

World Agroforestry Centre

Medium-Term Plan 2010 – 2012

*Transforming Lives and Landscapes
through Agroforestry Science*

June 2009

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ABBREVIATIONS

AAMPS	Association for African Medicinal Plants Standards
ADG	Assistant Director General
AEZ	Agroecological zones
AF	Agroforestry
AGM	Annual General Meeting
AHI	African Highlands Initiative
AI	Amazon Initiative
AIDS	Acquired Immuno Deficiency Syndrome
APAARI	Asia Pacific Association of Agricultural Research Institutions
ARARI	Amhara Regional Agricultural Research Institute
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASB	Alternatives to Slash-and-Burn
ASNAPP	Agribusiness in Sustainable Natural African Plant Products
AFTP	Agroforestry Tree Products
BOT	Board of Trustees
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
CAPRI	Collective Action and Property Rights
CBO	Community Based Organization
CDM	Clean Development Mechanism
CGIAR	Consultative Group on International Agricultural Research
CIAT	International Center for Tropical Agriculture
CIDA	Canadian International Development Agency
CIFOR	Center for International Forestry Research
CIMMYT	International Maize and Wheat Improvement Center
CIP	International Potato Center
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement
CORAF/WE CARD	West and Central African Council for Agricultural Research and Development
CP	Challenge Programme
CPWILD	Commercial Products from the Wild
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DG	Director General
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária
EPMR	External Programme and Management Review
ES	Environmental Services
ETFRN	European Tropical Forest Research Network
FAO	Food and Agricultural Organization
FARA	Forum for Agricultural Research in Africa
FASID	Foundation for Advanced Studies on International Development
FORNESSA	Forestry Research Network for sub-Saharan Africa
FORRI	Forestry Resources Research Institute
GRP	Global Research Project
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
HR	Human Resources
ICRAF	International Centre for Research in Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IER	Institut d'Economie Rurale du MALI
IFPRI	International Food Policy Research Institute

IPCC	Inter-Governmental Panel on Climate Change
IISD	International Institute for Sustainable Development
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
INERA	Institut de l'Environnement et Recherches Agricoles
INRAN	Institut National de Recherches Agronomiques du Niger
IPG	International Public Good
IRAD	Institutional Research and Application Development
IRD	Institut de recherche pour le développement
IRRI	International Rice Research Institute
ISAR	Institut des Sciences Agronomiques du Rwanda
ISRIC	International Soil Reference Information Centre
IT	Information Technology
ITTO	International Tropical Timber Organization
IUCN	World Conservation Union
IWMI	International Water Management Institute
KARI	Kenya Agricultural Research Institute
KEFRI	Kenya Forestry Research Institute
LADA	Land Degradation Assessment in Drylands
LP	Land and People
LULUCF	Land Use, Land-Use Change and Forestry
MTP	Medium Term Plan
NARO	National Agricultural Research Organisation
NARS	National Agricultural Research Systems
NASA	National Aeronautics and Space Administration
NEPAD	The New Partnership for Africa's Development
NGARA	The Network for Natural Gums and Resins in Africa
NGO	Non Governmental Organizations
NRM	Natural Resource Management
R&D	Research and Development
RAEZ	Regional Agro Ecological Zone
RELMA	Regional Land Management (SIDA)
RUPES	Rewarding Upland Poor for Environmental Services
SADC	Southern African Development Cooperation
SI	Strengthening Institutions
SIDA	Swedish International Development Agency
SLT	Senior Leadership Team
SPIA	Standing Panel on Impact Assessment
SPs	CGIAR System Priorities
STCP	Sustainable Tree Crops Program
SWEP	Systemwide and Ecoregional Programmes
PGR	Plant Genetic Resources
THETA	Traditional Health for the Treatment of AIDS
TM	Trees and Markets
TOFNET	Trees on Farm Network
TSBF	Tropical Soil Biology and Fertility Institute
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Program
UNECA	United Nations Economic Commission for Africa
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
USA	United States of America

OVERVIEW

Introduction

The World Agroforestry Centre 2008-2015 Strategy frames the context for the 2010-2012 Medium Term Plan. The 2009-2011 Medium Term Plan was formulated while finer details of the 2008-2015 Strategy were still being elaborated. The current document has benefited from the comments that the previous MTP received. In 2008 we articulated our strategic research agenda under six coherent and interlinked Global Research Projects (GRPs), which inevitably are still receiving some fine-tuning of content.

The Centre's mission is to generate science-based knowledge about the diverse roles that trees play in agricultural landscapes and to use its research to advance policies and practices that benefit the poor and the environment.

The 2010 project portfolio continues with the nesting of scales, from tree (GRP1), via farm (GRP2) and market (GRP3) to three GRPs at landscape scale: GRP4 focussed on land health, GRP5 on climate change and GRP6 on multifunctionality of the landscape. The continued partner country and general public interest in climate change issues has led to a larger share of our activity and funding relating to climate change, maintaining one of the GRPs as the focal point for work that relates from tree to landscape and governance scales.

In 2009, our global calendar is focussed on the Second World Congress on Agroforestry in August and our own Annual Science Meeting meeting was shifted to occur immediately afterwards to benefit from new thinking. In addition though this reduced the opportunity for full internal consultation of plans before the MTP submission date.

