also have sufficient organizational infrastructure to carry out their intended activities and members often provide their own material support such as transportation. NGOs also have developed strong institutional linkages as they involve members from different areas and communities including independent farmers, cooperatives, extension agents, researchers, and private sector representatives.

NGOs are also capable of attracting funds from members, public organizations, and international donors, and are given a tax exemption as "public utility institutions." While contributions and donations from association members or charities are generally not enough to allow the establishment of ambitious and sustainable programs, the availability of public and international funds widens the scope of the work that NGOs can accomplish. Therefore, overall, NGOs are able to mobilize financial resources to accomplish their goals and have proven to manage and use funds efficiently and effectively due to direct control of the members over the governance of these institutions.

Public investments in agricultural development in Morocco are mainly channeled through two public organizations, the "Centres de Travaux" (CTs) or work centers and the Chambres d'agriculture (Agriculture Chambers). The CTs link farmers with the Ministry of Agriculture and perform agricultural extension, promote farmers' professional organization, organize vocational training in agriculture, and promote and facilitate improvements for farmers' living on rainfed, marginal lands. Since CTs were established 60 years ago they have successfully promoted a variety of programs including land reform and distribution, farmer cooperative development, integrated rural development, crop management improvement, drought mitigation, irrigation management, and the provision of insurance.

The CTs have a decentralized structure which allows them the flexibility to quickly adjust to local conditions. With 122 units spread across the Moroccan territory, the CTs are in direct contact with local farmers and benefit from a long history of continued presence in rural areas. Results of the surveys indicate that the CTs are almost the only local institution to have highly educated staff (university degree) present in rural areas with experts covering areas such as crop and animal sciences, capacity-building, and monitoring and evaluation. They are also well

managed with accumulated experience in the diagnosis of challenges, the definition of work objectives, the monitoring and evaluation of projects, and financial management and accounting. Therefore, while they do not possess the technical capacity, they have great potential to acquire these skills and train farmers in agricultural practices for agricultural mitigation.

However, since the 1980s, the CTs have experienced a reduction in available funds as the government disengaged from activities that involve direct assistance to farmers. No efforts have been made to acquire alternative sources of revenue. As a result, the CTs experienced progressive downsizing and budget shortages as well as movement of personnel to other agriculture ministry departments. In addition, according to the "Service de la gestion du personnel des Centres de Travaux" (2001), despite being designed to operate autonomously, the central government often intervenes in day to day management decisions. The CTs also lack sufficient links to other organizations operating in the area of rural development.

Moreover, the Ministry of Agricultural and Rural Development aims to reposition the CTs as a key player in the implementation of its agricultural policies. They will have to serve as the expertise reservoir and intermediation entity between the central government and rural areas. Despite the problems faced by CTs, this structure could be the instrument of the rural development and could facilitate agricultural mitigation if they can acquire the technical capacity needed for implementation of agricultural mitigation projects.

The Agriculture Chambers are public establishments under the supervision authority of the Ministry of agriculture that perform a number of activities, including providing advice on and contributing to the development of regional agricultural policies, promoting information dissemination and awareness-raising activities, and developing and executing development projects with national and international partners.

Similar to the CTs, the role of the Agriculture Chambers remains limited, mainly due to lack of funding and human resources, both in terms of quantity and capacity of staff. Although the Chambers are endowed with a financial autonomy, giving them the authority to establish their own budget and generate financial resources, funding remains exclusively dependent on government budget allocation and no other sources of funding are generally sought. Because of insufficient funding, the Chambers' activities are limited to organizing informational meetings and facilitating farmers' travels to exchange acquired knowledge.

Recent and proposed reforms of the Chambers have the potential to increase the capacity of the organization to address regional development needs. The current reform strengthens the chambers logistic capacity and redefines their missions in a way that allows for a more active stakeholder participation in the definition of objectives, planning, and monitoring and evaluation, thereby increasing their local legitimacy. The new reform would also allow a better process management by changing the organizational structure and reassigning the various duties. A debate on a minimum education requirement for elected representatives in the professional chamber is currently taking place.

The reform process could also prepare the Agriculture Chambers to take on the role of project developer for agricultural mitigation projects. This would require

strengthening their financial autonomy and ties to external organizations to secure upfront and long-term funding for mitigation activities.

Discussion

The significant institutional changes currently underway as part of the overhaul of the agriculture sector offers an opportunity to strengthen the country's contribution to agricultural mitigation. Currently, agricultural mitigation objectives make up a very small part of the total portfolio of activities under the PMV although some of the adaptation measures involved in the PMV would also be beneficial for agricultural mitigation, such as promotion of no tillage systems in semiarid areas, agricultural intensification, and the conversion of cereal cropland to fruit tree plantations. Therefore, there is potential for the development of additional projects for agricultural mitigation, which would build on existing adaptation and rural development plans.

As the various organizations operating in the country (including cooperatives, NGOs, and local public organizations) adjust to the new agricultural strategy, they could make greater efforts to incorporate activities for agricultural mitigation. Many of the organizations like the farmer cooperatives, NGOs, and CTs have significant experience organizing farmers at the community level to address issues that require collective action, such as communal rangeland management, maintenance of irrigation channels, ancestral community linkages, and cereal storage. However, these organizations currently lack the technical capacity and resources to link local communities with carbon markets for agricultural mitigation. External technical assistance and funding may be required for such activities to get off the ground.

Mozambique

Technical Potential for Agricultural Mitigation

Agriculture represents a dominant sector of the Mozambican economy. Eighty-six percent of the labor force is involved in agriculture, which contributes about 28 percent to GDP (WDI 2009). However, agricultural production is primarily rainfed, not mechanized, and characterized by low productivity, with average crop yields about one half of the regional average (World Bank 2006). Low productivity is due to very limited use of inputs such as improved seeds, fertilizers, and irrigation, and lack of access to extension services and capital (ibid). Under such circumstances, there is a huge potential for mitigation. Expansion of irrigation schemes, water harvesting techniques, soil and moisture conservation, agroforestry, animal traction, and postharvest techniques would all contribute to agricultural mitigation of climate change.

Institutional Environment

Given the considerable threat posed by climate change, the government has crafted legislation and climate change strategies to confront the challenge. Mozambique ratified the UNFCCC in 1994 and the Kyoto Protocol in 2005. After becoming a party to the UNFCCC, the government created an inter-institutional working group with the objective of mainstreaming climate change into sector plans. This working group carried out the first national inventory on greenhouse gases and vulnerability

assessment in 1998. They were also involved in building national capacity for implementation of the CDM and in the elaboration of the National Action Plan for Adaptation (NAPA). NAPA was approved by the government in December 2007 targeting four major areas: early warning, agricultural production, water resources management, and coastal zones (MICOA 2007). The government also attempted to set up different working groups and regulatory tools under the coordination of the Ministry for Coordination of Environmental Action (MICOA 2003).

