

OCCASIONAL PAPERS ON **INNOVATION IN FAMILY FARMING**



# **FACING THE CHALLENGES OF CLIMATE CHANGE AND FOOD SECURITY**

THE ROLE OF RESEARCH, EXTENSION AND  
COMMUNICATION FOR DEVELOPMENT



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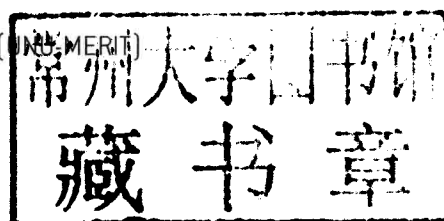
THE ROLE OF RESEARCH, EXTENSION AND  
COMMUNICATION FOR DEVELOPMENT

Based on a study carried out by

**Cees Leeuwis** (Wageningen University) and **Andy Hall** (INFORMERIT)

Text revision **Willem van Weperen**

Edited by **John Preissing**



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2013

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## LIST OF ACRONYMS

<b>CC</b>	Climate Change
<b>CCA</b>	Climate Change Adaptation
<b>ComDev</b>	Communication for Development
<b>CSDI</b>	Communication for Sustainable Development Initiative
<b>DFID</b>	The UK's Department for International Development
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>GFRAS</b>	Global Forum for Rural Advisory Services
<b>ICT</b>	Information and Communication Technologies
<b>LINK</b>	Learning Innovation and Knowledge network
<b>NGO</b>	Non-Governmental Organization
<b>NRM</b>	Natural Resource Management
<b>OEK</b>	Office of Knowledge Exchange, Research and Extension
<b>OEKR</b>	Research and Extension Branch, OEK, FAO
<b>PES</b>	Payments for Ecological Services
<b>R&amp;E</b>	Research and Extension
<b>T&amp;V</b>	Training and Visit extension approach
<b>UN</b>	United Nations
<b>UNEP</b>	United Nations Environment Programme
<b>UNU-MERIT</b>	United Nations University Maastricht Economic and Social Research and Training Centre on Innovation and Technology



## ACKNOWLEDGMENTS

The present study is part of a series of occasional papers on Agricultural Innovation in Family Farming produced by FAO's Research and Extension Branch under the overall coordination of Andrea Sonnino, Chief. The document is based on an original study prepared by Cees Leeuwis (Wageningen University) and Andy Hall (UNU-MERIT) under the supervision of John Preissing, Senior Extension Officer, FAO and Mario Acunzo, Communication for Development Officer, FAO. A revision of the document was carried out by Willem van Weperen while John Preissing edited the final version of the text.

The study is based on literature review and a series of field case studies carried out in Africa, Asia and Latina America that have been implemented thanks to the support of the Communication for Sustainable Development Initiative (CSDI) – GCP/INT/048/ITA, an FAO project funded by the Italian Ministry for the Environment and Territory.



## EXECUTIVE SUMMARY

In line with the Intergovernmental Panel on Climate Change (IPCC) this study defines climate change as any change in climate over time, whether due to natural variability or as a result of human activity.

### Dealing with climate change

Upon request of the Food and Agriculture Organization of the United Nations' Research and Extension Branch, a study was carried out by the Wageningen University and the United Nations University. The study report "Facing the challenges of climate change and food security: the role of research, extension and communication for development institutions", authored by Cees Leeuwis and Andy Hall, was finalized in October 2010 and constitutes the basis for the present document.

The study report is based on case studies from Bangladesh (Sulaiman, 2010), Bolivia (Pafumi and Ulloa, 2010), DR Congo (Mbaye, 2010) and Ghana (Adjei-Nsiah and Dormon, 2010) which were carried out with the purpose of assessing needs and gaps with regard to the provision of innovation support services for climate change adaptation. It took the form of desk-studies complemented with key informant interviews. Research results showed that climate change adds urgency to the need for adaptation in its widest sense in the natural resources sphere (agriculture, forestry, natural resources management, livestock and fisheries). The main message from the study is that not only is technical change for farm-level adaptation and mitigation needed, but also a change of policy and institutional regimes that govern agricultural production, value chains and natural resource management.