Highlights of the Project Portfolio

The World Agroforestry Centre seeks to contribute towards the Millennium Development Goals for the eradication of poverty and hunger, the promotion of social equity, and the mitigation of global concerns related to climate change and environmental degradation by understanding and promoting agroforestry in the tropics. Agroforestry systems are ubiquitous within the tropics and they are represent an immense diversity among and within tree species found within contrasting biological and complex niches, management systems and market value chains. Inherently they are of immense value for a varied group of farmers, partners and markets. There exist opportunities to improve and optimize productivity of agroforestry systems. However, the immense diversity within the system poses major challenges in developing generic models and principles. The vast range of taxa, restricted current use, lack of market integration, and particular biological characteristics, mean that much variation remains untapped to improve livelihoods and environments within the context of current and emerging global challenges and opportunities. Within this context, GRP1 is focused on intra- and inter-species biodiversity, GRP2 on the farm-level interactions, GRP3 on the market value chains, GRP4 on land health, GRP 5 on climate variability and change and GRP6 on the landscape context of environmental services and policies.

The 2010 project portfolio is composed of our six Global Research Projects (GRPs) as follows:

GRP 1: Domestication, utilization and conservation of superior agroforestry germplasm.

This GRP aims to increase farmers' access to improved germplasm of priority tree species and ensure better functioning of tree seed and seedling supply systems.

GRP 2: Enhancing productivity of agroforestry systems.

Under this GRP, we explore how farmers manage and benefit from tree species diversity and interactions, and we develop a better understanding and new approaches for nutrient and water productivity in land use with trees, animals and crops.

GRP 3: Improving tree product marketing for smallholders.

Research under this GRP is focused on expanding smallholders' access to value chains for Agroforestry tree products and improving their incomes and livelihoods through better marketing.

GRP 4: Reducing land health risks.

This GRP is developing multi-scale and widely usable methods of land health surveillance and will quantify and map major risks to land health at different scales. Efforts are made to evaluate the cost effectiveness and outcomes of intervention programmes and agroforestry practices as well as to develop national capacity in operational methods and tools of land health surveillance.

GRP 5: Climate change adaptation and mitigation through agroforestry.

The research aims to improve the stability of farming systems and livelihood strategies of smallholder farmers in light of current climate variability and long-term climate change. The focus is on the potential contribution of farmers' increased use of trees for intensifying, diversifying and buffering farm systems. The focus is on vulnerability assessments, the impact of climate change on agroforestry systems, and adaptation to climate change in line with synergies in agroforestry systems between climate change adaptation and mitigation.

GRP 6: Supporting multi-functional landscapes with trees for environmental services.

Through this GRP, we support better policies and the creation of incentives for maintaining the multifunctionality of landscapes with trees. This work is based on improved understanding of the roles trees play in securing watershed services, storing carbon and maintaining biodiversity in landscape mosaics. It identifies opportunities for suppressing negative incentives and strengthening positive ones for agroforestry solutions. Finally, studies of the 'tree cover transition' focus on the relationships between local and global drivers of land-use change and the return of trees to landscapes after stages of deforestation.

The current MTP aims to present greater detail on research being done, the quality of partnerships and roles of partners, as well as output and impact pathway formulations for each GRP. In the logframes, output targets are now specifically linked to outputs to facilitate monitoring and intentionally have much clearer pathways to outcomes and impacts.

New and Terminated Research:

The 2008 strategy document marked some significant strategic changes, but these have now been fully implemented.

- In follow-up to the 3rd EPMR and the 2008-2015 strategy, we refocused on 'science quality', based on an articulation of three key dimensions of quality: salience (relevance), credibility and legitimacy. Operational criteria have been formulated and are now used in screening and improving our proposals and in seeking balance between the development impacts that the global community committed to, and the independence of a science that remains critically aware of complexity, multifunctionality and its tradeoffs, and the negative as well as positive aspects of 'resilience'.
- Our pioneering engagement with 'rewards' for environmental services in Asia through RUPES now has its counterpart in Africa with the PRESA project, and gives us a headstart on the debate on implementation of C emission reduction schemes. New funding was obtained for this part of our agenda and the ASB Partnership for the Tropical Forest

Margins is fully revived and engaged in the global debate, providing concrete examples in landscapes with a long term research engagement.

- The global debate on emission reduction from the land use sectors have focused on ‘forest’ so far, but the internationally accepted definition of forest is problematic as it excludes much of the smallholder and community managed tree cover that can play a role in emissions or mitigation of emissions. Our efforts are aimed at more comprehensive international climate agreements that include all land use and use appropriate accounting mechanisms
- Where in 2008 we decided to refocus our previous analysis of tree-water relations and transpiration physiology on the landscape, the debate around fast-growing evergreen trees and their tradeoffs between productivity and reduction of stream flow suggest that continued analysis is needed, but focused on landscape niches and variable climates.
- The global expectations on biofuel production crashed in 2008 after a hype phase. There is now more opportunity to come with critical data and analyses, while there is a risk of an over-response in the public debate, with woody sources of bioenergy still the key to rural energy in many landscapes. Bioenergy, biodiversity, water and climate change issues are cross-cutting aspects of our research agenda.

Slower than Expected Progress in Previous MTP:

Some of the regional programs faced changes in leadership and management context, requiring reorientation on the partnership agenda. A few of the 76 output targets promised in 2008 were deferred mainly due to the projects’ activity lead persons assumed study leave. There were also delays in expected donor funding as well as anticipated Indo-Africa germplasm transfer protocols.

Changes in Collaborative Arrangements:

ICRAF has continued to play an important role in the Collaborative partnership on Forests (CPF). This partnership of 14 global institutions is actively involved in the UNFF and UNFCCC processes. For the UNFF8 session held in May 2009 in New York, the CPF partners generated a statement on trees and Forests in relation to climate change mitigation and adaptation, and also contributed ideas in the formulation of a strategy for funding the planned Multi Year Program of Work (MYPOW) for implementing UNFF decisions.

