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## Next Steps for Climate Change Mitigation in Agriculture

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### Key messages

- ▶ Agriculture can contribute significantly to climate change mitigation, but more action is needed to identify appropriate implementation mechanisms, technical guidelines, policies and sources of finance to improve readiness and capacity building.
- ▶ Mitigation measures must provide direct benefits to farmers and contribute to national food security, economic development and trade to gain political support and investment.
- ▶ Pilot projects need to demonstrate different mitigation mechanisms and improve their technical and economic feasibility under diverse farm conditions.
- ▶ Simple, cost-efficient and regionally adapted methods are required for monitoring, reporting and verifying agricultural emissions.
- ▶ Carbon markets are unlikely to provide sufficient incentives for widespread adoption of mitigation practices in agriculture.



Agricultural landscapes offer multiple opportunities for climate change mitigation. Photo credit: Neil Palmer

## Introduction

Agriculture is both a major contributor to greenhouse gas emissions and a potential sink for carbon. Shifts in agricultural practices can significantly affect climate change. Yet mitigation of climate change in agriculture has been limited to date. What is needed to advance?

Evidence strongly suggests that climate change mitigation in agriculture is feasible and can be significant at large scales. According to the Intergovernmental Panel on Climate Change, agricultural emissions can be managed by: (1) reducing emissions from methane and nitrous oxide, (2) greenhouse gas removals from the atmosphere through carbon sequestration, and (3) avoiding or displacing emissions, e.g. by maintaining existing biomass or soil carbon, or increasing energy efficiency.

This policy brief proposes that action is needed in six areas:

- ▶ international and national policy support;
- ▶ implementation options and effective governance;
- ▶ developing tools and technical guidelines;
- ▶ financing and economic incentives;
- ▶ strengthening national capacities; and
- ▶ ensuring co-benefits for the environment and poverty alleviation.

Opportunities and barriers for climate change mitigation in agriculture are presented for each of these areas. Key points are summarized in Table 1.

## Increasing international and national policy support

Frameworks already exist for mitigation policy in agriculture at international and national levels. These policy windows (see below) provide scope for action, but few make provisions that directly support mitigation measures. Only New Zealand has enacted a policy to reduce agricultural emissions starting in 2015.

### *Policy windows for agricultural climate change mitigation*

The Kyoto Protocol and the United Nations Framework Convention on Climate Change (UNFCCC)

- ▶ Kyoto Protocol. This permits new eligible activities such as management of croplands, grasslands and wetlands as compliance-grade offset credits. Annex I Kyoto Protocol Parties have to account for all non-CO<sub>2</sub> greenhouse gas emissions from agriculture.
- ▶ Clean Development Mechanism (CDM). The CDM approved a methodology for methane production from smallholder rice systems in 2011.
- ▶ Reduced Emissions from Deforestation and forest Degradation (REDD+). Agriculture is mentioned as a driver of deforestation and is eligible for finance.
- ▶ Nationally Appropriate Mitigation Action (NAMA). NAMAs establish country commitments to reducing greenhouse gas emissions, including emissions from agriculture. Developing countries can seek finance for these activities.
- ▶ UNFCCC negotiations. Agriculture was mentioned under the UNFCCC cooperative sectoral approaches and sector specific actions in the lead up to the climate change conference in Cancun in 2010, and a request has been made to the Subsidiary Body for Scientific and Technical Assistance (SBSTA) for a work program on agriculture.

#### National policies

- ▶ National cap-and-trade bills. There is a regional program in Alberta, Canada for soil tillage. New Zealand's Emissions Trading Scheme will include agriculture in 2015.
- ▶ Low carbon (or emissions) development strategies. These are national efforts to address mitigation across multiple sectors, some include agriculture, e.g. Guyana.
- ▶ National climate action frameworks or plans. These are national initiatives to coordinate policy on climate change and some include agriculture, e.g. Brazil, Kenya.
- ▶ National mitigation standards and carbon crediting. Australia's National Carbon Offset Standard (NCOS) and proposed Carbon Farming Initiative is an example.
- ▶ Intergovernmental collaboration. The Netherlands and Viet Nam are spearheading ministerial level meetings.

To advance policy, mitigation in agriculture will need to be compatible with national goals for food security, economic development and trade. Whether agriculture can become greenhouse gas neutral is an open question that will depend on countries' priorities. The largest potential for mitigating climate change from agriculture is in developing countries. Technical mitigation options in agriculture compatible with sustainable food production such as increasing soil carbon, should therefore be prioritized.

Similarly, mitigation measures must provide tangible benefits to farmers, including the poor. Some may receive higher prices from corporate social responsibility programs for 'low climate impact' agriculture, or may gain income by selling carbon credits or receiving public funds for mitigation practices. However, innovations are needed to further improve access to financial benefits, as current profits per hectare or per tonne of carbon are low. Carbon project developers for example, are looking to aggregate farm-based projects to lower transaction costs and reduce risk.

