

# Agriculture and Climate Change in National Green Growth Strategies

Working Paper No. 49

CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

Christine Negra



RESEARCH PROGRAM ON  
**Climate Change,  
Agriculture and  
Food Security**



Working Paper

# Agriculture and Climate Change in National Green Growth Strategies

Working Paper No. 49

CGIAR Research Program on Climate Change,  
Agriculture and Food Security (CCAFS)

Christine Negra

**Correct citation:**

Negra C. 2013. Agriculture and Climate Change in National Green Growth Strategies. CCAFS Working Paper no. 49. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark. Available online at: [www.ccafs.cgiar.org](http://www.ccafs.cgiar.org)

Titles in this Working Paper series aim to disseminate interim climate change, agriculture and food security research and practices and stimulate feedback from the scientific community.

This document is published by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), which is a strategic partnership of the CGIAR and the Earth System Science Partnership (ESSP). CCAFS is supported by the CGIAR Fund, the Danish International Development Agency (DANIDA), the Australian Government Overseas Aid Program (AusAid), Irish Aid, Environment Canada, Ministry of Foreign Affairs for the Netherlands, Swiss Agency for Development and Cooperation (SDC), Instituto de Investigação Científica Tropical (IICT), UK Aid, and the European Union (EU). The Program is carried out with technical support from the International Fund for Agricultural Development (IFAD).

**Contact:**

CCAFS Coordinating Unit - Faculty of Science, Department of Plant and Environmental Sciences, University of Copenhagen, Rolighedsvej 21, DK-1958 Frederiksberg C, Denmark. Tel: +45 35331046; Email: [ccaafs@cgiar.org](mailto:ccaafs@cgiar.org)

Creative Commons License



This Working Paper is licensed under a Creative Commons Attribution – NonCommercial–NoDerivs 3.0 Unported License.

Articles appearing in this publication may be freely quoted and reproduced provided the source is acknowledged. No use of this publication may be made for resale or other commercial purposes.

© 2013 CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). CCAFS Working Paper no. 49

**DISCLAIMER:**

This Working Paper has been prepared as an output for the Commission on Sustainable Agriculture and Climate Change under the CCAFS program and has not been peer reviewed. Any opinions stated herein are those of the author(s) and do not necessarily reflect the policies or opinions of CCAFS, donor agencies, or partners.

All images remain the sole property of their source and may not be used for any purpose without written permission of the source.

## Abstract

As a national development model that simultaneously pursues socio-economic progress and environmental conservation, the Green Growth concept is being tested in countries around the world through context-specific policies and projects. This report reviews Green Growth policy actions related to agriculture and climate change by eight countries – Mexico, Vietnam, Rwanda, India, South Korea, China, France and Australia – and assesses progress and challenges as well as the apparent significance of the 2007-2008 global financial crisis in motivating Green Growth strategies. As national strategies evolve into on-the-ground practice, robust investment in climate-smart agriculture will be essential to achieving real sustainability.

## Keywords

Green Growth, national policy, climate change, agriculture.

## About the author

Christine Negra produced this working paper as an independent consultant based in New York, NY, USA, +1 202.631.9016, [christine@ideapaths.org](mailto:christine@ideapaths.org)

## Acknowledgements

This working paper follows the 2012 report on ‘Achieving food security in the face of climate change’ by the Commission on Sustainable Agriculture and Climate Change (<http://ccafs.cgiar.org/commission>), which produced a set of recommendations for policy action including making sustainable, climate-friendly agriculture central to Green Growth and the Rio+20 Earth Summit.

# Contents

Abstract .....	3
Keywords .....	3
About the author .....	4
Acknowledgements .....	5
Contents .....	6
Acronyms .....	7
I. Introduction .....	9
II. National examples .....	10
Mexico .....	10
Vietnam: .....	12
Rwanda .....	14
India .....	16
South Korea .....	18
China .....	20
France .....	23
Australia .....	24
III. Conclusions: Is there real ‘green’ in Green Growth? .....	27
Sustainable, climate-friendly agriculture .....	27
National progress toward Green Growth .....	28
Effect of the global financial crisis .....	30
IV. Going forward .....	32
References .....	33

## Acronyms

ADB	Asian Development Bank
CAP	European Union Common Agricultural Policy
CCAP	Australian Climate Change Adaptation Program
CDM	Clean Development Mechanism
COP	Conferences of the Parties to the UNFCCC
ELUP	National Ecological Land Use Plan, Mexico
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FLEGT	Forest Law Enforcement, Governance and Trade
GAFSP	the Global Agriculture and Food Security Program
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information Systems
GPI	Genuine Progress Index
LCP	Land Consolidation Program, Rwanda
LDCF	Least Developed Countries Fund
MDG	Millennium Development Goals
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act, India
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
PAGE	Partners for Action on Green Economy

PECC	Special Climate Change Program, Mexico
PES	Payment for Ecosystem Services
R&D	Research and Development
REDD	Reducing Emissions from Deforestation and Forest Degradation
SP-RCC	Vietnam's Support Program to Climate Change
TEEB	The Economics of Ecosystems and Biodiversity
UNCSD	United Nations Conference on Sustainable Development (Rio+20)
UNDESA	United Nations Department for Economics and Social Affairs
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNFCCC	United Nations Framework Convention on Climate Change
VPA	Voluntary Partnership Agreement

## I. Introduction

The term Green Growth signifies an alternative development path that simultaneously pursues socio-economic progress and environmental conservation. The conceptual foundation for Green Growth has been evolving on the world stage through major international meetings in the 1970s and 1980s, the Brundtland Commission report (1987) and the 1992 Rio Earth Summit. Following the global financial crisis of 2007-2008, enthusiasm has grown among national and global leaders for Green Growth as a route to economic recovery and advancement through sustainable, low-carbon development (Runnalls, 2011).

In 2010, the Organization for Economic Co-operation and Development (OECD) published an interim report on Green Growth strategy (OECD, 2010) and in 2011 the United Nations Environment Program (UNEP) produced its *Towards a Green Economy* Report (UNEP, 2011). In its 2012 report, the Commission on Sustainable Agriculture and Climate Change recommended making sustainable, climate-friendly agriculture central to Green Growth and the Rio+20 Earth Summit (Beddington et al., 2012). In Rio, policy makers agreed on Green Growth guidelines rather than concrete policy commitments (UNDESA, 2012b).

While a global framework is still evolving (UNCSD, 2012b), innovative action around the world is testing the Green Growth concept through context-specific policies and projects. Critics have questioned the degree to which early efforts to implement Green Growth are sustainable (Hoffmann, 2011). This report reviews the degree to which sustainable, climate-friendly agriculture is included in the national Green Growth strategies of eight nations: Mexico, Vietnam, Rwanda, India, South Korea, China, France and Australia.<sup>1</sup>

<sup>1</sup> This report does not investigate how well national Green Growth strategies incorporate social dimensions (e.g. gender, indigenous rights, etc.) or rights-based approaches.

## II. National examples

In *The Future We Want*, the outcome document adopted at the Rio+20 Earth Summit, signatory governments stated:

*“We view the implementation of green economy policies by countries that seek to apply them for the transition towards sustainable development as a common undertaking, and we recognize that each country can choose an appropriate approach in accordance with national sustainable development plans, strategies and priorities... We also invite business and industry as appropriate and in accordance with national legislation to contribute to sustainable development and to develop sustainability strategies that integrate, inter alia, green economy policies.”* (UNCSD, 2012a)

A growing number of countries are developing national Green Growth strategies. They range from scoping studies to policy documents to prioritized action plans and have diverse institutional arrangements for inter-ministerial engagement and stakeholder consultation (e.g. lead agencies; new coordinating bodies) (UNDESA, 2012a). Only a few OECD countries have national Green Growth strategies, although concepts are being applied in agriculture through a variety of mostly pre-existing policy instruments (Andrew, 2012).

### Mexico<sup>2</sup>

Climate change and social and environmental sustainability were central elements of Mexico's National Development Plan for 2007-2012 (UNEP, 2012). Environmental policy integration has been encouraged through the Inter-Ministerial Commission on Climate Change which developed the Special Climate Change Program (PECC) that achieved 2012 greenhouse gas (GHG) reduction targets, modernized meteorological capacity, created a national vulnerability atlas, and developed emergency plans for extreme weather events. Mexico has built viable economic and environmental accounting systems and the National Consultative Council on Sustainable Development engages state governments in policy discussions.

<sup>2</sup> This section draws heavily on the Organisation for Economic Co-operation and Development (OECD) Environmental Performance Reviews: Mexico 2013 Assessment and Recommendations.