At the FAO’s Committee on Forestry (COFO) meeting held in Rome in March 2009, ICRAF was asked to lead the session on Forestry and Natural Resources Education and in collaboration with IUFRO and CIFOR we led discussion on Tree and Forestry Research challenges.

In a new initiative with COMESA (Common Market for Eastern and Southern Africa), ICRAF is leading efforts to build national capacity for understanding issues on climate change and participating in climate change negotiations. This major effort covering 19 countries is tapping into the knowledge generated by ICRAF and its partners. These efforts are assisting countries involved to build their strategies for the COP meeting in Denmark in November 2009.

The African Highlands Initiative (AHI) has implemented recommendations made by an external review panel appointed by IDRC. AHI programmes are now fully re-oriented, basing its work on established needs obtained through participatory processes. Buoyed by a new leader, Dr Gasper Mowo, the initiative is gaining renewed strength as a leading Natural Resource Management Platform for East and Southern Africa. AHI is currently hosted by NARO (Uganda), a position which helps to link well with national strategies there.

In an entirely new initiative, ICRAF is working with the India Council for Agricultural Research (ICAR) to help build a collaborative bridge with Africa. ICRAF hosted the first meeting of scientists

form 5 African countries (Kenya, Malawi, Tanzania, Uganda, Cameroon and Mali) and Indian scientists to develop a proposal for a multi-year collaborative programme. This was followed up by a meeting of Ministers of Agriculture from Africa in New Delhi, where the policy makers support was achieved, and the project proposal, which includes research support and scholarships for young African scientists is likely to be funded in the near future.

The inter-centre collaboration between ICRAF and ILRI has grown further particularly in areas of research data management, human resources management and information technology acquisition and maintenance. In all these areas, we have jointly appointed positions and/or jointly acquired and shared tools. Working with sister CGIAR centres, we continue to advance the initiative on collective action for East and Southern Africa, led by Dr Ravi Prabhu. ICRAF has also attended meetings on the CAADP (Comprehensive Africa's Agricultural Development Programme) where we have shared our perspectives in the intensification of tree planting as part of the planned agricultural developments. Links with CAADP processes are helping us to put into context the CGIAR agenda and how it responds to Africa's priorities. We have also intensified our collaboration with sub-regional organizations and networks, especially ASARECA, CORAF, ANAFE AFF (African Forest Forum) and FANR-PAN). AFF is a new independent network hosted at ICRAF and intensively involved in international and regional negotiations on forests and other tree systems.

ICRAF's participation in System-wide Programmes and Challenge Programmes is unchanged from the situation described in the 2009-2011 MTP. The management of the myriad of partners is coordinated by the Director General's Office, under the leadership of August Temu.

CGIAR SP Alignment:

Our six GRPs continue to contribute in distinctive ways to all five of the CGIAR system priorities and, more specifically, to 11 of the 20 sub-priorities: 1B, 2D, 3A, 3D, 4A, 4C, 4D, 5A, 5B, 5C and 5D bringing the unique "trees in agriculture landscapes" perspective to the collective CGIAR research effort. Most significantly they contribute to in decreasing order to SPs 4A, 3A, 4D, 3D, 5A, 5C and 2D. In financial terms, some 84% of 2010 expenditure is projected to be within the SPs.

Non SP Activities:

We continue to engage in capacity building within and adjacent to our strategic research agenda. A CCER on our training involvement commended this work and its partnership approach, but also suggested some new approaches to refocus efforts. In 2010, approximately 16% of activities by financial value are categorised to be outside the SPs as they are currently described. This total is comprised of 7.5% for new research, 5.2% for development support and 3.4% for capacity building.

Financial Indicators

1. Financial outcomes in 2008

World Agroforestry's total nominal income (unadjusted for purchasing power and excluding the CGIAR Gender and Diversity program) decreased by about 8% from US\$31.54 million in 2007 to US\$28.89 million in 2008. Although there was a decrease in total income, unrestricted income increased to US\$11.63 million in 2008 from US\$9.45 million in 2007. Restricted income on the other hand decreased from US\$20.52 million in 2007 to US\$15.21 million in 2008.

Total expenditure decreased by 10% from US\$28.82 million in 2007 to US\$25.85 million in 2008. This decrease is attributed to a reduction in restricted expenditure. In addition, World Agroforestry invested US\$0.439 million in new and replacement capital assets.

Changes in net assets for year 2008 reflected a surplus of US\$3.03 million (compared with a surplus of US\$2.73 million in 2007). This is due to increase in other revenue and gains by US\$ 0.48 million to US\$2.05 million (US\$1.57 million in 2007) and increase in unrestricted grant income of US\$2.18 million amounting to US\$2.66 million which helped the World Agroforestry to achieve the surplus. The substantial surplus changed our year end financial position, as a result the total unrestricted net assets in the Centre increased to US\$18.76 million in 2008 from \$15.73 million in 2007. World Agroforestry's short term solvency (liquidity) increased to 229 days. The long term financial stability (adequacy of reserves) increased to 178 days. These indicators are above the upper thresholds recommended by the CGIAR's Secretariat.

The 2008 outcomes were approximately 6% lower than the estimates reported in the MTP submitted in June 2008 for income and expenditure.

2. Financial estimates for 2009

Total nominal income for 2009 is estimated at US\$31.23 million, which is an increase of about 7% compared to our MTP proposal submitted in June 2008 (US\$29.09 million). Expenditure in 2009 is estimated at US\$31.81 million, reflecting an increase of about 10% compared to the figure presented in our MTP of June 2008 (US\$28.89 million), this is due to the success of the Center in securing restricted grants.