Beyond the CDM and NAPA, the government, through the Ministry for the Coordination of Environmental Action (MICOA), has produced different legal instruments related to climate and sustainable development.² Currently the government is preparing a strategy for REDD through the MICOA and the Ministry of Agriculture's (MINAG) National Department of Land and Forestry (DNLF). The main objective of REDD in Mozambique is to encourage sustainable use of natural resources through a payment system for environmental services (MICOA, 2010). However, there has been little discussion on other agricultural mitigation practices, such as soil carbon sequestration, and few efforts to link to voluntary carbon markets.

While many aspects related to climate change are covered by the existing legal framework and several inter-institutional coordination mechanisms have been developed and implemented, there is no systematic institutional focus on climate change (INGC 2009). Moreover, despite an increased number of regulations and legal tools, progress toward environmental sustainability (MDG 7) has been slow and is unlikely to be achieved by 2015 (UNDP and GoM 2008). Furthermore, while the country's adaptation strategies do consider agriculture, climate change mitigation plans focus only on the forestry sector. The government states that by promoting conservation agriculture, and afforestation and re-forestation, it is contributing to agricultural mitigation. This lack of attention to agricultural mitigation and limited funding for agricultural development in general will make organizing projects for agricultural mitigation more difficult and costly.

Currently, the country's agricultural sector performance is poor. Yields per hectare are low, new technologies are scarce or poorly adopted, and the staff and other resources to assist the producers are limited. MINAG aims to improve food security and rural livelihoods by commercializing agriculture, shifting production away from subsistence activities, and promoting access to international markets, all while safeguarding the use of natural resources and the environment.

However, agricultural plans are poorly executed. For example, while funding for agricultural priorities has increased in recent years MINAG utilizes only a fraction of budgeted funds, particularly at the provincial levels. In addition, nationwide, public extension services comprise only about 700 agents, which is extremely low compared to many neighboring countries. Zimbabwe, for instance, has about 8,000 extension agents and Tanzania about 5,000 agents (Skelton et al. 2003:10). Moreover, extension agents have limited transportation, educational materials, and facilities. Other constraints to agricultural development include inadequate

²These include: (i) Regulation for Environmental Quality Standards and Emissions, (ii) Regulation for Environmental Inspection, (iii) Environmental Strategy for Sustainable Development, (iv) Environmental Law, (v) Environmental Impact Assessment Regulation, (vi) Land Regulation, (vii) Land Legislation, (viii) Water Resources Legislation, (ix) Energy Policy, (x) National Program for Environmental Management (xi) Regulation for Mine Activities, (xii) Territorial Planning Law.

infrastructure, access to inputs for smallholders, and somewhat limited land tenure security (mostly due to lack of awareness about land rights). In this environment, the development of additional projects for agricultural mitigation will be more difficult.

*Governance*³

Organizations that have emerged to address the challenges of agricultural production in Mozambique could be mobilized to implement agricultural mitigation projects. In fact, several carbon sequestration projects are already operating in the country. One is led by ENVIROTRADE, a Mauritius-based company focused on biosequestration and payments for environmental services. The project began operating in Mozambique in 2003 with a carbon livelihood project in Gorongosa district, Nhambita community. The project was a consortium involving ENVIROTRADE, the European Union, the Edinburgh Center for Carbon Management (ECCM), and the University of Edinburgh (UE). By 2008/09 the project included 1,515 farmers comprising an area of 1,738.64 hectares (Serra 2009). Since its inception the project has sequestered 293,321 tons of CO₂ from which 116,808 tons have been certified and sold by Plan Vivo. The amount sold produced revenues of \$936,307, which has been distributed equally to the participating farmers and the community fund, and used to cover operational and transaction costs including certification, management, negotiation, and market research. The company expects to sequester about 2,132,715 tons of CO₂ over a period of 99 years. To achieve this, it has been expanding its areas of intervention and has carbon livelihood projects in two new sites: the Zambezi delta and the Quirimbas regions.

Despite its success in terms of farmers engaged, the amount of CO₂ sequestered, and environmental and livelihood improvements, ENVIROTRADE still faces a lot of challenges and constraints including a reluctance of the government and other actors to provide payments to smallholders for environmental services, confusion about leadership of the project, coordination of the different stakeholders, and lack of organizational capacity for MRV.⁴ In addition, ENVIROTRADE has had difficulty selling the offsets created by the project and still has half of its CO₂ stock for sale.

Two other carbon sequestration projects have been developed by the WWF. The first project, the Quirimbas Carbon Livelihoods Program, was developed in coordination with ENVIROTRADE. The second, the Zambezi Delta Carbon Livelihoods Program, was developed in coordination with the Mozambique government and several NGOs. Both are agroforestry initiatives aimed at agricultural communities and both offer benefits to the communities including revenues from the sale of carbon offsets and community trust funds (Shames and Scherr 2010).

Many other organizations involved in agricultural development have experience that is relevant for agricultural mitigation. These include producer

³This section is based on an institutional analysis of one province in Mozambique (Nampula Province), not the entire country. Potential institutional arrangements for agricultural mitigation may vary in other regions.

⁴Interview with Anabela Fernandes and Momade Nemané, ENVIROTRADE staff, Nampula August 27, 2010 and Serra (2009).

associations, NGOs, and private companies aimed at organizing smallholder farmers and linking them with markets for their outputs. Membership in producer associations varies from those where members join together out of mutual interest to obtain financing and better prices for inputs and outputs (both by reducing transaction costs and increasing their market power) to contract farming arrangements.

However, only 6.5 percent of smallholder farmers in Mozambique belong to producer associations (WFP 2010). Moreover, these associations are weak and lack the organizational, management, and technical skills to link with carbon markets, and have limited capacity to add value or market commodities.

A number of NGOs and private companies that assist producer organizations link to international markets by supporting the production process (for example, through the provision of inputs and information) and marketing may also have a role to play in agricultural mitigation. While not directly addressing climate change, many of these organizations, including Save the Children, OLIPA-ODES, and the Cooperative League of the USA (CLUSA), work directly with farmers to introduce new technologies and management practices, such as tree planting and CA, which are beneficial for climate change mitigation and adaptation. These organizations have experience with organizing and promoting sustainable land management practices among numerous smallholders.

An example of a successful producer association is the National Institute for Cashew Nut (INCAJU), which focuses on production, processing, and commercialization of cashew exports from numerous smallholder farmers (over 72,000 in Nampula Province, where cashew production is concentrated). INCAJU provides smallholders with extension services to improve the production of cashew nut trees, plant management (cleaning and pesticides), and postharvest processing and market linkage.

Cotton production also provides an example of a contract farming arrangement where smallholder producers are organized and linked to international markets through private companies. The government grants private companies areas, called concessões, where the company can promote cotton production among smallholder farmers, providing them all technical assistance and inputs including seeds, fertilizers, pesticides, and equipment. The company has the obligation to buy the cotton after production based on a price negotiated before production between the state, the Association of Cotton producers, and the Association of Cotton companies.