For developing countries planning to import more of their food, including many in South Asia and sub-Saharan Africa, support for agricultural mitigation rests on measures not limiting trade or reducing economic competitiveness. Trade concerns should be at least partly addressed by compensating importing countries for mitigation costs incurred.

**Table 1. Key barriers and opportunities for agricultural mitigation**

<b>Increasing international and national policy support</b>	
<b>Barriers</b>	<ul style="list-style-type: none"> <li>▶ Lack of clear financial incentives</li> <li>▶ Concern about constraining economic development, food security and trade</li> </ul>
<b>Opportunities</b>	<ul style="list-style-type: none"> <li>▶ Significant mitigation potential globally</li> <li>▶ Technical options exist that are compatible with economic development, adaptation and food security</li> <li>▶ Policies that set caps on emissions could increase carbon prices</li> <li>▶ REDD+ is a precedent and includes agriculture as a driver of deforestation</li> </ul>
<b>Demonstrating implementation options</b>	
<b>Barriers</b>	<ul style="list-style-type: none"> <li>▶ Few pilot projects in place</li> <li>▶ Need to reduce transactions costs and risk</li> <li>▶ Need to demonstrate on-the-ground that shifts in management can lead to reduced net emissions</li> </ul>
<b>Opportunities</b>	<ul style="list-style-type: none"> <li>▶ Technical options for implementation largely known</li> <li>▶ Precedent of REDD+ projects, policies and experimentation with market schemes</li> </ul>
<b>Developing tools and technical guidelines</b>	
<b>Barriers</b>	<ul style="list-style-type: none"> <li>▶ Monitoring, reporting and verification is complicated by the high potential for reversibility in agriculture, difficulties in measuring nitrous oxide and methane, and the cost of measuring diverse and changing farm practices</li> <li>▶ Few developing countries have capacity for this</li> <li>▶ Standard-setting processes are not well coordinated</li> </ul>
<b>Opportunities</b>	<ul style="list-style-type: none"> <li>▶ Standards and verification processes are under development through a number of regulated and voluntary markets</li> <li>▶ A step-wise approach to increasing accuracy thresholds can encourage early mitigation action</li> </ul>

## Financing and economic incentives

### Barriers

- ▶ The carbon market is unlikely to be a stand-alone incentive for changing practices
- ▶ The credibility and value of agricultural offset credits has been hindered by slow progress toward cap-and-trade markets, and challenges in establishing national standards for monitoring, reporting and verification
- ▶ Early financing is needed for readiness and capacity building activities

### Opportunities

- ▶ Aggregating projects may reduce transaction costs and facilitate investment
- ▶ Integrated analysis of potential sources, types and magnitude of finance can compare financing approaches and assess likely impacts and opportunities

## Strengthening national capacities

### Barriers

- ▶ Most developing countries lack capacity for measuring and monitoring greenhouse gas emissions, technical information delivery, and in governance structures for accountability

### Opportunities

- ▶ REDD programs for capacity strengthening already exist

## Ensuring co-benefits for the environment and poverty alleviation

### Barriers

- ▶ Farmers use agriculture to secure food and livelihoods, and climate change mitigation will always be a secondary benefit
- ▶ Farmers lack information about benefits and liabilities associated with carbon market contracts, as well as technical options for mitigation

### Opportunities

- ▶ Existing standards and certification principles can include best practices for mitigation
- ▶ Safeguards can be developed for food security, livelihoods, economic development, pro-poor outcomes and environmental impacts





Planting trees on farms contributes to climate change mitigation while also providing farmers with benefits such as food crops, timber, fodder, and enhanced soil fertility. Photo credit: Neil Palmer

## Demonstrating implementation options

Mechanisms for agricultural mitigation include carbon markets, government regulations such as cap-and-trade programs, corporate supply chains and livelihood options that include mitigation co-benefits. Yet very few examples of these mechanisms exist at present<sup>1</sup>, and more pilot projects are needed to demonstrate how they will work. They should cover diverse activities, farm sizes and agroecosystems – from livestock and fisheries to irrigation, energy use, land restoration and agroforestry. Although some

interventions such as carbon storage in soil or above-ground biomass are well understood, less is known about others such as management of nitrous oxide from manure. Farmers, including smallholders and women, must also actively participate in evaluating options to ensure their relevance and sustainability.

The UN Food and Agriculture Organization has suggested a step-wise approach to encourage early action for an agricultural offset program. In this scheme, pilot projects generate verifiable emission reductions to demonstrate that environmental services can be generated and rewarded. Then, larger scale efforts are implemented with simple accounting methodologies, before countries move to more sophisticated quantification of emission reductions and use of market incentives.