The 2012 passage of a General Law on Climate Change confirms a 30% GHG emissions reduction target by 2020 from the 2000 level (and 50% by 2050), established a voluntary emissions trading system, and mandated supporting institutions including a fund for harmonizing funding streams and projects (GLOBE, 2013). Eight ministries, including Agriculture, are tasked with creating a holistic national mitigation and adaptation policy. Mexico has demonstrated leadership under the United Nations Framework Convention on Climate Change (UNFCCC) as host to COP16 in 2010, as home to many Clean Development Mechanisms (CDM) projects, through its four National Communications and through its role in Reducing Emissions from Deforestation and Forest Degradation (REDD+) design. REDD+ implementation will be aided by 2012 reforms to the Environmental Law and Sustainable Forest Development Law and improved community forestry incentive programs under CONAFOR, the national forest commission (CIF, 2013).

Water and sanitation improvements exceeded Millennium Development Goals (MDGs) and water charging systems have been tested, however water conservation incentives in agriculture are not yet in place. Government subsidies to agriculture are below the OECD average and have been declining since 2000, yet 66% of government spending in rural areas is in the form of subsidies. Most agricultural subsidies emphasize increased production and encourage high input use and expansion of crop and livestock production, a primary driver of deforestation and land use change land. Mexico has experimented with 'fishery buybacks' to combat overexploitation of marine fisheries.

Agriculture is a very minor component of foreign direct investment, official development assistance (ODA) and government spending, and a shrinking percentage (from 35% in 1980 to 16% in 2010) of national employment (FAO, 2012b). While not a major recipient of ODA, a 2011 law on development cooperation established an aid agency to report on ODA. The number of organic agricultural producers in Mexico is among the highest in the world (UNEP, 2013a).

The 2012 National Ecological Land Use Plan (ELUP) creates the foundation for land use planning and zoning that promotes conservation and sustainable use of ecosystems (so far, 43 ELUPs have been decreed). The National ProArbol forestry payment for ecosystem services (PES) program spans over 3 million hectares. Protected areas in Mexico receive 14 million visitors per year, supporting 25,000 jobs (UNEP, 2013a).

Summary of national policy actions that contribute to sustainable agriculture under climate change in Mexico:

Progress:

- 2012 General Law on Climate Change confirmed a 30% GHG reduction target by 2020 and established a voluntary emissions trading system
- International leadership in UNFCCC (COP16 host, CDM projects, four National Communications, REDD+ design)
- Inter-Ministerial Commission on Climate Change promotes environmental policy integration
- Modern meteorological capacity, a national vulnerability atlas and extreme weather emergency planning initiated under the Special Climate Change Program
- 2012 National Ecological Land Use Plan enables ecologically-based zoning
- Sustainable forestry supported by ProArbol PES program, legal reforms related to REDD+ and community forestry incentive programs under CONAFOR
- Piloting of water charging systems; water and sanitation improvements
- Sustainability and climate change central to the National Development Plan

Challenges:

- Achieving a holistic national mitigation and adaptation policy with input from eight ministries.
- Reforming agricultural subsidies (OECD has suggested replacing agricultural subsidies with direct social spending to reduce incentives for inefficient practices and agricultural expansion while addressing social equity concerns)
- Implementing water conservation incentives in agriculture
- Establishing Ecological Land Use Plans (ELUPs) for regions under greatest development pressure (OECD, 2013)

**Vietnam:**

The climate change policy framework of Vietnam has several major components. The National Target Program to Respond to Climate Change (2008) seeks to respond to climate change and sustainable development through a green development strategy in agriculture, industry and energy, supported by research and public communication and international cooperation (Nguyen, 2012a). The National Climate Change Strategy (2011) fosters

sustainable utilization of national resources, adaptation and mitigation, sea level rise and disaster preparedness, climate monitoring, food and water security, and biodiversity conservation. The objective of the National Green Growth Strategy (2012) is a low carbon economy that reduces the intensity of GHG emissions and promotes the use of clean and renewable energies and greening of production and consumption (Nguyen, 2012b). The National Action Plan to Respond to Climate Change 2012-2020 includes 65 programs, projects and tasks in 2012-2020 with 10 priorities in 2012-2015.

Vietnam's Support Program to Climate Change (SP-RCC) provides a platform to aid harmonization, promote climate change policy dialogue, introduce new technologies, and facilitate climate change project priority and formulation, under the management of the Ministry of Natural Resources and Environment. Through the SP-RCC, the need for better coordination and communication between ministries and provinces has been recognized (UNFCCC, 2012) and a GHG emission program for the agricultural sector has been introduced (CIDA, 2012).

With agricultural households operating on less than 0.5 hectares on average, expanding demands on the land base, and perceptions of widespread 'land grabbing', demand for secure land rights has intensified pressure for reform of Vietnam's 2003 Land Law (Gillespie, 2013). National food safety standards have been developed in Vietnam, which may assist agricultural producers in meeting sustainability certification requirements (UNEP, 2013a). Through a Memorandum of Understanding with the Marine Stewardship Council (2005), the Vietnamese Government has signaled its interest in promoting sustainable fishing practices (UNDESA, 2013a).

A UN-REDD pilot country since 2009, Vietnam is transitioning to Phase II having gained experience with monitoring, reporting and verification (MRV), information systems, safeguards (e.g. free, prior and informed consent, FPIC, guidelines), participatory governance and benefit distribution. A high-biodiversity REDD+ project is being piloted with support from the Netherlands (Boyle and Murphy, 2012). Vietnam has submitted two National Communications to the UNFCCC and is home to 56 registered CDM projects. Reforestation programs include the 5 Million Hectares Reforestation Program, which ameliorates deforestation due to hydropower development (GLOBE, 2013). Vietnam is in negotiations with the European Union (EU) regarding a bilateral Voluntary Partnership Agreement (VPA)

under the Forest Law Enforcement Governance and Trade (FLEGT) Action Plan, which combats illegal logging and trade in forest products (UNDESA, 2013a).

Summary of national policy actions that contribute to sustainable agriculture under climate change in Vietnam:

Progress:

- National Target Program to Respond to Climate Change (2008) sets out a green research, development and communication strategy in agriculture, industry and energy
- National Climate Change Strategy (2011) includes sustainable national resource use; climate adaptation, mitigation and monitoring; food and water security; and biodiversity
- National Green Growth Strategy (2012) charts a course to a low carbon economy
- National Action Plan to Respond to Climate Change 2012-2020 includes 65 programs, projects and tasks in 2012-2020 with 10 priorities in 2012-2015
- Support Program to Climate Change (SP-RCC) harmonizes climate change policy and projects across ministries
- Phase II UN-REDD pilot country; piloting a high biodiversity REDD+ project
- 5 Million Hectares Reforestation Program addresses deforestation due to hydropower

Challenges<sup>3</sup>:

- Adjusting agriculture master plan to include ‘green agriculture’ and GHG emissions reduction objectives including R&D, infrastructure investments (e.g. water systems), financing and market incentives
- Diversifying rural agricultural livelihoods
- Accelerating afforestation/reforestation and sustainable forest management projects

## Rwanda

The Rwanda National Strategy on Climate Change and Low Carbon Development (2011) was developed by ten ministries with assistance from British academic, governmental and philanthropic institutions. With emphasis on both mitigation (N<sub>2</sub>O from agricultural soils and CH<sub>4</sub> from enteric fermentation generate 76% of national emissions) and adaptation, the

<sup>3</sup> This section draws heavily on “Vietnam National Green Growth Strategy” (Nguyen, 2012b).

strategy points to soil fertility management, agroforestry, irrigation infrastructure and road networks that enable food transport as key opportunities (Republic of Rwanda, 2011).

With support from UNEP's Least Developed Countries Fund (LDCF), Rwanda is creating a National Fund for Climate and the Environment to manage the flow of climate funds into Rwanda as well as a multidisciplinary Centre for Climate Knowledge for Development to facilitate knowledge exchange among ministries and stakeholders (UNDESA, 2012a).

Rwanda's National Adaptation Program of Action focuses on preventing water shortages and landslides and increasing resilience to climate change (GLOBE, 2013).

Rwanda's National Land Policy (2004) included a Land Consolidation Program (LCP), which sought to reduce fragmentation of land and enhance the livelihood of household farmers (Onguka, 2013). Since 2007, the Ministry of Agriculture has operated the Crop Intensification Program, which focuses on access to inputs (e.g. land, seeds, fertilizer), erosion control (e.g. terracing, agroforestry), livestock management and ownership (e.g. over 90,000 households now have animals), research and extension, and domestic and regional market development (e.g. sanitary standards, cold storage chains) (Nsengiyumva, 2011).

The Vision 2020 Umurenge Program integrates experience from diverse social protection initiatives by ministries, donors and NGOs and delivers direct support (cash transfers to rural households), public works (wages for labor on community infrastructure or agricultural productivity) and loans (HLPE, 2012).