For 2009, we anticipate a draw from reserves of \$0.578 million due to adjustments made in 2009 on unrestricted grant income as a result of strengthening of the US dollar against other major donors' currencies.

3. Financial proposal and plans 2010-2012

The financing plan for 2010 included in the 2010-2012 MTP is based on known or highly probable sources of future grants. World Agroforestry is being highly conservative in including probable sources in the 2010 financing plan, and we expect some moderate changes in the 2010 proposal. The plans for years 2011 and 2012 have been extrapolated on the basis of the 2010 financing plan, assuming a 5% average growth rate and inflation.

PROJECT NARRATIVES

Global Research Project 1: Domestication, utilization and conservation of superior Agroforestry germplasm

Project Overview and Rationale

Project Goal

Smallholder farmers, researchers and their public and private service supporters have the increased knowledge and capacity needed to improve rural livelihood options through the use of well-conserved, properly characterized and suitably enhanced tree genetic resources, via well functioning seed and seedling production and distribution systems.

Project Objectives

1. Resolve underlying constraints to the effective conservation and enhanced performance of tree genetic resources, through tree domestication by and for smallholder farmers, of germplasm that provides solutions to the fundamental problems that restrict the productivity of agroforestry systems.
2. Ensure the better functioning of tree seed and seedling supply systems, with easy access to improved germplasm of priority tree species.

Rationale

Fundamental problems that constrain the effective management and delivery of tree genetic resources for smallholder farmers include:

1. Constraints to characterization, domestication and the dissemination of information.
 - a. *Limited biological understanding of useful tree species:* the absence of previous research on a range of target taxa; the perennial nature, life history traits (e.g. dioecy) and long generation intervals involved in tree propagation and growth; the need to modify and update priority species lists due to changing requirements influenced by markets, niche availability, climate change, biotechnology, etc.; a limited understanding of performance and productivity differences between exotic, indigenous and naturalized species; the limited knowledge available on the nutritional and medicinal values of indigenous species; a lack of understanding on the potential invasiveness of introduced agroforestry species.
 - b. *Absence of tools and protocols for understanding genetic diversity levels and for conserving tree germplasm:* the lack of suitable measures of genetic variation and the absence of the interdisciplinary approach needed for proper characterisation; the poor genetic quality of founder populations being released by development projects; the potential risks of losses in vigour, resulting from inbreeding depression and dysgenic selection due to poor management practices; the limited available knowledge on adaptive responses to climate change, land degradation and other challenges; the absence of information on the phenotypic plasticity (flexibility to environmental changes) of priority species; the absence of impact assessments for genetically modified trees in agroforestry landscapes; a lack of knowledge on appropriate *ex*, *circa* and *in situ* conservation strategies, with current methods often ineffective, fragmented and unnecessarily costly; the impracticality of maintaining live gene banks of taxa with large growth forms; the wide range of diversity between species in life history traits, e.g., recalcitrance, reproductive biology, phenology, etc.; the different conservation approaches needed for the alternative niches in which trees grow.
 - c. *Scarcity of innovative tools and methodologies for tree propagation and management:* the lack of generic protocols for participatory priority-setting of target species in different agroecological zones, taking emerging global issues (e.g., climate change adaptation) into consideration; a lack of global guidelines for researchers and stakeholders on domestication approaches; the absence of methodologies for clonal selection and development of indigenous tree species cultivars,

- with a tendency therefore to focus on a few exotic taxa; the limited knowledge available concerning the trade-offs between different (biotechnology, traditional breeding, participatory, etc.) approaches to domestication; the lack of case studies to help extrapolate generic technologies; the need for continuous monitoring and improvement of tree genetic resources based on management practices and niche allocation; the current inadequate research on pests and diseases; the lack of a range of tested alternatives for farmers to plant that minimize market risks and maximize potential market gains.
- d. *Requirement to regularly update information on the domestication, distribution, use, management and conservation of genetic resources of agroforestry trees:* the lack of approaches developed with stakeholders to appropriately present updated research information, in different formats and with the right amount of detail, to guide farmers, scientists, CBOs, NGOs and others in the management and use of a wide range of different agroforestry tree species; the absence of accessible databases to allow users to select species for specific functions based on current and emerging challenges (e.g., to mitigate and adapt to climate change, to promote micronutrient security, to provide medicines); the lack of methods for recording current activities on the distribution, domestication and on-farm management of agroforestry tree genetic resources, with therefore a lack of learning from ongoing work.
2. Constraints to tree germplasm supply and availability.
Tree seed and seedling supply systems are poorly developed because of the difficulties in delivering a wide range of species to decentralised growers that each require only small volumes. Furthermore, as markets for agroforestry tree products are often poorly developed, so too are the markets for delivering germplasm. Access to tree seed and seedlings of good genetic and physiological quality is often cited by farmers as a constraint to production, resulting in a narrow range of tree species being adopted that do not adequately address market risks and realize productivity benefits from diversification. Demand has been largely un-quantified, however, with scant economic data on the sale of germplasm, and current practices of transfer across landscapes not well documented. There is an absence of a proper analysis of the cost effectiveness, required incentives, and quality and quantity considerations at a farm and landscape level. There is lack of appropriate models for germplasm supply to farmers that involve a wide range of possible actors, and little emphasis has been placed on the nursery production of tree seedlings in meeting demand. The current International Treaty for Plant Genetic Resources (ITPGR) is not relevant for most tree genetic resources because they are transferred informally and/or locally.