Another organization with experience linking farmers with international markets, IKURU, has even undergone the process of fair trade and organic certification (by FLO and ECOCERT, respectively), which provides valuable experience that could later be applied to link farmers with carbon markets. FLO certification requires linkage with legalized farmers' groups or associations, particular information about the farmer groups, proof that the farmers are paid better prices, and inspection by an FLO agent, among other things, and must be renewed on an annual basis. By marketing goods as fair trade, IKURU is able to offer between 10–20 percent above local market prices and for each ton of exported product the farmer's association gets \$110 to be used according to the association assembly decision.

ECOCERT certification is even more demanding, requiring a list of members of the farmer's association, testimony from local leaders or key informants verifying the farmers' association, contracts between ECOCERT and the farmer's association and between IKURU and the farmer's association, regulation by IKURU of the organic production process, a map showing the location of each organic farm, and periodic inspection and reporting on individual farmers to ensure that farmers do not use any chemicals or engage in field burning among other practices. Farmers' organizations must also demonstrate democratic and transparent management practices. CLUSA provided technical support for the certification process and one staff at IKURU worked full time on monitoring and preparing files for certification. Organic production provides prices 10–20 percent above average market prices and the farmers' association involved gets a bonus of \$150 per ton exported.

Despite the experience of many organizations in linking smallholder producers with international markets, considerable challenges remain in forming governance arrangements for agricultural mitigation. Apart from ENVIROTRADE, the organizations discussed above have no experience or agenda related to climate change. Therefore there is limited technical and organizational capacity for carbon market linkage, including meeting the requirements for monitoring, reporting, and verifying carbon offsets. Even ENVIROTRADE struggles with the MRV requirements—field staff is insufficient, overburdened, and many lack the educational requirements to provide technical support.⁵ In a country where illiteracy is common, linking farmers to the global market is still largely dependent (financially and technically) on international actors.

In general, there is still a huge gap in terms of basic knowledge on climate change issues throughout the country, which makes engaging in mitigation activities more difficult. For example, customs once asked how ENVIROTRADE transports carbon to the global markets and where ENVIROTRADE was paying export fees. Therefore, the development of additional mitigation activities would benefit from efforts to increase general knowledge on climate change issues.

Another challenge has been lack of coordination among the different stakeholders involved in agricultural development whose roles and priorities are not always harmonized and channels of communication are limited. For instance, ENVIROTRADE recommends 4x4 meter spacing of cashew nut trees while the government recommends 15x15 meters.

Moreover, farmers and other stakeholders are often unclear about who is leading agricultural projects. Sometimes the government initiates, as in the case of INCAJU, sometimes local leaders take the leadership, and in other instances international organizations or companies, such as ENVIROTRADE, take on leadership. This creates a problem of local legitimacy, a loose sense of ownership, and project appropriation by the locals. Therefore, projects for agricultural mitigation will need to establish linkages with the community and delineate responsibility across the organizations involved.

Discussion

The above examples show that different types of governance arrangements are possible to aggregate smallholder farmers and link them with carbon markets.

⁵Telephone interview with Antonio Serra, ENVIROTRADE staff, September 23, 2010.

However, apart from ENVIROTRADE, the organizations with the capacity to organize farmers and promote adoption of particular practices still lack the technical knowledge of carbon trading and the requirements for monitoring, reporting, and verification. This means that interventions for agricultural mitigation linked to carbon markets must first build capacity and knowledge of climate change issues or link with international organizations with specific expertise. However, experience gained through the process of organic certification (IKURU with help from CLUSA) may be useful and applicable to agricultural mitigation projects and demonstrates that organizations operating in the country have the capacity to expand their operations into other areas.

Another issue to be resolved is that the government and other actors question whether environmental services should be paid for. Rather, the government and NGOs have been promoting environmental services such as reforestation, and avoided deforestation through public awareness campaigns which do not promise compensation. Once a payment system is in place, they fear farmers will demand payment for these services and the state and many NGOs lack resources to provide payments directly. However, linking domestic environmental projects with international markets may relieve pressure on the state to directly provide resources for environmental conservation in general and agricultural mitigation in particular. There is hope that REDD-Mozambique, currently being developed, may address some of these issues. Greater awareness of the potential for other areas of agricultural mitigation, such as soil carbon sequestration, is also needed so that strategies can be designed and organizations coordinated to engage in such activities.

The development of projects for agricultural mitigation may be further limited by the significant development challenges faced by the country, including the remote location of many smallholder farmers, unfavorable infrastructure (such as roads), lack of information systems (particularly extension services), limited human capacity (low levels of education), and the lack of quality inputs (such as seeds) in local markets. These challenges will increase the start-up costs needed to implement agricultural mitigation activities.

Vietnam

Technical Potential for Agricultural Mitigation

The Vietnam National Strategy Study on the Clean Development Mechanism (GoV 2004) identified several potential subsectors for CDM projects, including energy conservation and energy efficiency, renewable energy, fuel conversion, recovery and utilization of accompany natural gas from crude oil field, landfill and gas recovery, reforestation and afforestation, reduction of CH₄ emission from agricultural and animal husbandry activities, and other sectors that help to reduce GHGs.

In terms of agricultural mitigation, only reforestation, afforestation, and livestock activities have been explored. Significant technical potential also exists for reducing methane emissions from rice production, which accounts for most of the agricultural area, as well as for reducing emissions for other food crops. Parts of Vietnam have three rice production seasons. Among these, the main opportunity for agricultural mitigation is during the spring season, when farmers can control the

water regime. There is also limited potential for increased soil carbon sequestration in many of the food crops. However, because these project types are not allowed under the CDM, there has been little focus by the government on these activities.

Institutional Environment

Enabling smallholder farmers in Vietnam to access markets for agricultural mitigation will require reform in several areas. On the administrative and legal side, it is not clear how the Government of Vietnam (GoV) would treat agricultural mitigation projects that would want to access the voluntary markets. Moreover, even for the CDM, projects are currently evaluated by a foreign designated operational entity (DOE) as the country has insufficient capacity to validate CDM projects.

The GoV has a large influence on the development of mitigation activities in the country and has set up a number of institutions and a legal framework for climate change mitigation. In particular, The Vietnam National Strategy Study on the Clean Development Mechanism (GoV 2004) sets out a vision and action plan for Vietnam to participate in the global compliance market. The document includes a portfolio of possible projects, and stresses the importance of raising awareness and building capacity on methodologies, project assessment, and monitoring. In 2008, the Ministry of Agriculture and Rural Development (MARD) approved the Action Plan for Adaptation and Mitigation of Climate Change 2008–2020, which focuses on research and capacity building. In December 2011, the Government released 3119/QĐ-BNN-KHCN, suggested to reduce by 20 percent total GHG emissions in the agriculture and rural development sector by 2020, while also reducing poverty and continuing agricultural and economic growth and effectively responding to climate change. The Decision was accompanied by a series of agricultural mitigation measures in various agricultural sectors.