This report is a shortened version of the final study report, produced on request of FAO. The purpose of the shortened report is twofold: (1) to serve as a planning document to sharpen the climate change focus of research, extension and communication for development institutions (including FAO's) in developing effective and relevant support activities for their partners and (2) to communicate the climate change support activities implemented by FAO in this field to potential partners and inform them about possible strategies and specific approaches that will enhance the role of extension, research and communication institutions and services for climate change adaptation (CCA). Besides introduction into the topic (section 1) the report discusses the context of climate change adaptation and its linkages with food security (section 2) and the analytical framework which has been used for the study (section 3). Subsequently, lessons learned from the case studies (section 4) are presented. A sketch of a new-style role for agriculture innovation support service agencies, including FAO (section 5) is provided. Finally, Annex 1 provides a more detailed conceptual framework linking agriculture innovation to the work of research, extension and communication for development.



## Climate change adaptation as a metaphor for the future

It is becoming increasingly clear that climate change will have a profound influence on the agro-ecological conditions under which farmers and rural populations need to develop their livelihood strategies, manage their natural resources and achieve food security. Climate change can be regarded as being part of a 'complex' problem situation, characterized by uncertainty, unknown consequences and competing interests. It is amidst this complexity that appropriate human responses will have to be developed. In the context of this report, we label such responses as 'adaptation', and take this to include 'mitigation'. From the literature on climate change it is clear that adaptation may involve an array of both technical and institutional responses, which may be inspired by both local or outside knowledge and experience. Such as new crop varieties, adapted cropping systems, more efficient irrigation techniques, new forms of water harvesting, alternative ways of preserving soil fertility, novel forms of pest and disease control and alternative coastal protection infrastructures as well as improved technologies for early warning. Examples of institutional responses include the installment of new market mechanisms for carbon trade, the development of credit and payment mechanisms for ecosystem services, the introduction of alternative chains and certification schemes for 'climate proof' agricultural products and the use of procedures and methodologies in (public and private) research and extension systems to enhance collective adaptive capacity in communities, regions and countries.

## Summary of the conceptual framework: the role of research, extension, communication in climate change adaptation

Climate change adds urgency to the need for adaptation in its widest sense in the natural resources sphere: agriculture, forestry, Natural Resources Management (NRM), livestock, aquaculture, fisheries. This does not just mean technical change for farm-level adaptation and mitigation. It also means adaptation of the policy and institutional regimes that govern agricultural production, value chains and natural resources management. Two critical features of this emerging adaptation agenda are: (1) the importance of negotiating new rules or institutional arrangements, often in a landscape of diverse stakeholders and (2) the importance of reconfiguring networks of activity to bring about change.

Any innovation support infrastructure should be able to support three essential processes: (1) Network building; (2) Social learning (3) Conflict management. Such support is likely to be a mix of "traditional" and newer communication strategies and services. Examples of these 'new' communication strategies are:

- > Network brokerage;
- > Demand articulation and knowledge brokerage;
- > Process facilitation, including visioning;
- > Interactive design and experimentation;



- > Learning-oriented monitoring;
- > Exploration of opportunities and constraints;
- > Lobby and advocacy communication;
- > Conflict management.

Both traditional and 'new' strategies may usefully involve a range of communication media, like interpersonal, mass media and Information and Communication Technologies (ICTs). In innovation processes, any actor or organization that carries out the tasks mentioned above is called an '*innovation broker*'. Responding to climate change demands new modes of operating for communication and extension professionals, as well as from researchers and scientists. To ensure that research contributes to the development of balanced technical and institutional innovations, interdisciplinary teams of scientists need to engage in collaborative research and experimentation with societal stakeholders.