The Rwandan Land Husbandry, Water Harvesting and Hillside Irrigation Project is the first grantee of the Global Agriculture and Food Security Program (GAFSP). US\$ 50 million will support research, extension, value chains and finance focused on reducing erosion and better resource management in over 10,000 hectares of hillside farms connected to 11,000 households (GAFSP, 2012; MINAGRI, 2010).

Summary of national policy actions that contribute to sustainable agriculture under climate change in Rwanda:

Progress:

- National Strategy on Climate Change and Low Carbon Development (2011) includes climate mitigation and adaptation, soil fertility management, agroforestry, irrigation infrastructure and road networks that enable food transport

- National Fund for Climate and the Environment will be a management center for international climate funds; Centre for Climate Knowledge for Development will facilitate knowledge exchange among ministries and stakeholders.
- National Adaptation Program of Action addresses water shortages, landslides and climate change resilience
- Land Consolidation Program combats land fragmentation in support of farmers livelihoods
- Crop Intensification Program (2007) works to improve access to agricultural inputs, erosion control, livestock management and ownership, research and extension, and domestic and regional market development
- Vision 2020 Umurenge Program delivers direct social support (cash transfers; public works for community infrastructure or agricultural productivity; loans)
- Land Husbandry, Water Harvesting and Hillside Irrigation Project is first GAFSP grantee, receiving US\$ 50 million for improved management of hillside farms

#### Challenges:

- Converting high population density and urbanization into an economic advantage while maintaining low per capita GHG emissions (Republic of Rwanda, 2011).
- Building resilience in rain-fed agriculture and diversifying agricultural production and export (Republic of Rwanda, 2011).
- Modernizing agricultural finance, rural infrastructures and market information systems (Nsengiyumva, 2011)

## India

The National Action Plan on Climate Change (2008) provides guidance for adaptation and mitigation through eight national missions including sustainable agriculture, forest cover, water supply, habitat conservation and strategic knowledge. Government-wide strategy is coordinated by the Prime Minister's Council on Climate Change (UNESCAP, 2012) and progress will be complemented by state-level Action Plans (GLOBE, 2013).

Recommendations from an Expert Group on Low Carbon Strategy for Inclusive Growth were central to India's 12<sup>th</sup> Five Year Plan (2012-2017). The National Environmental Policy (2006) prescribes a reduction in resource use per unit of economic output (UNESCAP, 2012).

India has documented its GHG emissions through two National Communications submitted to the UNFCCC – the most recent one included a vulnerability assessment – and there are nearly 900 registered CDM projects in India (GLOBE, 2013). In Andhra Pradesh and Rajasthan, two research centers are developing and piloting a protocol, SMART-CDM, for aggregating diverse farm activities by smallholder farmers across agro-ecological zones and increasing benefit to farmers from international carbon markets (Pye-Smith, 2012).

With assistance from the Asian Development Bank, the National Water Mission of India's National Action Plan on Climate Change is assessing priority adaptation strategies through pilot studies in three sub-basins that are experiencing major water challenges (ADB, 2013). Index micro-insurance targeted to 'uninsurable' farmers has been piloted using outcome monitoring of different delivery models (UNESCAP, 2012).

The 2006 Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) operates in every district in India. In 2010-2011, MGNREGA provided jobs for over 50 million rural households (at least one-third of workers must be women) at a cost of US\$9.1 billion. Over 80% of work projects have contributed to natural resource rehabilitation (Mahapatra, 2010). In Andhra Pradesh, MGNREGA was instrumental in bringing millions of acres of fallow land in small and fragmented parcels into productive use (Vakatti, 2013). The National Food Security Bill, if enacted by Parliament, will entitle some 800 million people to purchase staple food at subsidized prices (HLPE, 2012).

Small-scale farming, animal husbandry, forestry and fisheries are the primary livelihoods of 480 million Indians (UNESCAP, 2012). India accounts for 16% of agricultural GDP and 20% of the agricultural work force in the developing world. Of total global public agricultural research expenditures, India represented 6.7% in 2008 having increased its research and development (R&D) spending by more than 40% since 2000 (Beintema et al., 2012). India is a major global player in production, export and use of biodiesel (UNEP, 2013a).

The National Land Records Modernization Program is working to develop an effective, publicly accessible information system to improve on the overburdened manual land records system (Singh, 2013). To assist informal tenant farmers in accessing bank loans, input subsidies and crop insurance, the Andhra Pradesh Licensed Cultivators' Act enabled loan eligibility cards, however relatively few tenant cultivators have successfully received these, possibly due to low awareness or concern among legal landowners (Haque, 2013).

Summary of national policy actions that contribute to sustainable agriculture under climate change in India:

Progress:

- National Action Plan on Climate Change (2008) guides climate change adaptation and mitigation including sustainable agriculture, forest cover, water supply, habitat conservation and strategic knowledge
- Mahatma Gandhi National Rural Employment Guarantee Act (2006) provides ‘green jobs’ for over 50 million rural households throughout India
- If enacted, the National Food Security Bill would subsidize staple foods for 800 million people
- 12<sup>th</sup> Five Year Plan (2012-2017) was informed by an Expert Group on Low Carbon Strategy for Inclusive Growth
- Government-wide strategy coordinated by Prime Minister’s Council on Climate Change
- Engagement in UNFCCC: two National Communications; 900 registered CDM projects
- Two provinces are piloting SMART-CDM protocol for aggregating smallholder farm activities across agro-ecological zones to improve access to carbon markets
- National Water Mission is piloting adaptation strategies in three water-challenged areas
- Spent 6.7% of total global public agricultural research expenditures in 2008
- National Land Records Modernization Program will improve efficiency and public access

Challenges:

- Meeting ambitions for inclusive green growth despite population pressures, widespread poverty and climate change impacts on water resources
- Developing a consistent national framework for climate-related policy that effectively operationalizes a co-benefits approach (Dubash, 2013)
- Reconciling food security and biofuel energy needs in agricultural sector policies and investments

## South Korea

In 2008, low carbon green growth was identified as South Korea’s vision for development and a ‘Green New Deal’ stimulus package was approved early in 2009 (GLOBE, 2013; UNDESA, 2012a). As part of a major economic recovery package, the ‘Green New Deal’ focuses on green jobs, water management, river rehabilitation and clean energy (OECD,

2010). The Global Green Growth Institute is chaired by the former Prime Minister of Korea (Runnalls, 2011) and Korea has sponsored the Seoul Initiative Network on Green Growth (UNESCAP, 2012).

Later in 2009, led by a Presidential Commission, South Korea was an early innovator on the global stage with the publication of its National Strategy for Green Growth (Republic of Korea, 2009) and Five Year Plan, as well as an early adopter of the OECD's green growth indicators and measurement tools (UNDESA, 2012a). The Strategy emphasizes economic and environmental synergy, a green lifestyle revolution and contributing to mitigation efforts for climate change and other global concerns.

Formal adoption occurred through enactment of the Framework Act on Low Carbon Green Growth by the Korean National Assembly, which also provided a legislative foundation for a range of policy instruments (i.e. cap-and-trade, carbon tax, carbon disclosure and labeling, renewable energy expansion, REDD and other land use policies) and mandatory reporting of carbon emissions by relevant industries (GLOBE, 2013; UNDESA, 2012a). This is supported by a 2010 Enforcement Decree.

The Framework Act of 2009 indicates that, every five years, the Korean government must develop a 20-year climate change adaptation plan. The National Climate Change Adaptation Master Plan for 2011-2015 lists 86 major projects (some of which relate to agriculture, forestry, fisheries, water, ecosystems and climate monitoring), establishes an implementation committee representing 13 ministries, and provides for local planning (GLOBE, 2013). The Master Plan was updated in 2012 to reflect a new national climate change vulnerability assessment.

The 2012 Act on the Allocation and Trade of Greenhouse Gas Emissions Rights establishes a national emissions trading scheme to be mobilized toward meeting mid- and long-term emissions reduction targets, beginning in 2015. Sectoral scope, operational structure and permit allocations will be clarified through presidential decree (GLOBE, 2013).

The Ministry for Food, Agriculture, Forestry and Fisheries conducts regular policy reviews (e.g. the 3<sup>rd</sup> Five Year Plan on Environment-Friendly Agricultural Industry in 2010) and operates 27 regional environmentally-friendly agricultural enterprises. Policies in the food and agriculture sector have led to reductions in fertilizer (8.8% between 2009 and 2010) and

energy use, and investment in green technology and organic production methods (US\$ ~1 billion) (OECD, 2011). Agricultural subsidies are among the highest of the OECD countries and are heavily linked to production, which can obscure market signals (OECD, 2010).

Pressure is increasing for an improved land information system and a Virtual Spatial Information System to support agricultural productivity is in development (Kwak, 2013). Social consensus on cadastral reform is being sought through ‘public participation geographic information systems (GIS)’ (Lee, 2013).