In March 2003, the GoV assigned the International Cooperation Department of the Ministry of Natural Resources and Environment (MONRE) as the Designated National Authority (DNA) responsible for implementing the Kyoto protocol, and for evaluating and granting the authorization for participation in CDM projects. The government also established the CDM National Executive and Consultative Board (CNECB), whose role was to consult with the DNA on policies related to the development, implementation and management of CDM activities in the country, and to make recommendations on guidance and evaluation for CDM projects. In 2007, the Vietnam National Steering Committee for UNFCCC and the Kyoto Protocol replaced the CNECB. Furthermore, in May 2008, the Department of Meteorology, Hydrology and Climate Change of MONRE took over as DNA for managing and coordinating the implementation of all climate change related activities under the UNFCCC and the Kyoto Protocol. Their responsibilities included developing regulations, guidelines, and criteria for CDM implementation; evaluating and approving or rejecting proposed CDM projects; designing potential CDM projects; disseminating information on the CDM to the public; and managing and coordinating CDM investments in the country.

Finally, the Vietnam Environment Protection fund is responsible for registration of certified Carbon Emissions Reductions (CERs), supervision and management of CERs granted by the CDM Executive Board to CDM projects in Vietnam, and collection of fees from CERs being sold. Vietnam does not have local

Designated Operating Entities (DOEs) but instead relies upon foreign, independent auditors to evaluate whether a potential project meets all the eligibility requirements of a particular Accreditation Standard.

The GoV has published a number of legal documents that deal with the implementation of CDM projects in Vietnam in terms of project development and financial assistance (such as tax exemptions and government investments). CDM projects are subject to general investment registration and business registration rules in Vietnam. Foreign investment projects are required to obtain an investment certificate and in doing so must provide information on the financial capability of the investor and their local contractual arrangements. Domestic investment projects are generally exempt from this requirement. While the investment certification process is reasonably straightforward, it still represents an additional hurdle for international companies interested in developing mitigation projects.

These general investment rules would also apply to projects aimed at voluntary carbon markets. However, the licensing authority is unfamiliar with carbon offset projects, particularly those targeting the VCM, and may therefore be more reluctant to grant licenses for these activities.

In addition to applying for investment approval, foreign investors wanting to develop CDM projects in Vietnam must establish the Project Design Document (PDD) and submit this to the Designated National Authority (MONRE) to receive a Letter of Approval, submit the PDD to a DOE for validation, register with the UN CDM Executive Board, monitor emission reductions on an annual basis and have these verified by a DOE, submit a request for the issuance of the CERs to the UN CDM Executive Board, register the CER with the Vietnam Environment Protection Fund, and pay CER selling fees to the Vietnam Environment Protection Fund before selling or transferring any CERs outside of Vietnam.

Thus, over the past 7 years the GoV has implemented the necessary laws, policies, financial incentives, and administrative infrastructure to enable Vietnamese entities to participate in the CDM. However, the CDM market has yet to gain real traction in Vietnam. Out of 85 CDM projects in the pipeline (that is, they have received letters of approval from MONRE, the first stage in the process), only 26 projects have been registered with the CDM Executive Board.

Vietnam has no projects registered with the VCS, the Gold Standard, or the Climate Action Reserve, and thus, no VERs have been generated to date. Key barriers to Vietnam's access to the VCM are legal and structural. There are no regulations governing VERs in Vietnam. Also, gaps are related to information provision rather than to lack of technical understanding or development of technology. Due to the absence of a focal point or a national center for VCM information it is very difficult for foreign project developers to obtain market information. For example, technical documents related to the VCM have not been translated into the local language, which restricts market development.

However, developers, such as the Vietnam Forestry Technology Association, Netherlands Development Organization (SNV), the Hanoi Urban Environment Company Ltd, and the Energy and Environment Joint Stock Company (RCEE), have an interest in linking with the VCM. While there is virtually no existing local demand for VERs, two international companies with local Vietnamese operations and with a focus on the CDM have expressed some interest in buying locally generated VERs.

Another constraint to expanding agricultural mitigation opportunities through the VCM relates to the structure of agricultural production. In Vietnam, land is allocated to farmers for the long-term, giving them the right to make all agricultural production and management decisions. At the same time, farm sizes are small—less than 0.5 ha—making it more challenging to mobilize farmers to participate in agricultural mitigation. The government cannot use a top-down approach to organize farmers for agricultural mitigation due to the large gap between policy and farmer incentives. That is, despite having an extensive legal and administrative framework for climate change mitigation, none of the national plans including the Action Plan for Adaptation and Mitigation of Climate Change contain guidelines on institutional arrangements for mobilizing smallholder farmers to participate in agricultural mitigation.

Despite the above-mentioned constraints, Vietnam invests considerably more resources in agriculture and rural development compared to countries in Sub-Saharan Africa and has been successful at reorienting the sector from subsistence to exports over the last two decades. Vietnam has also been able to minimize the effects of global crises. For example, in 2009 in response to the financial crisis, the government announced a stimulus package that included \$3.3 billion targeted towards agriculture and rural development, including irrigation, grain storage, and farm machinery (Thurlow et al. 2011). In addition Vietnam has already invested significant resources toward their climate change response strategies, including \$143 million per year until 2015 (Carmody, Nguyen, and Brown 2011). Additional investments would be needed, however, to promote opportunities for agricultural mitigation.

Governance

While most cooperation around local development continues to be state-led as opposed to demand-driven, several new laws have provided space for local initiatives and organizations to address rural development challenges and there has been a shift to make some of the local state-led organizations more independent. A number of these organizations that work with farmers at the local level have the potential to expand opportunities for agricultural mitigation, given their experience with aggregating smallholder producers and linking with national and international markets.

After the failure of the old cooperative regime, several new types of farmer organizations formed, although these are still limited. Farmer organizations can take the form of collaborative groups, cooperatives, and associations, depending on their field of operation and products. There are different regulations for each type of farmer organization recognized by the GoV and these organizations can be supported by sociopolitical organizations such as women's or youth associations. While some forms of cooperation are rather loose, others operate under tight and comprehensive rules. These collective organizations could be used to aggregate smallholder producers and monitor compliance with contractual obligations for agricultural mitigation.

Following the market reforms, a number of collaborative groups have formed, including groups related to irrigation, crop production, livestock raising, and forest protection, among others. Collaborative groups are volunteer, demand-driven organizations formed by small groups of farm households. Some require

capital and property contributions from members while others do not. The scale and focus of these organizations varies widely. Some collaborative groups are supported by mass organizations, extension centers, or other government institutions, while many are not formalized or registered with the state.

Cooperatives help farmers obtain cheaper inputs and increase their bargaining power in output markets. They also help increase information flow and provide extension services. Membership in cooperatives is voluntary and participating households contribute capital and production materials such as breeding facilities, livestock, and arable land. Agricultural cooperatives are concentrated mainly along the Red River Delta, and are generally classified into two categories: general trade cooperatives and phase specialty cooperatives.