Playing new intermediary roles in climate change adaptation processes would require a number of shifts:

- > Expand from a focus on technology change to a focus on socio-institutional change;
- > Expand from rural space to national space intermediation;
- > Expand from public agencies to multiple agencies;
- > Expand from a tactical to a strategic role;
- > Expand from practice development to policy development;
- > Expand from information diffusion to communication for development;
- > Expand core expertise to further include facilitation skills.

Intermediation, in the context of agriculture extension mainly referring to brokering relations, is traditionally used in mediating research-farmer interactions, but can be used in a much wider sphere of activity. Research, extension and communication professionals could reorient their core expertise in intermediation toward these wider dimensions of the climate change adaptation task. This report provides a conceptual framework for this shift and makes suggestions on how these types of support services could be organized to help FAO member countries, as well as FAO's own needs for institutional learning and adaptation towards climate change.

## Lessons from the case studies

Similarities and differences emerging from the four country case-studies are:

- > There is a need for adaptation;
- > Projects and programmes are organized around climate change;



- Ministries than other Agriculture seem to be taking the lead;
- Emphasis is on technological adaptation and the local level;
- Research and extension configurations are dynamic and stable at the same time;
- Interventions seem to be mostly problem driven — not opportunity-led;
- There is need for coordination and integration of activities;
- An institutional vacuum for innovation intermediation exists at the country level;
- An institutional vacuum exists for innovation intermediation at the level of international development organizations.

### **Repositioning international support for research, extension, and communication for development innovation support services**

The analysis of case-studies and relevant literature has made clear that climate change adaptation is not only an issue of technological adaptation, but also one of institutional adaptation within and beyond the agricultural innovation system, including wider policy, regulatory and market regimes. The national case-studies indicate that there is a vacuum regarding the provision of the broader innovation support services that are needed to enhance adaptive capacity. To carry out these adaptations, (new) innovation intermediaries are required that provide a range of innovation support services.

An analysis of the landscape of international agencies and country case studies reveals that agencies playing the wider systems intermediation role are lacking and there is presently no international agency that has an explicit role in providing support and advice on multi-level techno-institutional adaptation. Hence there is certainly a role for FAO's Research and Extension Branch in this. Also, Climate Change could serve as a vehicle to introduce the new broad-based perspective into agricultural development services and the new approach might be attractive to investors interested in taking this agenda forward.

This may lead FAO as well as other organizations dealing with innovation support services to work with new strategic partners. At the same time, those working with current classical research and extension organizations will also benefit because they can:

- Provide extension and research organizations with up-to-date insights from innovation studies;
- Advise member country institutions on suggested human resource policy changes to job descriptions of field-level extension staff, and make senior extension officers responsible for facilitating the local institutional change process;
- Enhance diagnostic and visioning skills at regional extension offices;
- Conduct experiments with organizing interaction among relevant players in local level 'innovation systems'.



# CONTENTS

LIST OF ACRONYMS .....	IV
ACKNOWLEDGMENTS .....	V
Executive summary .....	VI
CHAPTER 1	
<b>INTRODUCTION .....</b>	<b>2</b>
CHAPTER 2	
<b>CLIMATE CHANGE ADAPTATION AS A METAPHOR FOR THE FUTURE.....</b>	<b>5</b>
CHAPTER 3	
<b>SUMMARY OF THE CONCEPTUAL FRAMEWORK: THE ROLE OF RESEARCH, EXTENSION AND COMMUNICATION IN CLIMATE CHANGE ADAPTATION .....</b>	<b>8</b>
CHAPTER 4	
<b>LESSONS FROM THE CASE STUDIES.....</b>	<b>13</b>
CHAPTER 5	
<b>CONTOURS FOR A NEW POSITIONING FOR AGRICULTURE INNOVATION SUPPORT SERVICES.....</b>	<b>17</b>
References.....	25
ANNEX 1	
<b>CONCEPTUAL FRAMEWORK: THE CHANGING ROLE OF EXTENSION, COMMUNICATION AND RESEARCH.....</b>	<b>30</b>



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## CHAPTER 1

# INTRODUCTION

In 2010, a study was carried out to assist the Research and Extension Branch in FAO to position itself strategically in meeting needs and demands that arise as a consequence of climate change. The goal of the study was also to assist other global and national agencies meet these needs. This resulted in the report “*Facing the challenges of climate change and food security: the role of research, extension and communication institutions*” (Leewis and Hall, 2010). The need for this study emerged from the present challenges faced by Research and Extension (R&E) institutions around the globe, *vis-à-vis* climate change, and the FAO Research and Extension Branch’s mission to contribute to the strengthening of inclusive agriculture innovation systems.