GRP1 has two research outputs:

- GRP1.1: Improved agroforestry tree germplasm available with associated information on potential use, benefits and conservation while considering climatic constraints and risks of invasiveness.
- GRP1.2: Prototypes available for sustainable tree seed and seedling supply systems that promote the use of diverse and productive germplasm by small holder farmers in different social, economic and cultural settings.

Outputs Description

Changes from previous MTP:

Minor changes in wording

Description (Output level)

GRP1.1: Improved agroforestry tree germplasm available with associated information on potential use, benefits and conservation while considering climatic constraints and risks of invasiveness.

GRP1.1 addresses the following three research questions:

1. What innovative approaches can be developed and used to domesticate, promote and conserve high-value tree species in partnership with smallholder farmers, taking into consideration emerging challenges and opportunities such as global warming, urbanization, increased international trade, biotechnology, hidden hunger and land degradation?
2. What are the most appropriate technologies for characterizing and selecting genetic variation in agroforestry trees, taking into consideration factors such as cost effectiveness, adoption potential and tradeoffs?
3. What are the optimum *ex*, *circa* and *in situ* conservation strategies for managing and utilizing agroforestry tree genetic resources, in light of current and emerging global challenges and opportunities?

GRP1.2: Prototypes available for sustainable tree seed and seedling supply systems that promote the use of diverse and productive germplasm by small holder farmers in different social, economic and cultural settings.

GRP1.2 addresses the following two research questions:

1. What are the most appropriate pathways and modalities for supplying tree germplasm to farmers, taking into account role allocation, cost effectiveness, incentives, and quality and quantity considerations, at the farm and landscape levels?
2. What are the best systems and methodologies for procuring, storing and producing high-quality germplasm of priority tree species? What are the opportunities and limitations for private sector involvement? What types of incentives are needed?

Alignment to CGIAR System Priorities (Output Level)

GRP1.1 aligns to CGIAR System Priorities:

- 1B: Promoting conservation and characterization of under-utilized plant genetic resources to increase the income of the poor
- 2D: Genetic enhancement of selected species to increase income generation by the poor
- 3A: Increasing income from fruits and vegetables

GRP1.2 aligns to CGIAR System Priorities:

- 3A: Increasing income from fruits and vegetables

And has secondary links with:

- 1B: Promoting conservation and characterization of under-utilized plant genetic resources to increase the income of the poor
- 5B: Making international and domestic markets work for the poor
- 5C: Rural institutions and their governance
- 5D: Improving R&D options to reduce rural poverty and vulnerability

Countries of Planned Research (Output Level)

GRP1.1: Kenya, Malawi, Tanzania, Zambia, Cameroon, DR Congo, Gabon, Burkina Faso, Côte d'Ivoire, Equatorial Guinea, Ghana, Mali, Niger, Nigeria, Senegal, India, Sri Lanka, China, Indonesia, Philippines, Thailand, Bolivia, Peru

GRP1.2: Kenya, Malawi, Tanzania, Zambia, Cameroon, DR Congo, Gabon, Burkina Faso, Côte d'Ivoire, Equatorial Guinea, Ghana, Mali, Niger, Nigeria, Senegal, India, Sri Lanka, China, Indonesia, Philippines, Thailand, Bolivia, Peru

Impact pathways by Output

GRP1 outputs provide a foundation for conservaton and the profitable use of appropriate tree germplasm on farms, with further exploration of agroforestry interactions, climate change impacts, markets links and policy contexts in other GRPs.

The primary impact that GRP1 targets is: The increased access enabled to quality germplasm will enhance tree species and genetic diversity within agroforestry systems, resulting in more resilient, productive and valuable farming landscapes that also contribute to the long-term conservation of tree genetic resources in both farmland and forest.

Output GRP1.1 is expected to contribute to this impact via the outcomes specified below for various stakeholders:

1. Increased ability among agroforestry research, development and policy stakeholders to efficiently use and promote improved knowledge on suitable multidisciplinary approaches for tree domestication.
2. Farmers and other stakeholders domesticate and conserve a broader range of important tree species.

Output GRP1.2 is expected to contribute to this impact via the outcomes specified below for various stakeholders:

1. Efficient operational models of decentralized tree seed and seedling delivery systems will be adapted and applied by national and international partners.
2. Informed decisions by national development programs in tree germplasm supply will improve access to quality planting material by smallholders, with enhanced cultivation and diversity in farm landscapes being the result.
3. National institutes, developmental organizations and policy makers will increase support for small-scale seed and seedling retailers as entrepreneurs as part of a commercial commodity chain in germplasm delivery.
4. Nursery operators, national partners and smallholders contribute to widespread cultivation of quality germplasm of improved tree varieties.

Through GRP1.1 outputs, there will be an increased ability among agroforestry research, development and policy stakeholders to efficiently use and promote improved knowledge which will be captured in strategies produced, databases upgraded, new manuals developed, etc., on appropriate approaches for tree domestication. The impact of research on and development of improved methodologies and technologies – while concurrently enhancing capacity in genetic diversity analysis, propagation technologies and multiplication skills of regional nursery operators, national partners and smallholder farmers – will result in widespread cultivation of quality germplasm of improved varieties, increasing productivity and resilience. Greater availability of updated and well-presented information on key tree species will also contribute towards increased species diversity in farmland.

Through GRP1.2 outputs, operational models supporting tree germplasm supply will increase efficient dissemination of and access to quality tree germplasm by smallholder farmers. Reaching more smallholders more efficiently has vast developmental potential, as more stable and productive tree germplasm will contribute to improved livelihoods, enhanced food security and protection of the environment. Enhanced tree diversity within agroforestry systems will result in more resilient and productive farms and long term conservation of tree genetic resources.