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1. Examples include: Vi Agroforestry in Western Kenya, Plan Vivo's Scolel Te project in Mexico, and CDM woodlot projects such as the Humbo Ethiopia Assisted Natural Regeneration Project. Australia has also been a leader in reducing farm emissions through avoided deforestation, improved perennial pastures and conservation practices. Unilever and Danone have implemented programs to offset their own corporate carbon emissions.

## Developing tools and technical guidelines

Robust monitoring, reporting and verification are needed to ensure that changes in land management result in reduced net emissions. Developing simple, cost-efficient methods that can be applied globally will facilitate comparisons and rapid implementation.

Climate change mitigation in agriculture involves high reversibility, patchiness, variability and diversity of land ownership, making precise monitoring costly. A combination of models and on-farm measurements can yield robust results if applied at large enough scales, though some changes in management can be hard to detect. For example, there is no consensus about the economic feasibility of measuring changes in soil carbon over extensive areas and long time periods, or attributing the changes to land management.

Few standards exist for agricultural practices, though some countries are moving quickly to develop them, e.g. Australia<sup>2</sup>. The Voluntary Carbon Standard is the only system to address agriculture globally, covering improved cropland and grassland management, and crop and grassland conversion. Methodologies currently under review include sustainable agricultural land management practices, nitrous oxide emissions for agricultural crops in the USA from nitrogen fertilizer reductions, afforestation/ reforestation of agricultural land, adoption of sustainable grassland management through fire and grazing, and mosaic deforestation.

## Financing and economic incentives

Both public and private funding will be required to promote climate change mitigation in agriculture. Coordination of finance will help align mitigation funds with development assistance and guide investments to better target strategic needs.

Public finance will be needed to support readiness and capacity strengthening for implementing pilots, sharing lessons, and developing regionally relevant tools and methods for monitoring, reporting and verification. Private finance is important for carbon markets and corporate-driven programs. Agri-businesses have a strong interest in investments that stabilize or enhance food production while contributing to corporate mitigation targets. Consumer demand for low carbon products and increased use of carbon labeling on products can provide additional incentives.

The small number of on-farm pilot projects measuring emissions reductions and sequestration is not yet sufficient to mobilize significant levels of investment capital, and low carbon prices further limit investment interest. The first Emission Reductions Purchase Agreement for soil carbon in Africa was signed in 2010, which should lead the way for more projects. Also, the market value of agricultural offset credits is strongly influenced by regulations requiring international, regional or national compliance to mitigation targets.

## Strengthening national capacities

Low capacity exists in most developing countries for promoting climate change mitigation in agriculture, and accountability structures are typically weak. Few countries have the means for monitoring greenhouse gas emissions or to effectively develop technical options with farmers. REDD programs have begun to

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2. [www.climatechange.gov.au/government/initiatives/national-carbon-offset-standard.aspx](http://www.climatechange.gov.au/government/initiatives/national-carbon-offset-standard.aspx)

address such needs with workshops, training and advanced degrees, but more capacity will be needed. Agriculture should build on the foundations created by REDD and seek additional funding for capacity strengthening in both government and nongovernmental sectors.

## Ensuring co-benefits for the environment and poverty alleviation

Co-benefits will be necessary for mitigation to be widely adopted and sustained. Some existing standards and certification programs like the Climate, Community and Biodiversity Alliance, provide such opportunities, including poverty reduction, enhanced biodiversity and soil health. Mitigation initiatives should also include safeguards such as contributions to a community fund to reduce negative social or environmental impacts. Smallholder farmers still remain largely uninformed about climate change policy and

mitigation options, even in existing REDD and CDM projects. They must be informed about how mitigation mechanisms work, what benefits they can realistically expect and the potential risks from engaging in offset contracts along with other impacts.

## Towards action

The agricultural sector can potentially play a much more significant role in enhancing climate change mitigation at a global level. Action is needed on multiple fronts, from policy to finance and co-benefits. Similar to the Bali Action Plan for REDD, a period of intensive development and investment is needed now, to advance mitigation in agriculture. Moving forward on multiple fronts will enable rapid development of policy, but also more robust approaches to climate change mitigation that also meet the economic development needs in the world's poorest regions.

This policy brief summarizes major concepts from the CCAFS Report and Policy Brief 'Lessons from REDD+ for Agriculture' (2011) by Christine Negra and Eva Wollenberg, available at: [www.ccafs.cgiar.org](http://www.ccafs.cgiar.org). This research was partly supported by the UK Department for International Development (DFID), and resulted from collaboration between the CCAFS program, the University of Vermont and the Heinz Center. The authors are grateful to Cecelia Angelone, Alison Nihart, Sam Bickersteth and the 32 people interviewed for the study. The authors are responsible for any errors.

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