Summary of national policy actions that contribute to sustainable agriculture under climate change in South Korea:

Progress:

- ‘Green New Deal’ stimulus package (2009)
- National Strategy for Green Growth and Five Year Plan (2009) emphasizes economic and environmental synergy, green lifestyles and climate change mitigation
- Framework Act on Low Carbon Green Growth enables policies for cap-and-trade, carbon tax, carbon reporting, renewable energy and REDD/land use and also mandates regular updating of a 20-year climate change adaptation plan
- Act on the Allocation and Trade of Greenhouse Gas Emissions Rights (2012) establishes a national trading scheme to meet emissions reduction targets
- 2013 national climate change vulnerability assessment
- Virtual Spatial Information System to support agricultural productivity

Challenges:

- Determining the sectoral scope, operational structure and permit allocations of national emissions trading scheme
- Reforming agricultural subsidies
- Reversing trend of annual forest loss

## China

The 2007 National Climate Change Program, the 2008 Policies and Actions for Addressing Climate Change and the 2009 Climate Change Resolution inaugurated climate change policy in China, however a comprehensive Climate Change Bill is still pending and primary focus has been directed to the energy sector (GLOBE, 2013). In preparation for a national scheme

scheduled for 2020, emissions trading systems are being piloted in seven municipalities and provinces. The National Development Reform Commission has the leadership role for climate change policy (UNESCAP, 2012).

With major emphasis on renewable energy, China's 12<sup>th</sup> Five Year Plan (2011-2015) mandates a 17% reduction in GDP carbon intensity (i.e. the amount of carbon emitted per unit of economic activity) from 2005 levels by 2015, commits to 15% non-fossil fuel sources by 2020, expands the suite of regulated GHGs and targets a 21.6% increase in forest cover (GLOBE, 2013; UNEP, 2013a). Ministries and provinces are responsible for delivering to targets. The previous Five Year Plan (2006-2010) enshrined the circular economy concept (efficient resource use, recycling and environmental protection) as China's national development model (UNEP, 2013a).

China has published a series of Green Development Index reports with three 'first-class' indicators for environment and resources reflecting carrying capacity, the influence of economic growth, and support by government policy (Xiaoxi, 2012). Scientific development, mainstreaming ecological concerns and evolving a China-specific approach have been central during the gradual formulation of China's green economy strategy and, going forward, there will be emphasis on resource saving, indicators and optimizing land use (Hai, 2012). As part of China's green economy path, the Genuine Progress Index (GPI), which includes economic, environmental and social accounting, will complement GDP and will be a new standard for political performance of regional officers (Jin, 2012). In response to the financial crisis, China's major stimulus package (US\$586 billion) was ~40% 'green' (OECD, 2010).

Home to almost one-quarter of the developing world's agricultural GDP and 40% of its agricultural work force, China represented 13% of total global public agricultural research expenditures in 2008 having more than doubled its R&D spending since 2000 (Beintema et al., 2012).

In pursuit of improved agricultural productivity, China plans to increase water conservation investments to a total of US\$ 630 billion over the next 10 years. China is a leader in payments for watershed services, accounting for 61 initiatives and 91% of payments globally in 2011. These payments provide both environmental and economic benefits in rural regions (Bennett et al., 2013). China has conducted a TEEB (the Economics of Ecosystems and Biodiversity)

study for Water and Wetlands and has signaled support for a national TEEB study to inform its environmental management strategies.

Through the Priority Forestry Program, China has combined rural poverty reduction with environmental protection through production of forest-based cash crops by rural households. Expertise in afforestation and forest product markets has been a positive ancillary benefit (Putzel, 2013). A major importer and exporter of forest products, China is experiencing growing demand for certified wood products and the area of certified forests is rising (UNDESA, 2013a).

Summary of national policy actions that contribute to sustainable agriculture under climate change in China:

Progress:

- National Climate Change Program (2007), Policies and Actions for Addressing Climate Change (2008) and Climate Change Resolution (2009) inaugurated climate change policy
- Emissions trading being piloted in seven areas to prepare for a national scheme in 2020
- 12<sup>th</sup> Five Year Plan (2011) prescribes a 17% reduction in GDP carbon intensity by 2015 and a 21.6% increase in forest cover
- Green Development Index reports on carrying capacity, influence of economic growth and policy support related to environment and resources; Genuine Progress Index (GPI) holds public officials responsible for economic, environmental and social advances
- Spent 12.8% of total global public agricultural research expenditures in 2008
- Global leader in payments for watershed services; will increase water conservation investments to US\$ 630 billion over 10 years
- Priority Forestry Program combines rural poverty reduction with environmental protection through production of forest-based cash crops by rural households

Challenges:

- Establishing a comprehensive climate change bill
- Expanding primary focus beyond energy sector; optimizing land use
- Increasing efficiency (land, water, energy, etc.) and resilience (land rehabilitation) in agriculture sector
- Reconciling food security and biofuel energy needs in agricultural sector policies and investments

## France

France's National Program for Tackling Climate Change (2000) summarized national objectives, many of which were subsequently addressed through legislative and regulatory actions for energy, finance, agriculture and urban planning (GLOBE, 2013). The 'Plan Climat 2004' (2004 Climate Plan) included tax exemptions for organic farmers. Under the Energy Policy Framework (2005), updated Climate Plans are now required biennially.

The 2006 Farming Policy Framework set a 7% biofuels target for 2010, exceeding the European target of 5.75% (GLOBE, 2013). A 'plan performance énergétique' (Energy Performance Plan) addresses energy efficiency in agriculture, renewable energy production and farmers' economic competitiveness, and provides for expanding farm energy audits (Dale, 2012).

France's National Sustainable Development Strategy *Towards a Green and Fair Economy* (2010), coordinated through an inter-ministerial Committee for Sustainable Development, aims for a decarbonized and equitable economy through nine strategic challenges (UNDESA, 2012a). A 'sustainable development scoreboard' and 50 quantitative targets and objectives address sectoral and cross-sectoral issues including sustainable consumption and production, climate change, management of biodiversity and natural resources, sustainable development and global poverty (Republic of France, 2010). In the aftermath of the global financial crisis, France released a Green Growth and Employment plan and 21% of its US\$ 33 billion stimulus package targeted 'green' measures (OECD, 2010).

France operates within the context of the EU, whose agricultural policies are generally structured to allocate funds to farmers and regions, while environmental policies take a regulatory approach. For example, under the EU Common Agricultural Policy (CAP), investments in water management at the farm or regional level can be compensated, but flood and drought risk management are handled through separate policy mechanisms (Berkhout et al., 2013).

Together with Brazil, Denmark, Norway and South Africa, France is one of the 'Group of Friends of Paragraph 47' of the Rio+20 Outcome Document, specifying the Global Reporting Initiative (GRI) which encourages integrated sustainability reporting by private companies (UNEP, 2013a).

Summary of national policy actions that contribute to sustainable agriculture under climate change in France:

Progress:

- National Sustainable Development Strategy (2010) sets out nine strategic challenges for achieving a green and fair economy and quantitative objectives for sustainable consumption and production, climate change, management of biodiversity and natural resources, sustainable development and global poverty
- The 'plan performance énergétique' (Energy Performance Plan) addresses energy efficiency in agriculture, renewable energy production and farmers' economic competitiveness
- The National Program for Tackling Climate Change (2000) summarized national objectives, many of which were subsequently addressed through legislative and regulatory actions for energy, finance, agriculture and urban planning
- Under the Energy Policy Framework (2005), Climate Plans are now updated biennially

Challenges:

- Achieving GHG emissions reduction targets in context of European financial conditions
- Harmonizing agricultural and environmental policies and responding to climate change vulnerability
- Navigating discontinuities between national and European Union policies

## Australia

A net food exporter, Australia dedicates 59% of its land area to agriculture, which is projected to suffer productivity losses in major commodities in the coming decades due to climate change (DAFF, 2012). Water use intensity is relatively low at 0.06 m<sup>3</sup> of water used for every dollar of national GDP (UNESCAP, 2012). Agricultural subsidies in Australia are among the lowest of the OECD countries (OECD, 2010). Concerns about climate change and excessive water use have led to major water reforms focused on efficient and balanced use (i.e. water trading, infrastructure) in the Murray–Darling Basin, which produces 39% of national agricultural income (Commonwealth of Australia, 2007; DAFF, 2012; Roberts, 2012).

In 1998, Australia established a Greenhouse Office – the first in the world – and pioneered the National Carbon Accounting System, which set out to track and project all GHG sources and sinks related to land-based activities. Established in 2000, Australia's Renewable Energy

Target was expanded in 2009 to call for 20% renewable sources in the national electricity supply. As of 2011, 85% of renewable energy is delivered by hydroelectricity and biomass (native forest wood waste is precluded) (GLOBE, 2013).