For both GRP1.1 and GRP1.2, developing capacity for generating and applying technical know-how will strengthen the national and global networks promoting tree planting and germplasm supply programs, which is essential to meet current and emerging international challenges.

Target ecoregions for GRP1 are:

Sub-Saharan Africa

RAEZ 1. Warm arid and semi-arid tropics (AEZ 1):

- West Africa: Burkina Faso, Guinea, Mali, Niger, Nigeria and Senegal

- East Africa: Ethiopia, Kenya, Tanzania and Sudan
 - South Africa: Angola, Botswana, Madagascar, Malawi, Mozambique, Zambia and Zimbabwe
- RAEZ 2. Warm sub-humid tropics (AEZ 2):
- East Africa: Kenya, Uganda, Tanzania
 - South Africa: Malawi, Mozambique, Zambia and Zimbabwe
- RAEZ 3. Warm humid tropics (AEZ 3):
- West Africa: Cameroon, DR Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Ghana, Liberia, Nigeria, Sierra Leone

Asia and the Pacific

RAEZ 8. Warm arid and semi-arid tropics (AEZ 1):

- Parts of India and Thailand.

RAEZ 9. Warm sub-humid tropics (AEZ 2):

- India, Sri Lanka and Thailand.

RAEZ 10. Warm humid tropics (AEZ 3):

- Indonesia, Philippines, Vietnam, Kampuchea, Laos, Thailand, South West China, Bangladesh, Sri Lanka

RAEZ 11. Warm arid and semi-arid subtropics with summer rainfall (AEZ 5):

- China, India.

Latin America

RAEZ 17. Warm humid tropics (AEZ 3):

- Brazil, Bolivia, Peru

RAEZ 18. Cool tropics (AEZ 4):

- Bolivia, Peru

Beneficiaries and end users

That interface directly with ICRAF: national tree seed agencies, tree nursery operators, national forestry and agroforestry research institutes, NGOs, universities, international research institutes, policy makers, regional bodies and the private sector.

Interfaced through partners: community based organizations, development agencies, extension agents, farmers, inter-governmental bodies involved in germplasm transfers, local and national policymakers, non-governmental organizations, producer associations, regional bodies involved in germplasm regulation, tree seed marketers and the private sector

International Public Goods (IPG)

International public goods (IPGs) produced by the project include generic and species-specific information in the form of strategies, guidelines, domain recommendations, template agreements (eg Indo-Africa germplasm exchange) to facilitate international transfers of e.g. fruit materials covered by plant breeding rights practices, methods and protocols for tree management and domestication, as well as tree germplasm. Specific research IPGs will include:

- Manuals and guidelines on participatory tree domestication, propagation, nursery establishment, on-farm germplasm management and appropriate silvicultural practice for fruit, timber, medicine, biofuel, fodder and other categories of functional use of tree species.
- Models for international organisations, national governments and NGOs to facilitate the sustainable supply of agroforestry tree seed and seedlings, for development organizations and farmer groups, for a massive scaling up in tree planting.

- High quality germplasm of key agroforestry tree species, maintained as seed and/or established in field genebanks, clonal orchards and mother blocks, available for demonstration and as founder material for further use by national and international programs.
- Publications on the best strategies for sustainable conservation of agroforestry tree germplasm, considering issues including climate change, natural forest loss, land degradation, the need for dietary diversification and the importance of traditional healthcare systems
- Knowledge (morphological, physiological and genetic) on germplasm of key agroforestry species, with an advanced understanding of the desirable traits of priority species under different environmental conditions.
- High-resolution maps of African countries linked to selection guidelines for tree species and populations for present and future climates.
- Development of expressed sequence tag (EST) libraries for key agroforestry tree species, to support regional efforts in upstream research for selection of high quality germplasm.
- Publication on the potential and pitfalls of biotechnology in promoting agroforestry trees, at genetic and landscape levels

Additional IPGs beyond research include:

‘Action research’:

- Assisting small-scale seed producers and nursery operators to form associations, in order to assess the advantages, disadvantages and requirements of such groups in delivering germplasm, and generate key lessons for promoting them
- Assisting small-scale seedling vendors to market seedlings using a range of possible methodologies, in order to test the advantages and disadvantage of various approaches.

Capacity building:

- Conducting training courses and developing training curricula to assist in widely disseminating best- practice to research and development partners, universities, schools and other teaching institutions.

Development-support:

- Facilitating the dissemination and use of founder quantities of tree germplasm, and providing online and printed decision-support tools and training materials to a range of end users.

Elaboration of Partners’ Roles

Our international partners primarily assist in:

- a) the development of strategies, databases, international policy formulation, multilateral conservation efforts, and advocacy for conservation and use of tree genetic resources.
- b) molecular genetics work for understanding genetic diversity and for marker-assisted selection

International partners include: University College Dublin (UCD), ARCS Siebersdorf, Australian Tree Seed Centre, CAB International, CIFOR, CIRAD, Forest Landscape Denmark (FLD), European Forestry Institute, Food and Agricultural Organization of the United Nations (FAO), Ghent University, International Centre for Under-utilized Crops, IITA, Bioversity International, International Society Horticultural Science, Unilever, Scottish Crop Research Institute (SCRI) Dundee, UK .

The developmental and private sector partners mainly collaborate and desire research findings linking directly into development projects or private investments. These partners include: Netherlands Development Organization. SNV, Technoserve, IUCN/SECO, Mars Inc., Syngenta International AG and Unilever.

Regional partners that assist in regional networking and conservation efforts include: CORAF, COMIFAC, APAARI, ASARECA, Centro Agronómico Tropical de Investigación y Enseñanza

(CATIE), the Forum for Agricultural Research in Africa (FARA), FORNESSA, and the SADC Tree Seed Centre Network.