General trade cooperatives mainly organize to supply production inputs such as irrigation, electricity, and seedlings; to assist with land preparation; and to provide technique training, plant protection services, and some extension services. Few cooperatives focus on processing and selling products for their members and therefore are not likely to have linkages with international markets. Phase specialty cooperatives, which are less commonly found, provide only one service for their members or local community. The two most popular services provided by these cooperatives are civil electricity and irrigation services.

However, there are some commodity-based associations that focus on increasing the competitiveness of a specific product and of farm households in the market. These associations involve joint production operations and profit sharing by members. These organizations may also develop specific trademarks, such as higher production standards to ensure quality, in order to increase profits. Some examples of successful commodity-based associations include a sticky rice production and distribution association in Kinh Mon, Hai Duong. This association was formed from three farmer groups with the aim of adding value to its traditional product through the use of improved quality seeds and a new protocol for production, processing, and storing, and linking this specialty product with supermarkets and wholesaling/retailing agents in Hanoi.

Contract farming is a common practice in Vietnam and another way in which farmers may organize to increase returns to agricultural production. Five main types of contracts are possible, including sales contracts with state agro-processing enterprises, production contracts with foreign companies, individual sale from farmer to merchants (domestic), sale through service cooperatives, and handicraft and industrial village contracts. Contract farming often relies on cooperative organizations to carry out the terms of the agreement as in the case of the Lam Son Sugar Company in Thanh Hoa Province (Dao The Anh, 2004). Under this arrangement, sugarcane planting households are organized into groups or cooperatives to negotiate and manage their contract with the company that agrees to purchase the sugarcane and provide members with access to credit and inputs, such as fertilizers.

Farmer associations and cooperatives are also a key source of products sold in supermarkets (especially vegetables, fruit, and flavored rice), one of a few outlets for farmers to market their "quality" products and receive a price premium (Moustier et al. 2010). In Vietnam, supermarkets are large trade establishments and their development has progressed at a steady rate with support from public authorities interested in modernization and food safety. Contracts are written for 80

percent of supermarket suppliers that specify the frequency of delivery, quality requirements, and conditions of payment. Farmer organizations are essential to negotiate and implement the terms of the contract. One supermarket chain, Metro, actually invests in the quality development by individual farm enterprises, farmer organizations, and traders, together with the Vietnam ministry of trade, and German and Dutch funding agencies. In collaboration with the Agriculture Development Departments of Vietnam, Metro has provided training to more than 10,000 farmers in good agricultural practices, business knowledge, processing and packaging, and safety standards (Moustier, et al. 2007).

The reforms permitted the private sector to operate with support from foreign investments and an increasing number of international NGOs are setting up offices in Vietnam. The number of local NGOs has also increased as the space for local initiatives broadened both for grassroots organizations and mass state-sponsored organizations to serve as partners in development projects at the community level (Norlund et al. 2006). NGOs, therefore, appear well positioned to play the role of project developer, given their links to international funding sources and experience with agricultural development in local communities. There are 530 international NGOs operating in Vietnam, 256 NGOs in Hanoi and HCMC, and 800 Science and Technology organizations (Wischermann 2003; VUFO 2005; Nguyen Ngoc Lam 2005). NGOs generally have the technical skills and human resources needed to develop carbon offset projects and provide training for farmers.

For example, CASRAD, a government-established research organization, has developed numerous agricultural development projects over the last 10 years with international funding, including projects aimed at linking rural poor producers with supermarkets and other quality supply chains, institution building for the organization and management of collective activities, improving production practices, and increasing the income of the poor. A Vietnamese NGO called Sustainable Rural Development (SRD) focuses on capacity-building among smallholder farmers to intensify rice production and improve environmental protection. Oxfam America, an International NGO, cooperating with the Plant Protection Department of the Ministry of Agriculture and Rural Development (MARD) also promotes a System of Rice Intensification (SRI), which increases returns to producers, reduces the risk of crop loss or failure due to climate shocks or pests and diseases, improves rice quality, and reduces water usage and soil and water pollution by agrochemicals.

The above discussion suggests that there are a number of organizations with potential to aggregate farmers and link them with carbon markets given their experience in agricultural development and integrating smallholder farmers into supply chains. However, several challenges remain to implementing agricultural mitigation projects. First, there is lack of experience and knowledge of carbon markets and the various options for agricultural mitigation. Despite the government's efforts to take advantage of opportunities offered by the CDM, there are a limited number of competent CDM experts in Vietnam and virtually none with expertise on the voluntary carbon markets. That is, local project developers have limited and often unsuccessful experience with the CDM and no experience with VCM procedures such as validation, registration, or verification. There is also a lack of expertise on "new" technologies or practices for agricultural mitigation within

these organizations. Thus, knowledge dissemination and capacity building are required to advance agricultural mitigation projects.

Second, while NGOs and local entrepreneurs have experience in applying for funding for development projects, few are aware and capable of attracting funding for mitigation projects. Developers of agricultural mitigation projects will require support to reframe proposals from a focus on the environmental or social issues to be addressed, to an assessment of the specific project activities proposed and how they will deliver emissions reduction, and provide co-benefits (Practical Action Consulting et al. 2009).

Third, without access to funding sources, start-up costs of establishing a baseline, project verification, and implementation are too great for many project developers. The start-up costs of developing CDM projects in Vietnam (including documentation, registration, validation, and monitoring) can be as high as \$100,000 to \$200,000 per project (Practical Action Consulting et al. 2009). Although the cost of these processes may be slightly lower within the VCM, the financial gains of the VCM are also lower.⁶ NGOs/agencies working on sustainability issues in Vietnam are yet to be convinced that the carbon market offers sufficient returns to warrant the initial investment required in both time and resources. The ability to secure long-term funding is an additional constraint to project development, particularly since benefits are paid only after credits are issued, which can take 2–3 years after the start of the project.

Discussion

Despite significant institutional potential, human capital, and resources to develop and implement agricultural mitigation activities in Vietnam, this is a new area that the country's legal and regulatory system and organizations are not quite prepared to tackle without further funding and capacity strengthening. Expanding opportunities for agricultural mitigation by accessing the VCM will be particularly difficult given the GoV's focus on CDM opportunities and their top-down approach to climate change mitigation. While the GoV has designed the legal framework and designated administrative entities to manage various aspects of their mitigation strategy, there are no guidelines on how to mobilize smallholder farmers to participate in agricultural mitigation and the organizations operating at the local level, such as cooperatives and associations, have no experience or technical capacity to engage in mitigation activities.

Given the government's preference for formal cooperation and organization, local communities also have little experience with collective action around issues of mutual interest. Moreover, government extension agents have little experience collaborating with local communities or adapting their approach to suit local conditions. There is, therefore, a disconnect between government strategies and the reality on the ground.

In order for agricultural mitigation activities to gain support of the GoV, pilot activities involving farmer organizations are essential. These will also increase the capacity of these organizations to engage in mitigation activities. Pilot sites for

⁶With a VCM approach cost savings can be made for registration and issuance, however costs associated with the development of the project design document (PDD), validation and verification, will not be much lower than in the CDM.

agricultural mitigation should target existing farmer organizations that cover large areas, relatively homogenous farmer groups (for example, those specializing in rice production along the Red River Delta), and a range of agroecological conditions to show the variety of agricultural mitigation options.