## FAO KEY TASK: CONTRIBUTING TO REALIZING AGRICULTURE INNOVATION IN FAMILY FARMING

### Conceptual framework

The study led to the development of a conceptual framework that would assist FAO to reflect on the new role of research and extension and to better support member countries in this field. Furthermore, the framework also served simultaneously to give direction to country case-studies that have contributed to this document<sup>1</sup>. The conceptual framework presented in Annex 1, redefines the role of extension, communication and research based on contemporary thinking in innovation studies. In essence, the argument is that (a) climate change adaptation requires coherent technical and institutional innovations and responses across multiple societal levels and (b) bringing about such coherent responses requires the performance of a range of new intermediation and facilitation roles in addition to “classical” extension, research and communication for development services.

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1 Four country case studies (Sulaiman, 2010; Pafumi and Ulloa, 2010; Mbaye, 2010; Adjei-Nsiah and Dormon, 2010) were carried out with the purpose of assessing which needs and gaps exist in actual practice with regard to the provision of innovation support services for climate change adaptation. In addition, an international landscape review was carried out to get a better view of what other international agencies do in the sphere of innovation intermediation.

### INTERMEDIATION - FACILITATION ACCESS TO MARKETS

An organic promotion project (EPOPA) united 14 African export companies under the label Jambo Africa. Through project intermediation a new institutional arrangement between organic produce exporting companies was established, to get smallholder farmers access to Western export markets. Something the individual companies could never have achieved on their own. Project intermediation contributed towards increase of smallholder farmer income and improved the resilience of farming systems against climate change effects.