National partners include: various national tree seed centres; national agricultural, forestry and horticulture research institutes; universities; national health authorities (for fruit and medicinal species); national extension systems; and quarantine authorities. The national partners primarily engage with in developing and testing methods, developing improved germplasm and propagation methods, conservation of individual tree species, and assembling range-wide collections. In addition, nationally-based NGOs and CBO partners are engaged in scaling up research.

Global Research Project 2: Enhancing productivity of agroforestry systems

Project Overview and Rationale

Project Goal

Smallholder farmers benefit from the combination of local and science-based knowledge on managing the interactions between trees, animals, crops, soils and climate, within the constraints of labour, capital, markets and prevailing policies.

Project Objectives:

1. Analyze economic and ecological opportunities of diversified and intensified agroforestry systems, including use of tree crops, and develop principles and guidelines for improved agroforestry management and integration of agroforestry on tropical smallholder farms.
2. Assess the efficiency of nutrient and water and use of agroforestry systems for smallholder farmers and support pathways for increasing these efficiencies and maintaining soil fertility.
3. Identify sustainable management options for tree diversity on farms based on tradeoffs between economic, environmental and cultural benefits, local (gender specific) resource availability and in the context of biotic, abiotic and economic stress factors and uncertainty.

Rationale

Although it is generally recognized that agroforestry practices can contribute to increased productivity and provision of environmental services in many ways – through diversified tree products, secured soil health, and enriched livestock feeds, for example --, there are major gaps in knowledge and between knowledge and its use.

Smallholder farmers around the world have seen little improvement in their welfare because prices for basic necessities are higher, agricultural productivity has stagnated, and input costs have increased faster than revenues, while production and market risks remain high. Most farmers in the tropics are not insured and operate in an environment of high uncertainty. They rely on local social networks – that may well share the same exposure to risk factors – for this function. Following the recommendations of agricultural advisors, many farmers have also become less insulated from risk because they now focus on monoculture production or on only one dominant farming enterprise.

Rainfall variability (and possibly climate change) as well as land degradation and desertification are among the most important obstacles to the achievement of food and/or income security. Yet, reduction of the planned, established and managed diversity of agricultural systems has impacted negatively on the stability of ecosystems, rendering them less able to cope with environmental shocks. At the same time, fragmentation of tropical landscapes has resulted in reduced availability and increased costs of products and services that could previously be obtained from natural ecosystems adjacent to farming areas. Whereas agroforestry systems can play an important role by providing new sources of ecosystem products and services, there is lack of information on the best ways to diversify agroforestry systems for optimal benefits for both the small-scale producers as well as the global community. This also includes the role of trees and agroforestry in mitigating the vulnerability of rural communities and their resilience to recover from natural and man-made disasters (e.g. excessive droughts, earthquakes, tsunamis and political conflicts). At the same time, it is expected that there is a marketing niche for small and medium-scale tree production systems that can offer greater livelihood options to farming communities than some well-established global monoculture cash crop production systems such as coffee, tea, rubber, cashew nut or cocoa.

Inadequate water supply is major constraint to agricultural production in dry lands. In many cases, however, rains provide adequate quantities of water for optimal crop production but this water is

lost, usually by overland flow, before the vegetation can use it. Water is also lost through poor tree management and landscape planning. For example, some fast growing tree species such as eucalyptus, pines and acacias are increasingly depleting the environment because their fast growth is matched by higher water and nutrient consumption.

Documented local and ‘scientific’ ecological knowledge on tree selection and management on farms is hardly available or non-existent for most native tree species. There is therefore a dire need to generate such information, which could be used in strategies for integrating trees on small farms for increasing food and tree crop productivity. Information is also lacking on the tradeoffs between economic and environmental benefits of indigenous tree species that are presently over-exploited in the wild and underutilized in agricultural systems.

GRP2 has two research outputs:

GRP2.1: Decision support tools for diverse and resilient integration of tree resources on farms developed, in the face of climate change and economic uncertainty, based on consideration of costs, benefits, risks and trade-offs at farm level.

GRP2.2: Principles, methods and practices for enhanced growth, productivity and efficiency of water and nutrient use of farming systems.

Outputs Description

Changes from previous MTP

This GRP includes most of the research activities and outputs of GRP2 (Improved on-farm productivity of trees and Agroforestry Systems) mapped out in the previous MTP 2009-2011. However, there are some changes in the grouping of project outputs following the Centre’s new Research Strategy 2008-2015 and developments in our science. The current GRP2 research outputs could be more clearly regrouped under two headings: 1) intensification and diversification (associated with resilience and adaptation to climate change) linked to integration of components through design and management of AF practices (in the light of costs, benefits and risks). 2) enhanced growth, productivity and efficiency of water and nutrient use of farming systems. Thus the two previous output areas GRP2.1 (costs, benefits and risks of Agroforestry technologies and systems under varying conditions), GRP2.2 (principles, methods and practices developed for improved tree and Agroforestry management) were regrouped.

Output Description

GRP2.1: Decision support tools for diverse and resilient integration of tree resources on farms developed, in the face of climate change and economic uncertainty, based on consideration of costs, benefits, risks and trade-offs at farm level.

GRP2.1 helps to better understand the system resilience through increasing agro-biodiversity and microclimates studies through mixed agroforests at farm level, including bio-fuels. The potential for Agroforestry to enhance farmers’ adaptive methods and strategies that are effective in coping with current stresses need to be investigated. Agroforestry options on-farm level may provide a means to diversify and intensify production of smallholder farming systems. The subproject addresses specifically climate change adaptation strategies for ecosystems and rural communities, land degradation issues and desertification.