The six priorities of the Australian Climate Change Adaptation Program (CCAP) (2007) are water, coasts, infrastructure, natural ecosystems, natural disaster management and agriculture. CCAP includes a AUS\$ 20 million research program focused on vulnerability assessment and support to local governments. Also in 2007, the National Greenhouse and Energy Reporting Act paved the way for an integrated information system (GLOBE, 2013). The Australian Bureau of Statistics has been directed to enhance data collection and transparent dissemination related to foreign investment in agriculture and ownership of agricultural land (DAFF, 2012).

The 2011 Clean Energy Act – a collection of 18 different laws – empowers action toward Australia’s pledge for an 80% reduction in GHG emissions from 2000 levels by 2050, most notably a carbon pricing mechanism that will transition into an emissions trading scheme in 2015 and link to the EU Emission Trading Scheme by 2018 (GLOBE, 2013). Revenue from the carbon pricing mechanism supports the Land Sector Package, which directs AUS\$ 429 million to research and technical assistance for mitigation (DAFF, 2012).

Not included in the Clean Energy Act, agriculture is handled by the Carbon Farming Initiative (CFI), which issues carbon credits for voluntary, land-based GHG emissions offsets (i.e. carbon sequestration, GHG emission avoidance and native forest protection projects that align with approved methodologies) and provides related advisory services (GLOBE, 2013). The CFI, the first national scheme of its kind, is intended to assist farmers with the costs of increasing efficiency and climate change adaptation (DAFF, 2012).

An AUS\$ 1 billion Biodiversity Fund supports protection of biodiverse carbon stocks and other funds support indigenous carbon farming and planning for natural resources management under climate change. Australia has dedicated budgetary and technical resources to support REDD+ projects and adaptation in developing countries (GLOBE, 2013).

Summary of national policy actions that contribute to sustainable agriculture under climate change in Australia:

Progress:

- First Greenhouse Office in the world (1998); National Carbon Accounting System tracks and projects all GHG sources and sinks related to land-based activities
- Australia's Renewable Energy Target (2009) calls for 20% renewable electricity sources nationally; in 2011, 85% of renewable energy came from hydroelectricity and biomass
- Australian Climate Change Adaptation Program (2007) prioritizes water, coasts, infrastructure, natural ecosystems, natural disaster management and agriculture and includes AUS\$ 20 million for research on vulnerability assessment and local governance
- National Greenhouse and Energy Reporting Act (2007) paved the way for an integrated information system
- Clean Energy Act (2011) enable an 80% reduction in GHG emissions including a carbon pricing mechanism followed by an emissions trading scheme; revenues support the AUS\$ 429 million Land Sector Package for mitigation research and technical assistance
- Carbon Farming Initiative issues carbon credits for voluntary, land-based GHG emissions offsets (i.e. carbon sequestration, GHG emission avoidance, native forest protection) and assists farmers with the costs of increasing efficiency and climate change adaptation
- Biodiversity Fund directs AUS\$ 1 billion to protect biodiverse carbon stocks; funds support indigenous carbon farming and natural resources management under climate change.
- Major water reforms (i.e. water trading, infrastructure) in the agriculture-rich Murray–Darling Basin encourage efficient and balanced use.

Challenges:

- Achieving objectives for GHG emissions reductions, renewable energy and climate change resilience of agriculture and food exports
- Accelerating integration of climate forecasting in agricultural management

### III. Conclusions: Is there real ‘green’ in Green Growth?

#### Sustainable, climate-friendly agriculture

A number of major reports have addressed how agriculture can be incorporated into Green Growth strategies. FAO has proposed that greening the economy with climate-smart agriculture involves combined attention to increasing resource efficiency and building resilience in agriculture, forestry and fisheries management at multiple scales (FAO, 2012a). The OECD has indicated that policies to support Green Growth in the food and agriculture sector should emphasize resource use efficiency throughout supply chains (anchored in investments in innovative R&D and education), well-functioning markets that provide accurate signals about natural resource scarcity (e.g. undistorted by subsidies), well-defined and enforced property rights, and systems for measuring progress (OECD, 2011). The World Farmers Organization has put forth four primary goals for agriculture in the context of the Green Economy: produce more with less; use a knowledge-based approach of best practices; reward farmers for adopting sustainable practices; and break the poverty cycle (WFO, 2012). In following through on *The Future We Want*, UN global policy and strategic frameworks are committing to improve access by agricultural producers, especially smallholders and rural women, to productive assets (UNDESA, 2012c). UNEP has proposed that national accounts should track natural capital stocks in monetary terms (UNEP, 2011).

A summary list of objectives for agriculture under Green Growth might therefore include:

- Resource use efficiency increases across supply chains
- Agricultural systems gain resilience to climate change and other sources of volatility
- Governments and others invest in R&D and education for agricultural best practices
- Agricultural markets accurately signal natural resource scarcity and appropriately reward use of sustainable practices
- Farmers’ (including rural women) rights to land and other productive assets are clearly defined and enforced
- Governments create and use environmental accounts

## National progress toward Green Growth

As countries move from concept to action on Green Growth, they follow a cycle that encompasses designing policies (including engaging major stakeholders and ministries<sup>4</sup>), making policies official (e.g. enactment by legislatures and heads of state), creating institutional and financial implementation mechanisms, monitoring results on the ground (e.g. using a results framework), evaluating policy effectiveness (e.g. achieving targets) and assessing and adjusting policy mechanisms. Table 1 provides a coarse assessment of how far each of the eight profiled countries has moved along this policy progression.

*Table 1 - Summary of Green Growth policy progress*

Design	Enact	Implement	Monitor	Evaluate	Adjust
<b>Mexico</b>					
<ul style="list-style-type: none"> <li>▪ Inter-Ministerial Commission on Climate Change</li> <li>▪ REDD+ design</li> </ul>	<ul style="list-style-type: none"> <li>▪ National Development Plan</li> <li>▪ General Law on Climate Change</li> <li>▪ Ecological Land Use Plan</li> </ul>	<ul style="list-style-type: none"> <li>▪ Extreme weather plans</li> <li>▪ ProArbol PES program</li> <li>▪ CDM projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Environmental accounts</li> <li>▪ 4 National Comms</li> <li>▪ Vulnerability atlas</li> <li>▪ Modernized meteorology</li> </ul>	<ul style="list-style-type: none"> <li>▪ Exceeded MDGs for sanitation and water</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reforms to Forest and Environmental laws</li> <li>▪ Improved community forestry programs</li> </ul>
<b>Vietnam</b>					
	<ul style="list-style-type: none"> <li>▪ Green Growth Strategy</li> <li>▪ Climate change targets/ strategy</li> <li>▪ Reforestation program</li> <li>▪ Food safety standards</li> </ul>	<ul style="list-style-type: none"> <li>▪ SP-RCC coordinating platform</li> <li>▪ 65 projects / programs under 10 priorities</li> <li>▪ 56 CDM projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ National Comms</li> </ul>		<ul style="list-style-type: none"> <li>▪ Phase II REDD pilot country</li> </ul>
<b>Rwanda</b>					
	<ul style="list-style-type: none"> <li>▪ Climate change / low Carbon development strategy</li> <li>▪ Adaptation Program of Action</li> </ul>	<ul style="list-style-type: none"> <li>▪ Climate and environment fund</li> <li>▪ Climate knowledge center</li> <li>▪ Vision 2020 Umurenge Program</li> <li>▪ Land Consolidation &amp; Crop Intensification</li> </ul>	<ul style="list-style-type: none"> <li>▪ National Comms</li> </ul>		

<sup>4</sup> UNESCAP (2012) advises that Green Growth strategies are more likely to be at the center of national decision-making and to receive investment by private sector entities if they are led by heads of state or finance ministers.