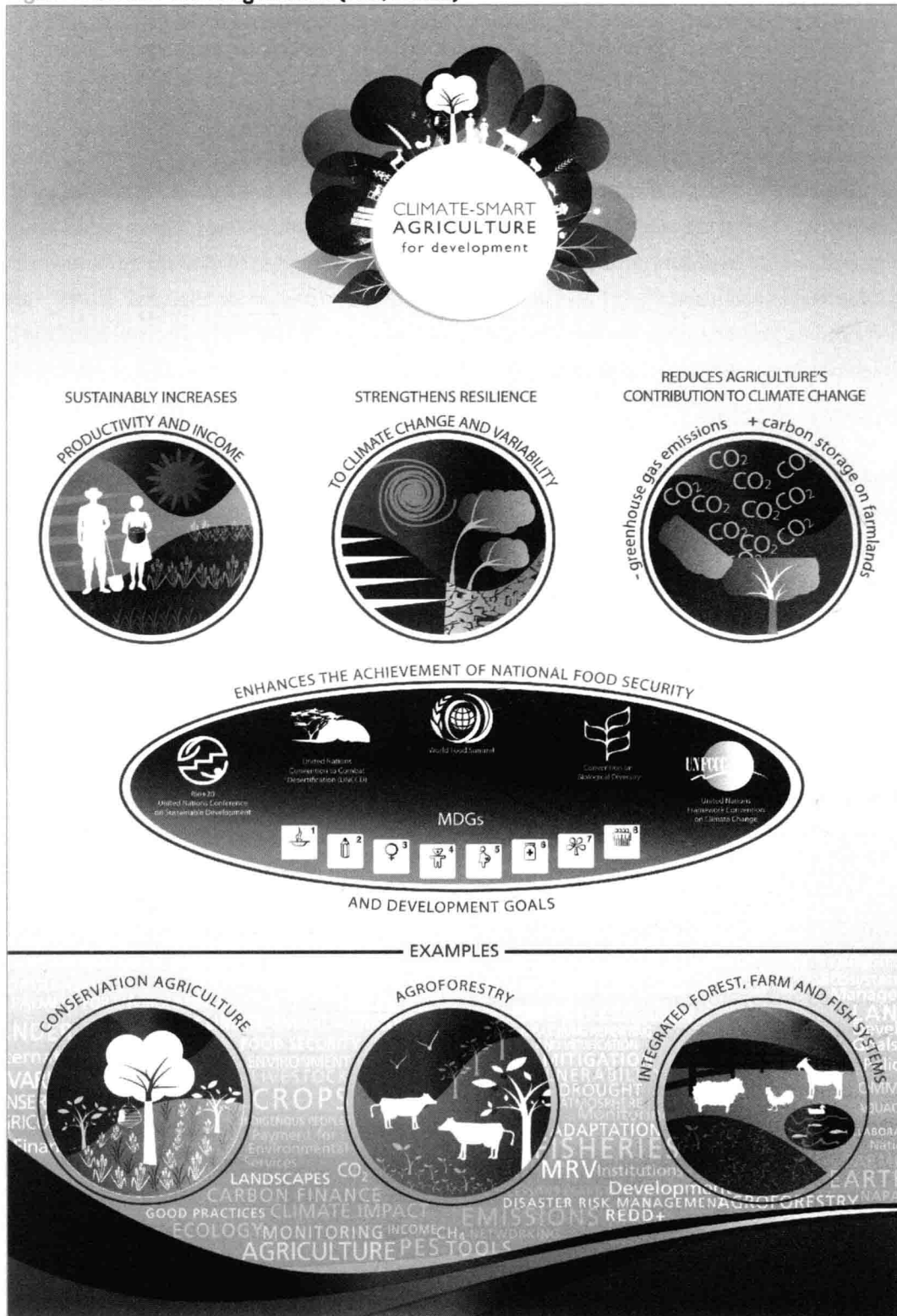
## Intermediation

This implies that extension should not only be dealing with improving agriculture production performance through dissemination of knowledge, but should engage in a broader range of development tasks such as facilitating farmer access to inputs, credit facilities or markets, organizing producer groups, negotiating contracts between processors and producers, or linking producers to researchers and policy makers. All these intermediating tasks require additional skills sets, like facilitation, trust-building, networking or negotiation skills. Skills, which extension staff, recruited for transfer of technology tasks in a more traditional extension setting, may not necessarily have. Subsequently the emergence of new type of service providers can be observed, who develop these capacities and/or specialize in intermediary service delivery.

This document is a revised and shortened version of the study of Leewis and Hall. Its purpose is twofold: (1) to serve to sharpen the climate change focus of the Research and Extension Branch, FAO in developing effective and relevant support activities with its partners and (2) to communicate the need for new climate change support activities and promote possible strategies and approaches that will enhance the role of extension, research and communication institutions and services for climate change adaptation.

Besides the more explicit focus on climate change research, extension and communication needs, some practical examples were added in this revised edition of the report. It first discusses the context of climate change adaptation and its linkages with food security and the analytical framework which has been used for the study (chapter 2 and 3). Subsequently, it describes the lessons learned from the case-studies, followed by a sketch of a new-style agriculture innovation support services in the face of climate change and food security challenges (chapters 4 and 5).

Figure 1. Climate-smart Agriculture (FAO, 2011a)



## CHAPTER 2

# CLIMATE CHANGE ADAPTATION AS A METAPHOR FOR THE FUTURE

It is increasingly clear that climate change will have a profound influence on the agro-ecological conditions under which farmers and rural populations need to develop their livelihood strategies, manage their natural resources and achieve food security. Numerous publications by FAO and others point to this<sup>2</sup>. It has even led to new terms like 'climate smart farming' i.e. this includes "sustainable crop production intensification." In practical terms this means "Grow more food using less land, water, fertilizer and pesticides, which are scarce, and more labour, care and intelligence, which are abundant." (FAO, 2011c) By doing so the production system becomes less dependent on external resources, less harmful to the environment and more resilient.