For smallholder farmers in Vietnam to access markets for agricultural mitigation will require reform in several areas. On the administrative and legal side, the GoV needs to develop a strategy to assist project developers (NGOs and private companies) to pursue agricultural mitigation projects through the voluntary markets. In addition, while there is a general interest by companies in Vietnam to access the voluntary market, developing such interest among smallholder farmers will be more difficult given that the economic benefits are limited and because long-term contracts would hinder the ability of farmers to make production decisions in the short term—many farmers in Vietnam already have good access to markets and tend to adjust cropping decisions and agricultural inputs rapidly based on price signals.

Agricultural mitigation activities must therefore provide additional benefits in terms of environmental conservation and agricultural productivity, or be linked to markets for specialty products enabling farmers to receive higher prices for “green” products. New farmer organizations with commodity chain linkages could engage in these activities. However, they would require additional capacity and knowledge of carbon markets and also an advisory service for this field.

5. CONCLUSIONS

The countries analyzed in this paper are vastly different in terms of historical background and in terms of economic and agricultural development. These differences are reflected in the institutions that characterize these countries. In stark contrast with the other countries, the centrally planned system in Vietnam provides little space for local, community-based organizations to play a role in agricultural development in general and projects for agricultural mitigation in particular. As a result, communities have little experience with collective action around issues of mutual interest. The lack of strong organizations at the local level and limited experience with collective action will make organizing numerous smallholders to engage in agricultural mitigation projects more difficult. At the same time, there is a very strong link between the government, provincial, district, and village communities through official government channels, which could facilitate government-led or government-supported mitigation options.

As demonstrated by the development of several mitigation projects targeting the CDM, state institutions can be used to promote mitigation activities. However, at this point, the success of Vietnam’s CDM strategy is limited due to lack of expertise in carbon markets and limited technical capacity. Furthermore, no such strategy exists to support linkages with voluntary carbon markets, which at this point provide the main opportunity for agricultural mitigation activities. Moreover, the top-down system in Vietnam creates both challenges and opportunities for the development of agricultural mitigation efforts requiring significant community involvement. The expansion of spaces for private companies, NGOs, and farmer organizations will broaden the number of stakeholder options for the development

of future agricultural mitigation efforts, but capacity building will remain essential for successful implementation.

In the three case studies in Africa, several organizations (including public, private, community organizations, and NGOs) have experience that is relevant for the development of projects for agricultural mitigation, including community organizing and establishing market linkages. However, most of these organizations suffer from lack of technical expertise in carbon markets, many have limited knowledge of strategies for agricultural mitigation, and most are faced with a lack of resources needed for start-up and implementation of projects for agricultural mitigation.

In addition, most governments in Africa, including those of Ghana and Mozambique, lack well-defined and coordinated strategies and regulations to support the development of GHG mitigation projects. Rather, they place greater emphasis on adaptation efforts. Furthermore, state support for the development of mitigation projects (in the form of technical assistance, information, funding, and so on) is more limited and the development challenges greater than in the case of Vietnam. For agricultural mitigation projects to get off the ground in this context will require external assistance in terms of technical capacity building and resources from international NGOs, research organizations, and/or private carbon companies. Indeed, international entities (NGOs, private carbon developers, multilateral/bilateral donors, and so on) have developed the few REDD and agricultural mitigation projects operating in the region to date (Shames and Scherr 2010).

Agricultural mitigation will require the support of institutions at multiple levels. At the international level new and expanded market mechanisms for carbon trading, international funds to support mitigation, policies and investments supporting agricultural development are necessary. At the national level, governments need to mainstream agricultural mitigation strategies into economic development and climate change plans, highlighting country level priorities for mitigation, many of which will have synergies with development and climate change adaptation objectives. Coordinated national-level planning that integrates adaptation, mitigation, and development priorities is more likely to maximize benefits to smallholder producers. Furthermore, capacity building is needed to increase knowledge of agricultural mitigation options and how to access carbon markets. As mentioned above, this will require assistance from international NGOs, research organizations, and private companies.

The development of global institutions for agricultural mitigation is slow and fraught with difficulties, and the uncertainty and lack of guidelines increase the transaction costs of agricultural mitigation projects. However, agricultural mitigation efforts can and should develop at the local level (Ostrom 2010). This includes the development of more pilot studies and efforts to increase the technical and organizational capacity building of local organizations to expand agricultural mitigation efforts in the future.

APPENDIX 1: SUMMARY TABLE OF INSTITUTIONAL POTENTIAL FOR AGRICULTURAL MITIGATION

Indicators	Ghana	Morocco	Mozambique	Vietnam
Level 2: Institutional environment				
<ul style="list-style-type: none"> Legal system for addressing climate change 	<p>Ghana ratified the UNFCCC and the Kyoto Protocol. The EPA of Ghana is the designated national authority to comply with these commitments and oversee implementation of the CDM and other climate change activities.</p>	<p>Morocco ratified the UNFCCC and the Kyoto Protocol. Since 1995, Morocco has developed a series of laws and strategies to address climate change in compliance with these commitments.</p>	<p>Mozambique ratified the UNFCCC and the Kyoto Protocol and inter-institutional working groups were created to implement strategies to comply with these commitments under the Ministry for Coordination of Environmental Action (MICOA).</p>	<p>A legal framework for CDM mitigation projects is in place but may be cumbersome for many organizations/businesses. Rules for accessing the VCM have not been developed.</p>
<ul style="list-style-type: none"> National strategies addressing climate change (adaptation/mitigation) 	<p>A national strategy for mitigation has been developed and is being translated into plans at the ministry level. However, climate change efforts in the agriculture sector focus only on adaptation.</p>	<p>The National Action Plan for the Environment includes a strategy for mitigating the country's GHG emissions. Agricultural mitigation projects are specified although the focus is less on agriculture than other sectors. Agricultural cc plans focus on adaptation.</p>	<p>An inter-institutional working group is responsible for developing national plans to confront climate change. Plans for linking with the CDM and for adaptation (NAPA) have been designed.</p>	<p>National strategies for mitigation and adaptation have been developed. The Vietnam National Strategy Study contains a vision and action plan for Vietnam to participate in the global compliance market.</p>
<ul style="list-style-type: none"> Coordination among ministries 	<p>A national committee on climate change under the Ministry of Environment, Science, and Technology reviews policies and programs to complement national priorities and key ministries has begun to integrate cc plans into their operations; however, there is still lack of integrated planning and implementation across national agencies.</p>	<p>Relevant ministries are tasked with carrying out mitigation efforts in their sector. The Ministry of Agriculture and Marine Fisheries and its subsidiary agencies are responsible for agricultural mitigation.</p>	<p>The inter-institutional working group is responsible for mainstreaming climate change into sector plans and many coordination mechanisms have been created. However, there is not yet a systematic institutional focus on climate change and coordination among stakeholders in agricultural development is a problem.</p>	<p>The definition of roles and responsibilities for climate change mitigation is clear and there is significant coordination among ministries.</p>