		on Programs			
<b>India</b>					
<ul style="list-style-type: none"> <li>▪ National Food Security Bill</li> <li>▪ Low Carbon strategy expert group</li> </ul>	<ul style="list-style-type: none"> <li>▪ Environmental Policy</li> <li>▪ Climate change action plan</li> </ul>	<ul style="list-style-type: none"> <li>▪ ~900 CDM projects; SMART-CDM</li> </ul>	<ul style="list-style-type: none"> <li>▪ 2 National Comms/ vulnerability assessment</li> </ul>	<ul style="list-style-type: none"> <li>▪ MREGA</li> <li>▪ Index insurance</li> <li>▪ Water adaptation pilots</li> </ul>	
<b>South Korea</b>					
<ul style="list-style-type: none"> <li>▪ National green growth strategy for Five Year Plan</li> <li>▪ Virtual Spatial Information System</li> </ul>	<ul style="list-style-type: none"> <li>▪ Framework Act on Low Carbon Green Growth</li> <li>▪ “Green New Deal”</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enforcement Decree</li> <li>▪ GHG emission rights allocation/ trade act</li> <li>▪ 86 adaptation projects</li> <li>▪ US\$ ~1 billion invested</li> </ul>	<ul style="list-style-type: none"> <li>▪ OECD’s GG indicators and measurement tools</li> <li>▪ Vulnerability assessment</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reduced fertilizer and energy use in agriculture</li> </ul>	<ul style="list-style-type: none"> <li>▪ Adaptation plan updates</li> <li>▪ Ministerial policy reviews of environment-friendly agricultural industry</li> </ul>
<b>China</b>					
<ul style="list-style-type: none"> <li>▪ Green economy strategy</li> <li>▪ Water/ wetlands TEEB</li> </ul>	<ul style="list-style-type: none"> <li>▪ 12<sup>th</sup> Five Year Plan: 17% GDP carbon intensity drop</li> <li>▪ US\$ 630 billion to water conservation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Agricultural R&amp;D</li> <li>▪ 40% green stimulus package</li> <li>▪ Emissions trading pilots</li> <li>▪ Priority Forestry Program</li> </ul>	<ul style="list-style-type: none"> <li>▪ 91% of global watershed PES</li> </ul>	<ul style="list-style-type: none"> <li>▪ Green Development Index reports</li> <li>▪ Will use Genuine Progress Index</li> </ul>	
<b>France</b>					
<ul style="list-style-type: none"> <li>▪ National Program for Tackling Climate Change</li> <li>▪ Energy Policy Framework</li> <li>▪ Green Growth/ employment plan</li> </ul>	<ul style="list-style-type: none"> <li>▪ National sustainable development strategy</li> <li>▪ Energy efficiency plan</li> <li>▪ Various climate-related laws/ regulations</li> </ul>	<ul style="list-style-type: none"> <li>▪ 21% green stimulus package</li> <li>▪ Farm energy audits</li> </ul>	<ul style="list-style-type: none"> <li>▪ Scoreboard: 50 quantitative targets</li> </ul>		<ul style="list-style-type: none"> <li>▪ Biennial energy policy updates</li> </ul>
<b>Australia</b>					
	<ul style="list-style-type: none"> <li>▪ Australian Climate Change Adaptation Program</li> <li>▪ Greenhouse/ energy reporting act</li> <li>▪ Clean Energy Act</li> <li>▪ Land Sector Package</li> <li>▪ Carbon Farming Initiative</li> </ul>	<ul style="list-style-type: none"> <li>▪ AUS\$20 million to research</li> <li>▪ AUS\$ 1 billion Biodiversity Fund</li> <li>▪ Murray-Darling water reforms</li> </ul>	<ul style="list-style-type: none"> <li>▪ Foreign investment in agriculture</li> </ul>		<ul style="list-style-type: none"> <li>▪ Expanded renewable energy target</li> </ul>

## Effect of the global financial crisis

It appears that the global financial crisis of 2007-2008 amplified uptake of Green Growth approaches to socio-economic development. Some nations such as Mexico already had significant momentum toward Green Growth policies by 2008. For other nations such as Vietnam, Green Growth was more explicitly seen as a pathway toward economic recovery from the global financial crisis. Table 2 summarizes policy initiatives that were underway before and during the financial crisis in each of the eight profiled countries and those that emerged in the wake of the financial crisis.

*Table 2 - Green Growth policy actions before and after the 2007-2008 global financial crisis and subjective assessment of whether countries explicitly pursued Green Growth as a strategy for recovery from the 2007-2008 global financial crisis*

Pre-2009	Post-2009	Recovery strategy?
<b>Mexico</b>		
<ul style="list-style-type: none"> <li>▪ National Development Plan (2007-2012)</li> <li>▪ Water and sanitation improvements</li> <li>▪ National communications to UNFCCC</li> </ul>	<ul style="list-style-type: none"> <li>▪ Inter-Ministerial Commission on Climate Change</li> <li>▪ General Law on Climate Change</li> <li>▪ 2012 National Ecological Land Use Plan</li> <li>▪ ProArbol forestry PES program</li> <li>▪ Host to COP16 in 2010</li> </ul>	<ul style="list-style-type: none"> <li>▪ No, Mexico had already incorporated Green Growth concepts into its national plan (Calderon, 2012)</li> </ul>
<b>Vietnam</b>		
<ul style="list-style-type: none"> <li>▪ National Target Program to Respond to Climate Change (2008)</li> <li>▪ Agenda 21 and National Sustainable Development Council (2004)</li> </ul>	<ul style="list-style-type: none"> <li>▪ National Green Growth Strategy (2012)</li> <li>▪ National Climate Change Strategy (2011)</li> <li>▪ UN- REDD pilot country since 2009</li> </ul>	<ul style="list-style-type: none"> <li>▪ Yes (MPI, 2012)</li> </ul>
<b>Rwanda</b>		
<ul style="list-style-type: none"> <li>▪ National Adaptation Program of Action (2007)</li> <li>▪ Vision 2020 Umurenge Program (2008)</li> <li>▪ Land Consolidation Program (2004)</li> <li>▪ Crop Intensification Program (2007)</li> </ul>	<ul style="list-style-type: none"> <li>▪ National Strategy on Climate Change and Low Carbon Development (2011)</li> <li>▪ National Fund for Climate and the Environment (2013)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Yes, although effects of the 2008 financial crisis were not immediate or direct and alleviation of perennial poverty is an important motivation (Rwanda Focus, 2008)</li> </ul>
<b>India</b>		
<ul style="list-style-type: none"> <li>▪ Mahatma Gandhi National Rural Employment Guarantee Act (2006)</li> <li>▪ National Environmental Policy (2006)</li> <li>▪ National Action Plan on Climate Change (2008)</li> <li>▪ 40% increase in agricultural R&amp;D</li> </ul>	<ul style="list-style-type: none"> <li>▪ National Food Security Bill</li> <li>▪ 12<sup>th</sup> Five Year Plan (2012-2017)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not necessarily, as India experienced more of a slowdown than a recession. India's need for high economic growth to match population growth is a motivation for economic development policy (UNESCAP, 2012)</li> </ul>
<b>South Korea</b>		

<ul style="list-style-type: none"> <li>▪ Low carbon Green Growth identified as vision for development (2008)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Green New Deal stimulus (2009)</li> <li>▪ National Green Growth Strategy (2009)</li> <li>▪ Five Year Plan (2009)</li> <li>▪ Framework Act on Low Carbon Green Growth (2009)</li> <li>▪ Enforcement Decree (2010)</li> <li>▪ Act on the Allocation and Trade of Greenhouse Gas Emissions Rights (2012)</li> <li>▪ National Climate Change Adaptation Master Plan for 2011-2015</li> <li>▪ Review of 3<sup>rd</sup> Five Year Plan on Environment-Friendly Agricultural Industry (2010)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not necessarily as Korea is considered to have been ahead of the curve in taking up Green Growth, although the domestic stimulus package heavily invested in Green Growth (UNEP, 2011)</li> </ul>
<b>China</b>		
<ul style="list-style-type: none"> <li>▪ National Climate Change Program (2007)</li> <li>▪ Policies and Actions for Addressing Climate Change (2008)</li> <li>▪ Doubled agricultural R&amp;D (2000 to 2008)</li> <li>▪ Priority Forestry Program (?)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Climate Change Resolution (2009)</li> <li>▪ 12<sup>th</sup> Five Year Plan: GDP carbon intensity drop of 17% in 2005-2015 (2011)</li> <li>▪ Emissions trading pilots</li> <li>▪ Green Development Index reports</li> <li>▪ Watershed PES; US\$ 630 billion to water conservation; water / wetlands TEEB</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not necessarily, as China continued its economic growth trajectory (UNESCAP, 2012)</li> </ul>
<b>France</b>		
<ul style="list-style-type: none"> <li>▪ National Program for Tackling Climate Change (2000)</li> <li>▪ Energy Policy Framework (2005)</li> </ul>	<ul style="list-style-type: none"> <li>▪ 21% green stimulus package</li> <li>▪ Green Growth and Employment plan</li> <li>▪ National Sustainable Development Strategy: Towards a Green and Fair Economy (2010)</li> <li>▪ National sustainable development strategy</li> <li>▪ Energy efficiency plan</li> </ul>	<ul style="list-style-type: none"> <li>▪ Yes, Green Growth policies emerged after the global financial crisis (OECD, 2010)</li> </ul>
<b>Australia</b>		
<ul style="list-style-type: none"> <li>▪ Greenhouse Office (1998)</li> <li>▪ National Carbon Accounting System</li> <li>▪ Renewable Energy Target (2000; 2009)</li> <li>▪ Australian Climate Change Adaptation Program (2007)</li> <li>▪ National Greenhouse and Energy Reporting Act (2007): AUS\$20 million for vulnerability research, local support</li> <li>▪ Murray-Darling Basin Plan, Water Act (2007)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Clean Energy Act (2011): GHG emissions drop 80% in 2000-2050; carbon pricing; emissions trading; Land Sector Package (AUS\$429 million to mitigation)</li> <li>▪ Carbon Farming Initiative: land-based GHG emissions offset credits</li> <li>▪ AUS\$1 billion Biodiversity Fund</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not likely, as many 'green' policies were already in place and Australia has not used Green Growth terminology in its national policies</li> </ul>

## IV. Going forward

Following the Rio+20 Earth Summit, the United Nations is convening a major multi-lateral policy process focused on the post-2015 development agenda. However, this process is challenged by the same core challenge that affects many other global policy platforms: divergent worldviews about how to allocate responsibilities in meeting global sustainability imperatives and how to prioritize among socio-economic (e.g. poverty reduction) and environmental (e.g. climate change mitigation) concerns (Evans, 2012).