## CLIMATE CHANGE ISSUES ARE COMPLEX

In most contexts, climate change can be regarded as part of a 'complex' problem situation in several senses: (a) there is often considerable *uncertainty* about specific climatic and ecological dynamics at play; (b) climatic and ecological change have (initially unknown) *consequences* for several interrelated societal spheres ( e.g. agriculture, forestry, fisheries, health, energy, economy, migration, etc.) and (c) it is likely that there are different and *competing* human *interests* and values at stake (e.g. between rich and poor, farmers and pastoralists, 'food' and 'fuel', economy and ecology, rural and urban communities, etc.).

### THE EMERGENCE OF "CLIMATE SMART FARMING"

Climate smart farming is agriculture that sustainably increases productivity, resilience (adaptation), reduces/removes greenhouse gases (mitigation), and enhances achievement of national food security and development goals.

Source: FAO <http://www.fao.org/climatechange/climatesmart/en>

2 Visit <http://www.fao.org/climatechange/en>

## ENHANCING THE CAPACITY TO ADAPT

It is amidst this complexity that appropriate human responses will have to be developed. We will label such responses as '*adaptation*', and take this to include '*mitigation*'. Working towards adaptation, then, poses specific challenges for research, extension and communication institutions and services. These challenges, however, are not unique to the context of climate change. From a wider perspective we can see that the world we live in is (and has been) characterized by continuous change, of which the pace seems to be accelerated by globalization, a phenomenon underpinned by international trade patterns and regulatory regimes, ICTs, enhanced transport facilities, and population growth. Hence, we can argue that enhancing the capacity to adapt to newly-emerging realities is going to require permanent attention from research, extension and communication institutions and is critical for realizing a range of millennium development goals.

## TECHNICAL AND INSTITUTIONAL RESPONSES

From literature on climate change it is clear that adaptation may involve an array of both technical and institutional responses, which may be inspired by both local or outside knowledge and experience (FAO, 2010). New technologies and technical practices may, for example, include new crop varieties, adapted cropping (including agro-forestry) systems, more efficient irrigation techniques, new forms of water harvesting, alternative ways of preserving soil fertility, novel forms of pest and disease control and alternative coastal protection infrastructures, as well as improved technologies for early warning. Often it involves existing technologies farmers are adopting, resulting in a triple win: farmers getting higher yields, improved resilience and stronger soils that sequester more carbon (Warutere and Verkooijen, 2011).

Such technical responses need to be combined with, and embedded in, new institutional solutions, whereby the term 'institutions' refers to the formal and informal rules and organizational forms and policies through which society is ordered. Examples of possibly relevant institutional responses include the installment of new market mechanisms for carbon trade, the development of credit and payment mechanisms for ecosystem services like conserving farmland around aquifers, adapted land tenure arrangements and contracts, new organizational forms and laws for the management of water catchments, the introduction of alternative chains and certification schemes for 'climate proof' agricultural products, the re-organization of input supply and marketing arrangements for new cropping systems, and, last but not least, the use of alternative procedures and methodologies in (public and private) research and extension systems to enhance collective adaptive capacity in communities, regions and countries.



### **NEW INSTITUTIONAL ARRANGEMENTS; PAYMENT FOR ECOSYSTEM SERVICES (PES)**

Perrier Vittel discovered it would be cheaper to invest in conserving the farmland surrounding their aquifers than to build a filtration plant to address water quality issues found in 1990. Accordingly, they purchased 600 acres of sensitive habitat and signed long-term conservation contracts with local farmers. Farmers in the Rhine-Meuse watershed in northeastern France received compensation to adopt less intensive pasture-based dairy farming, improve animal waste management, and reforest sensitive filtration zones.

*Source:* Forest Trends, The Katoomba Group and UNEP, 2008