<ul style="list-style-type: none"> System of property rights 	<p>Customary laws are legalized and land is allocated and regulated by the local chiefs. As rights to use the land do not always accompany land allocation, there may be difficulties for producers to adopt practices for agricultural mitigation.</p>	<p>Parallel systems of customary and formal laws regarding property rights complicate efforts to promote adoption of practices for agricultural mitigation.</p>	<p>The legal framework provides communities/individuals with some degree of tenure security over their land; however, the majority of the population is unaware of their land rights.</p>	<p>The market reforms broke up collective landholdings giving farmers ownership and control over the land they farm.</p>
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Indicators	Ghana	Morocco	Mozambique	Vietnam
Level 2: Institutional environment				
<ul style="list-style-type: none"> Degree of investments in agriculture from government, NGOs, other sources 	<p>Public investments in agriculture are limited. Additional investments are made by donor organizations.</p>	<p>Agricultural investments have been increasing through the <i>Plan Maroc Vert</i>, although the development of the policy framework supporting such investments has lagged behind.</p>	<p>Investments in agriculture are inadequate and plans for agricultural development are poorly executed particularly by government agencies.</p>	<p>Considerable public investments have been made in agriculture and rural development that have transformed the sector from subsistence to export-orientation.</p>
<ul style="list-style-type: none"> Availability of resources for climate change response 	<p>Most national agencies as well as NGOs lack funding for climate change activities in general and mitigation activities in particular. While donor funding for climate change activities is increasing, budgets for many projects remain inadequate.</p>	<p>The PMV includes climate change components but the focus is mainly on adaptation. More investments towards the development of mitigation projects are needed.</p>	<p>Investments in climate change response are inadequate.</p>	<p>Vietnam has already invested considerable resources in their climate change response strategies. Additional investments would be needed, however, to promote agricultural mitigation.</p>
<ul style="list-style-type: none"> Provision of inputs, such as equipment, fertilizer, labor and outputs 	<p>Subsidies for fertilizer and other inputs declined during the structural adjustment period.</p>	<p>The PMV focuses on providing incentives (including inputs) to farmers to increase productivity.</p>	<p>Inputs and production technologies are scarce and productivity is low.</p>	<p>Due to a shift in the agriculture sector towards exports and high-value products, farmers have greater access to inputs through contract farming arrangements, associations, and cooperatives.</p>

<ul style="list-style-type: none"> • Presence and effectiveness of extension and other advisory and information services 	In general, farmers have little access to information from extension agents and lack technical skills.	The PMV focuses on increasing and improving rural development services delivered by MAMF.	Extension services are lacking throughout the country and extension agents have few resources at their disposal.	Extension agents often lack strong ties to the communities and extension approaches are not adapted to local conditions.
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Indicators	Ghana	Morocco	Mozambique	Vietnam
Level 3: Governance				
<ul style="list-style-type: none"> • Technical capacity in SLM and other strategies for agricultural mitigation 	The Ministry of Agriculture and several NGOs possess knowledge of SLM strategies. However, there is little awareness about the potential for SLM to contribute to climate change mitigation.	Several NGOs operating in the country possess knowledge of SLM practices but not of the link between SLM and climate change mitigation.	Some NGOs and private companies have knowledge of SLM practices but there is less awareness of the link between SLM and climate change.	There is a lack of expertise on practices and technologies for agricultural mitigation among most organizations with potential for project development and implementation.
<ul style="list-style-type: none"> • Carbon technical capacity (aggregation, MRV, establishing baseline, legal/contracting, and so on) 	Organizations at all levels lack carbon technical capacity for agricultural mitigation. However, the experience of several REDD initiatives by an international companies/NGOs could pave the way for future agricultural mitigation activities.	Government agencies, NGOs and local organizations do not possess technical capacity for complying with carbon markets. However producer cooperatives/associations and NGOs have experience aggregating farmers for market linkage. CTs could acquire carbon technical capacity.	Most organizations lack carbon technical capacity. However, the experience of several REDD initiatives by an international companies/NGOs could pave the way for future agricultural mitigation activities.	Expertise on carbon markets is limited. Local project developers have limited and often unsuccessful experience targeting the CDM and have no experience with VCM procedures.
<ul style="list-style-type: none"> • Organizational/management capacity 	NGOs have the greatest organizational capacity but lack carbon technical capacity and face budgetary constraints	NGOs have significant organizational strengths (qualified staff, efficient organizational structure, able to mobilize financial resources and so on)	The organizational capacity of many producer associations is limited. Linking farmers with international markets has required involvement of NGOs and private companies.	Local organizations and NGOs are well organized and with sufficient management capacity. However, they lack knowledge and experience with carbon markets and sufficient funding for climate change mitigation.

<ul style="list-style-type: none"> • Linkages with local communities/ local legitimacy 	<p>FBOs and other CBOs are present throughout the country and should be involved in projects for agricultural mitigation.</p>	<p>Cooperatives and community-based NGOs are rooted in the communities and respond to the demands of citizens.</p>	<p>Unclear leadership of agricultural development projects often creates a problem of local legitimacy and a loose sense of ownership of farming communities.</p>	<p>Farmer organizations and many NGOs are well connected with local communities and already an important part of the supply chain process.</p>
<ul style="list-style-type: none"> • Ability to manage participatory design and implementation of projects 	<p>FBOs are grassroots, demand driven organizations which provide channels for farmers concerns and demands and mobilize farmers.</p>	<p>Cooperatives and community-based NGOs are well positioned to organize community members to engage in agricultural mitigation projects.</p>	<p>Producer associations need to be strengthened to better organize and coordinate smallholder farmers.</p>	<p>Farmer organizations are already involved in negotiating and implementing production contracts on behalf of members.</p>
<ul style="list-style-type: none"> • Potential for securing upfront/long-term finance 	<p>Funding for agricultural development is inadequate and even more limited for climate change. This is one of the biggest challenges in the development of projects for agricultural mitigation.</p>	<p>Funding for agricultural development is increasing; however, funds directed towards agricultural mitigation are very limited.</p>	<p>Limited funding is available for agricultural development and less for climate change mitigation. Agricultural mitigation projects</p>	<p>Few organizations are aware and capable of attracting funding for mitigation projects.</p>