In the meantime, national-level innovation and action will continue to be essential and a variety of supporting initiatives are planned or underway. For example, UNEP will spearhead a 'Partners for Action on Green Economy' (PAGE) program, which will provide technical assistance to 30 countries as they develop their own version of a green economy (UNEP, 2013b). A global partnership on Wealth Accounting and the Valuation of Ecosystem Services (WAVES) was launched in 2010 to develop international guidelines and support establishment of national-level environmental accounting (WAVES, 2013).

As national Green Growth strategies evolve into on-the-ground practice, robust investment in climate-smart agriculture will be essential to achieving real sustainability.

## References

1. ADB. 2013. Promoting Climate-Resilient Development. Asian Development Bank. Manila, Philippines. [www.adb.org/themes/climate-change/climate-resilience](http://www.adb.org/themes/climate-change/climate-resilience).
2. Andrew D (Head, Environment Division OECD Trade and Agriculture Directorate). Presentation: “Towards Sustainable Agriculture: the OECD Green Growth Strategy” at the 2nd Global Conference on Agriculture, Food Security and Climate Change, 3-7 September 2012, Hanoi, Vietnam.  
[http://www.afconference.com/images/3\\_7Sep/Docs/Tuesday/andrew\\_tuesday\\_9-10amfinal\\_sans.pdf](http://www.afconference.com/images/3_7Sep/Docs/Tuesday/andrew_tuesday_9-10amfinal_sans.pdf).
3. Beddington J, Asaduzzaman M, Clark M, Fernández A, Guillou M, Jahn M, Erda L, Mamo T, Van Bo N, Nobre CA, Scholes R, Sharma R, Wakhungu J. 2012. Achieving food security in the face of climate change: Final report from the Commission on Sustainable Agriculture and Climate Change. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark.  
[www.ccafs.cgiar.org/commission](http://www.ccafs.cgiar.org/commission).
4. Beintema N, Stads G-J, Fuglie K, Heisey P. 2012. ASTI Global Assessment of Agricultural R&D Spending: Developing Countries Accelerate Investment. International Food Policy Research Institute, Washington, DC.  
<http://www.asti.cgiar.org/globaloverview>.
5. Bennett G, Carroll N, Hamilton K. 2013. Charting New Waters: State of Watershed Payments 2012. Forest Trends. Washington, DC.  
<http://www.ecosystemmarketplace.com/reports/sowp2012>.
6. Berkhout F, Bouwer L, Bayer J, Bouzid M, Cabeza M, Hanger S, Hof A, Hunter P, Meller L, Patt A, Pfluger B, Rayner T, Reichardt K, Van Teeffelen A. 2013. European responses to climate change: Deep emissions reductions and mainstreaming of mitigation and adaptation. Policy brief: Key Findings of the FP7 Responses project. <http://www.responsesproject.eu/>
7. Boyle J, Murphy D. 2012. Designing Effective REDD+ Safeguard Information Systems: Building on existing systems and country experiences. International Institute for Sustainable Development. Manitoba, Canada.
8. Calderon, F. (President of Mexico). How can the G20 transform our economies to maximize efficient, equitable use of resources, while meeting the challenge of ensuring economic stability and growth? World Economic Forum.  
<http://www.weforum.org/content/president-calderon-green-growth-public-private-partnerships>

9. CIDA. 2012. Project profile for Support Program to Respond to Climate Change in Vietnam. Canadian International Development Agency. <http://www.acdi-cida.gc.ca/cidaweb%5Ccpo.nsf/projEn/A035152001>.
10. CIF. 2013. Climate Investment Funds: Mexico. Climate Investment Funds. <https://www.climateinvestmentfunds.org/cifnet/?q=country/mexico>.
11. Commonwealth of Australia. 2007. Water Plan. <http://www.comlaw.gov.au/Details/C2013C00100>
12. DAFF. 2012. National Food Plan green paper 2012. Department of Agriculture, Fisheries and Forestry, Canberra, Australia.
13. Dubash NK, Raghunandan D, Sant G, Sreenivas A. 2013. Indian Climate Change Policy: Exploring a Co-Benefits Based Approach. *Economic & Political Weekly*, 48(22): 47-61.
14. Evans A. 2012. Climate, Scarcity and Sustainability in the Post-2015 Development Agenda. Center on International Cooperation, New York University, New York, NY, USA. [http://cic.es.its.nyu.edu/sites/default/files/evans\\_post2015\\_dec2012.pdf](http://cic.es.its.nyu.edu/sites/default/files/evans_post2015_dec2012.pdf).
15. FAO. 2012a. Greening the Economy with Climate-Smart Agriculture. Background Paper for the Second Global Conference on Agriculture, Food Security and Climate Change, Hanoi, Vietnam, 3-7 September. <http://www.fao.org/docrep/016/ap403e/ap403e.pdf>.
16. FAO. 2012b. State of Food and Agriculture. UN Food and Agriculture Organization. Rome, Italy.
17. GAFSP. 2012. Rwanda. The Global Agriculture and Food Security Program. Washington, DC. [www.gafspfund.org/gafsp/content/rwanda](http://www.gafspfund.org/gafsp/content/rwanda).
18. Gillespie J. 2013. Vietnam's land law reforms: radical changes or minor tinkering? East Asia Forum: Economics, Politics and Public Policy in East Asia and the Pacific. [www.eastasiaforum.org](http://www.eastasiaforum.org)
19. GLOBE International. 2013. Climate Legislation Study: A Review of Climate Change Legislation in 33 Countries. Third Edition. Edited by Townshend T, Fankhauser S, Aybar R, Collins M, Landesman T, Nachmany M, Pavese C. Climate and Development Knowledge Network. London, UK.
20. Hai Y (Policy Research Centre for Environment and Economy, China). Presentation on "Policy Context for China's Activities on GE Indicators" at UNEP conference on measuring progress toward the green economy. Geneva, Switzerland. December 4-6, 2012.

21. Haque T. 2013. Impact of Licensed Cultivators Act in Andhra Pradesh. Paper presented at the Annual World Bank Conference on Land and Poverty. Washington, DC. April 8-11, 2013.
22. HLPE. 2012. Social protection for food security. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome, Italy.
23. Hoffmann U. 2011. Some reflections on climate change, Green Growth illusions and development space. Report no. 205. United Nations Conference on Trade and Development, Geneva, Switzerland.
24. Jin Z (Director, Center for Technology Innovation and Strategic Studies, Chinese Academy of Social Sciences, Beijing Academy of Soft Technology). Presentation on “Genuine Progress Index: Three dimension of Green development measurement systems” at UNEP conference on measuring progress toward the green economy. Geneva, December 4-6, 2012.
25. Kwak B. 2013. Developing Spatial Information System (V-SIS) for Management of Disaster and Protection of National Agricultural & Stockbreeding Industry. Paper presented at the Annual World Bank Conference on Land and Poverty. Washington, DC. April 8-11, 2013.
26. Lee J. 2013. Korea’s PPGIS (Public Participatory GIS) Initiative Within the National Cadastre. Paper presented at the Annual World Bank Conference on Land and Poverty. Washington, DC. April 8-11, 2013.
27. Mahapatra R. 2010. MGNREGA: Making way for women’s empowerment. One World South Asia. <http://southasia.oneworld.net/features/mgnrega-paving-way-for-women-empowerment>
28. MINAGRI. 2010. Rwanda GAFSP Proposal: LWH Scale-up. Ministry of Agriculture and Animal Resources. Kigali, Rwanda. [www.gafspfund.org/gafsp/sites/gafspfund.org/files/Documents/Rwanda\\_proposal.pdf](http://www.gafspfund.org/gafsp/sites/gafspfund.org/files/Documents/Rwanda_proposal.pdf).
29. MPI. 2012. Vietnam’s Green Growth Strategy (Period 2011-2020 and Vision towards 2050), Summary of Draft Strategy. Vietnam Ministry of Planning and Investment, Department for Science, Technology, Natural Resources and Environment. Hanoi, Vietnam. <http://www.adbi.org/files/2012.05.07.cpp.sess2.4.trinh.viet.nam.green.strategy.pdf>.
30. Nguyen TD. 2012a. Prime Minister’s Keynote Address at 2012 Global Conference on Agriculture, Food Security and Climate Change. 3-7 September 2012, Hanoi, Vietnam. [www.afconference.com](http://www.afconference.com)