APPENDIX 2: GUIDING QUESTIONS FOR THE ASSESSMENT OF ORGANIZATIONAL CAPACITY

Strategic Leadership	
Questions:	<p>Do you have an organizational strategy for climate change/market access? When was the strategy developed? Has it been updated since then? When? Has the organizational strategy been formulated through a consultative process with employees/staff? Were external stakeholders consulted in formulating the organizational strategy on climate change and market access? Does the organization seek external funding to secure core resources for issues on climate change/market access?</p>
Indicators:	<p>Existence of organizational strategy on climate change/market access Existence of dialogue mechanism between organizational leaders and relevant staff and external stakeholders to discuss formulation of organizational on climate change/market access</p>
Organizational structure	
Questions:	<p>Do the organizations have specialized units for dealing with specific climate change and market access issues? If so, what do these units specialize in? Are the work groups and units involved with climate change /market access adequate for implementing the organization's strategy on these respective topics? How centralized (versus decentralized) is decisionmaking? Are the functional units adequately centralized or decentralized? Are work processes clearly structured?</p>
Indicators:	<p>Listing of specialized units dealing with specific climate change /market access issues Number of specialized units dealing with specific climate change /market access issues Number of individuals involved per project or number of projects/activities individuals work on Existence of clear decisionmaking process</p>
Human resources	
Questions:	<p>How many people in the organization are involved in climate change /high-value commodity market access? What are the relevant qualifications and experience of individuals in the organizations involved in designing/implementing policies and programs on climate change /market access? Are they adequately qualified and skilled for their work in relation to climate change/market access? Does the organization have a budget for training and development on work related to climate change /market access? What has been the trend of the budget over time? What kind of trainings related to climate change /high-value commodity market access has staff participated in the past year? How many people were trained? Are the trainings given dependent on the needs in the organization or to whatever is offered on the market or by a donor?</p>
Indicators:	<p>Percentage of people involved in climate change and market access to the entire organization Qualification (including level of education, specialization, years of experience) of</p>

	<p>individuals in relation to topic worked on</p> <p>Number of trainings provided on climate change /market access</p> <p>Listing of kind of training staff participated in</p> <p>Trend on the budget for trainings on climate change /market access</p> <p>Number of people trained on climate change /market access</p>
Financial management	
Questions:	<p>How much are the financial resources allocated to deal with issues on climate change and market access? What is its proportion compared to organization's total budget?</p> <p>How has your budget on climate change /market access developed over time?</p> <p>What is the percentage budget allocation for each of the activities (for example, communication dissemination, project implementation, training) related to climate change and market access?</p> <p>What percentage of the funds on climate change /market access comes from internal and external sources?</p> <p>How frequent is financial planning undertaken?</p> <p>Are members of the governing body involved in financial planning and monitoring?</p> <p>How often is financial information provided to those who need it?</p> <p>Are there financial reports and statements to support effective decisionmaking and good performance?</p> <p>How often are balance sheets and income and expense statements prepared?</p>
Indicators:	<p>Proportion of budget allocated to climate change/market access vis-à-vis organization's total budget</p> <p>Trend on the budget for climate change /market access</p> <p>Percentage allocation of funds for main activities related to climate change /market access</p> <p>Frequency of financial planning undertaken</p> <p>Involvement of governing body in financial planning and monitoring</p> <p>Frequency of sharing of financial information</p> <p>Existence of financial reports</p> <p>Frequency of preparation of balance sheets and income and expense statements</p>
Infrastructure	
Questions:	<p>Are the necessary buildings, facilities, vehicles available and distributed adequately to support work on climate change /market access?</p> <p>Are the necessary computers, software and other specialized equipment available and distributed adequately to support work on climate change /market access?</p> <p>Are the buildings and internal services (water, electricity) adequate to support and facilitate daily work?</p> <p>How has the level (adequacy/inadequacy) of technological resources affected the organization's performance concerning its work on climate change /market access?</p> <p>Overall, is the organization's level of technology appropriate to carry out its functions on climate change /market access? Is any particular unit seriously lagging behind the others technologically?</p> <p>Do all units have access to international information (on climate change /market access) through library and information management systems?</p>
Indicators:	<p>Availability (such as ratio per person) of appropriate facilities and equipment (for example, software, computers) to support work on climate change /market access, including access to communication needs (for example, vehicles, internet, fax)</p> <p>Existence (and accessibility) of library and information management system</p>

Program Management	
Questions:	<p>Is there a written plan for each program area and each major project related to climate change /market access?</p> <p>Are there adequate timelines for the programs on climate change /market access?</p> <p>Are there adequate budgets for the programs on climate change /market access?</p> <p>How often are budgets reviewed?</p> <p>How does the organization monitor its programs on climate change /market access appropriately?</p> <p>Is there a procedure outlined to monitor results?</p> <p>Are monitoring and evaluation systems in place?</p> <p>How often are monitoring and evaluation of programs conducted?</p> <p>Do you regularly review programs related to climate change /market access on a regular basis with respect to how they contribute to the overall organizational strategy on these topics?</p>
Indicators:	<p>Existence of a clear plan for each program/project related to climate change /market access</p> <p>Existence of monitoring and evaluation system</p> <p>Alignment of program/project related to climate change /market access to the organizational strategy on these topics</p> <p>Frequency of program reviews</p> <p>Frequency of conducting budget reviews</p> <p>Extent to which budgets/financial targets are met</p>
Process Management	
Questions:	<p>Is there ongoing internal communication about the organization's activities on climate change /market access?</p> <p>What are the main vehicles of internal communication?</p> <p>Do staff members receive information related to the organizational mission and progress in fulfilling the mission on climate change /market access?</p> <p>How is information on climate change /market access gathered, managed and shared within the organization?</p> <p>What is the process in designing/formulating policies on climate change/market access?</p> <p>What inputs are used in designing policies on climate change/market access?</p> <p>Are research evidence regularly used to support policy and strategy design?</p> <p>Have policies been formulated through a consultative process?</p> <p>Was stakeholder consultation and public participation part of policy design process (policy problem identification, analysis, and choice of policy alternatives) on climate change and market access?</p> <p>To what extent are relevant stakeholders involved in the policymaking process?</p>
Indicators:	<p>Listing of internal communication vehicles</p> <p>Frequency of circulation within organization regarding activities on climate change /market access</p>
Inter-organizational linkages	
Questions:	<p>Does the organization develop and maintain partnerships and networks with important stakeholders involved with climate change /market access such as such as smallholder farmers, researchers, NGOs, policymakers, academe?</p> <p>What specific organizations are these? Please list.</p> <p>What kind of collaboration/partnership do you have with each of these organizations?</p>

	<p>Does your organization exchange information with others concerned with climate change /market access?</p> <p>Has ongoing partnerships with external organizations brought in new ideas and resources to the organization? What are these?</p> <p>Does the organization communicate information about its work to external stakeholders, including the general public?</p> <p>Is the organization electronically linked to the external world of colleagues working on climate change /market access?</p> <p>Does your organization have funds (including staff) to support electronic networks related to climate change /market access?</p> <p>Does the organization develop and maintain regular relations with political authorities of the appropriate executive and legislative areas concerned with climate change /market access?</p>
Indicators:	<p>Existence of partnerships and networks</p> <p>List of organizational partners</p> <p>Proportion of budget for electronic networks and trend in budget</p> <p>Number of electronic networks the organization is a member</p> <p>Existence of relationship with political authorities concerned with climate change /market access</p> <p>Frequency of communication with political authorities concerned with climate change /market access</p>

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