31. Nguyen TD. 2012b. Prime Minister's Approval of the National Green Growth Strategy. Decision No. 1393/QĐ-TTg. Hanoi, Vietnam, September 25, 2012.
32. Nsengiyumva F. 2011. Policies and investments in support of smallholder commercialization. Presentation at "Smallholder-led Agricultural Commercialization and Poverty Reduction: How to Achieve It?" Policy Symposium: COMESA/ACTESA/MINAGRI. Kigali, Rwanda. April 20-22, 2011.  
[http://fsg.afre.msu.edu/aamp/Kigali%20Conference/Nsengiyumva\\_Rwanda\\_Policies\\_and\\_investments.pdf](http://fsg.afre.msu.edu/aamp/Kigali%20Conference/Nsengiyumva_Rwanda_Policies_and_investments.pdf)
33. OECD, 2010. Interim Report of the Green Growth Strategy: Implementing our commitment for a sustainable future. Meeting of the OECD Council at Ministerial Level, 27-28 May 2010. Organization for Economic Cooperation and Development, Paris, France. <http://www.oecd.org/greengrowth/45312720.pdf>.
34. OECD. 2011. A Green Growth Strategy for Food and Agriculture: Preliminary Report. Organization for Economic Cooperation and Development, Paris, France. <http://www.oecd.org/greengrowth/sustainableagriculture/48224529.pdf>.
35. OECD. 2013. Environmental Performance Reviews: Mexico 2013 Assessment and Recommendations. Organization for Economic Cooperation and Development, Paris, France. <http://www.oecd.org/env/country-reviews/mexico2013.htm>
36. Onguka GO. 2013. Land Consolidation and Settlement Reorganization: The Rwandan Context. Paper presented at the Annual World Bank Conference on Land and Poverty. Washington, DC. April 8-11, 2013.
37. Putzel L. 2013. Understanding the role of forest income in rural livelihoods: Insights from China. AlertNet, Thompson Reuters Foundation.  
<http://www.trust.org/item/?map=understanding-the-role-of-forest-income-in-rural-livelihoods-insights-from-china/>
38. Pye-Smith C. 2012. Taking the heat out of farming: An innovative agroforestry project is helping Indian smallholders to join the global carbon market. ICRAF Trees for Change no. 10. Nairobi: World Agroforestry Centre.
39. Republic of France. 2010. National Sustainable Development Strategy: Towards a Green and Fair Economy. Interministerial Committee for Sustainable Development. <http://www.developpement-durable.gouv.fr/IMG/pdf/NSDSp60.pdf>.
40. Republic of Korea. 2009. Road to Our Future Green Growth: National Strategy and the Five-Year Plan (2009~2013). Presidential Commission on Green Growth. <http://english.mest.go.kr/web/42208/en/board/envview.do?bbsId=265&pageSize=10&currentPage=13&boardSeq=1226&mode=view>

41. Republic of Rwanda. 2011. Green Growth and Climate Resilience: National Strategy for Climate Change and Low Carbon Development. Kigali, Rwanda.
42. Roberts A (La Trobe University). Presentation: “Reforming agricultural water policy in the Murray-Darling Basin, Australia” at the 2nd Global Conference on Agriculture, Food Security and Climate Change, 3-7 September 2012, Hanoi, Vietnam.  
[http://www.afconference.com/images/3\\_7Sep/Docs/Tuesday/WorkGroupB/australia-vietnamconferencev5.pdf](http://www.afconference.com/images/3_7Sep/Docs/Tuesday/WorkGroupB/australia-vietnamconferencev5.pdf)
43. Runnalls D. 2011. Environment and Economy: joined at the hip or just strange bedfellows? S.A.P.I.E.N.S, 4(2): 1-10. <http://sapiens.revues.org/1150>.
44. Rwanda Focus. 2008. Financial crisis spares Rwanda, but indirect effects expected. Rwanda Focus. <http://focus.rw/wp/2008/10/financial-crisis-sparers-rwanda-but-indirect-effects-expected/>.
45. Singh C. 2013. Improving Land Governance and Securing Land Rights. Paper presented at the Annual World Bank Conference on Land and Poverty. Washington, DC. April 8-11, 2013.
46. UNCSO. 2012a. The Future We Want: Outcome document adopted at Rio+20. United Nations Conference on Sustainable Development, New York, NY, USA. <http://www.un.org/en/sustainablefuture/>.
47. UNCSO. 2012b. United Nations Conference on Sustainable Development, Rio+20. New York, NY, USA. <http://sustainabledevelopment.un.org/rio20.html>
48. UNDESA. 2012a. A guidebook to the Green Economy, Issue 3: exploring green economy policies and international experience with national strategies. United Nations Department for Economics and Social Affairs. New York, NY, USA. <http://sustainabledevelopment.un.org/content/documents/738GE%20Publication.pdf>.
49. UNDESA. 2012b. Decisions by Topic: Green economy in the context of sustainable development and poverty eradication. United Nations Sustainable Development Knowledge Platform. United Nations Department for Economics and Social Affairs. New York, NY, USA <http://sustainabledevelopment.un.org/index.php?menu=1225>.
50. UNDESA. 2012c. Follow-up framework by the United Nations system to Rio+20. United Nations Department for Economics and Social Affairs. New York, NY, USA. <http://sustainabledevelopment.un.org/followupbyunsystem.html>
51. UNEP. 2011. Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication. United Nations Environment Program, Nairobi, Kenya. <http://www.unep.org/greeneconomy/GreenEconomyReport/tabid/29846/language/en-US/Default.aspx>.

52. UNEP. 2012. Mexico's Pathway to a Green Economy. United Nations Environment Program. Nairobi, Kenya.  
<http://www.unep.org/greeneconomy/AdvisoryServices/CountryProfiles/Mexico/tabid/104141/Default.aspx>.
53. UNEP. 2013a. Green Economy and Trade Opportunities Project (GE-TOP). United Nations Environment Program. Nairobi, Kenya.
54. UNEP. 2013b. Partnership for Action on Green Economy (PAGE). United Nations Environment Program. Nairobi, Kenya.  
<http://www.unep.org/greeneconomy/PAGE/tabid/105854/language/en-US/Default.aspx>
55. UNESCAP. 2012. Green Growth, Resources and Resilience: in Asia and the Pacific. United Nations Economic and Social Commission for Asia and the Pacific. Bangkok, Thailand.
56. UNFCCC. 2012. Vietnam: Policy development, financial mechanism, technology transfer to respond to climate change. COP18/CMP8 Side Event. United Nations Framework Convention on Climate Change, Bonn, Germany.  
[http://www.mmechanisms.org/e/event/details\\_121126COP18sideevent.html](http://www.mmechanisms.org/e/event/details_121126COP18sideevent.html).
57. Vakatti K. 2013. Improving the Land Use in Grassroots; How 3.3 Million Acres of Barren Land of Poor Has Been Brought Under Cultivation: Experience of MGNREGS in Andhra Pradesh. Paper presented at the Annual World Bank Conference on Land and Poverty. Washington, DC. April 8-11, 2013.
58. WAVES. 2013. Wealth Accounting and the Valuation of Ecosystem Services. The World Bank. Washington, DC. <http://www.wavespartnership.org/waves/about-us>
59. WFO. 2012. Agriculture's Contribution to the Green Economy: Proposed Outcomes from the Rio +20 Summit. World Farmers' Organization. Rome, Italy.  
<http://www.uncsd2012.org/content/documents/Ag%20and%20the%20Green%20Economy.pdf>.
60. Xiaoxi, Li (Deputy Director, Beijing Normal University). Presentation on "Green Development Index in China" at UNEP conference on measuring progress toward the green economy. Geneva, December 4-6, 2012



RESEARCH PROGRAM ON  
**Climate Change,  
Agriculture and  
Food Security**



The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a strategic initiative of CGIAR and the Earth System Science Partnership (ESSP), led by the International Center for Tropical Agriculture (CIAT). CCAFS is the world's most comprehensive global research program to examine and address the critical interactions between climate change, agriculture and food security.

**For more information, visit [www.ccafs.cgiar.org](http://www.ccafs.cgiar.org)**

Titles in this Working Paper series aim to disseminate interim climate change, agriculture and food security research and practices and stimulate feedback from the scientific community.