GRP2.1 also addresses the need to understand the principles of managing integrated systems, including the identification and evaluation of options, testing of scaling up approaches, and the synergies or tradeoffs between improved economic returns, short-term market production, pest and diseases risks and long-term sustainability of the systems. The costs, benefits and risks of such intensified and diversified systems have to be understood and synthesized into management principles for smallholder farmers.

Partners contributing to GRP2.1 include:

- ◆ CGIAR Centres: ICRISAT, ICRISAT, ILRI, Biodiversity International and CIAT, TSBF
- ◆ Advanced research institutes (ARIs) and other centers: CIRAD, ICIPE
- ◆ UN institutions: UNFCCC, UNEP, FAO and partners (Sahel Eco).
- ◆ Universities: University of Hohenheim, Germany; University of Gottingen, Germany; Ghent University, Belgium; University of Copenhagen, Denmark, Bogor Agricultural University, Indonesia; University of Malawi, Malawi; University of Nairobi, Kenya; Jomo Kenyatta University of Agricultural Sciences, Kenya.; University of Rwanda; Universidade Federal Rural do Rio de Janeiro, Brazil and Universidade Federal do Paraná, Brazil.
- ◆ National agricultural research systems (NARS) representing national agriculture, forestry and livestock research.
- ◆ Development agencies, Local governments and NGOs.
- ◆ Private bodies: Mars Inc.
- ◆ Networks: SearNet, etc.

GRP2.2: Principles, methods and practices for enhanced growth, productivity and efficiency of water and nutrient use of farming systems.

GRP2.2 addresses specifically the role of Agroforestry in enhancing the performance of smallholder farming systems by increasing the productivity of associated crop and livestock systems, enhancing water and nutrient productivity and use efficiency by trees, leading to more diverse and intensive production systems and generating income through medium- and high-value tree products. Prime examples of how Agroforestry can contribute to rural livelihoods include rubber-based Agroforestry systems in Southeast Asia and West Africa, shea and baobab tree-based parklands in West and Central Africa, cacao production system in West Africa and Southeast Asia, coffee systems in Latin America, Africa and Southeast Asia and smallholder timber production in all three continents, especially where accessible forest resources have been depleted. There are also vast opportunities for Agroforestry to have wider poverty reduction impacts through market-driven and locally led tree cultivation systems, but these openings are not well understood by policy makers and shapers, development planners, researchers and donors. Hence, there is need for more research to demonstrate the existing use and impacts of these systems.

Partners contributing to GRP2.2 include:

- ◆ CGIAR Centres: International Water Management Institute (IWMI), ICRISAT, ILRI, Biodiversity International and CIAT, Tropical Soil Biology and Fertility Institute (TSBF)
- ◆ Advanced research institutes (ARIs) and other centers: ICIPE
- ◆ UN institutions: FAO and partners
- ◆ Universities: University of Hohenheim, Germany; University of Gottingen, Germany; Ghent University, Belgium; University of Copenhagen, Denmark, Bogor Agricultural University, Indonesia; University of Malawi, Malawi; University of Nairobi, Kenya; Jomo Kenyatta University of Agricultural Sciences, Kenya; University of Rwanda.
- ◆ NARS representing national agriculture, forestry and livestock research.
- ◆ Local governments and NGOs.
- ◆ Water productivity and use partners (FAO, IWMI, Rainwater Partnership, International Rainwater Catchment Systems Association, Southern and Eastern Africa Rainwater Network (SEARNET), International Rainwater Harvesting Alliance).
- ◆ CFC, IFAD
- ◆ Private bodies: Mars Inc.

Alignment to CGIAR Priorities (Output Level)

GRP2.1 aligns to CGIAR System Priorities:

3D: Sustainable income generation from forests and trees
and has secondary links with:
3A: Increasing income from fruits and vegetables
4A: Integrated land water and forest management at landscape level
4D: Sustainable agro-ecological intensification in low and high-potential areas
5D: Improving R&D options to reduce rural poverty and vulnerability

GRP2.2 aligns to CGIAR System Priorities:

4C: Improving water productivity
and has secondary links with:
3A: Increasing income from fruits and vegetables
4A: Integrated land water and forest management at landscape level
4D: Sustainable agro-ecological intensification in low and high-potential areas
5D: Improving R&D options to reduce rural poverty and vulnerability

Countries of Planned Research (Output Level)

GRP2.1 and GRP2.2 work is applicable to all regions where the centre is working including Latin America region, but the priority countries are:

GRP2.1: Ethiopia, Kenya, Rwanda, Uganda, Malawi, Tanzania, Zambia, Zimbabwe, Cameroon, DR Congo, Burkina Faso, Gambia, Ghana, Guinea, Niger, Nigeria, Senegal, Sierra Leone, India, China, Indonesia, Philippines, Thailand, Vietnam, Brazil, Peru, Mauritania,

GRP2.2: Ethiopia, Kenya, Malawi, Tanzania, Zambia, Zimbabwe, Cameroon, DR Congo, Burkina Faso, Niger, Nigeria, Senegal, Sierra Leone, India, China, Indonesia, Philippines, Thailand, Brazil, Mauritania,

Impact Pathways by Output

GRP2 will focus on the farm scale interactions between trees and livelihoods, in between the tree germplasm quality issues, selection and participatory tree domestication work including biofuels of GRP1, the market forecasting and market chain analysis including certification systems value chain aspects of GRP3, the dynamics and drivers of land use change and rehabilitation of degraded lands of GRP4, and the landscape-scale interactions of GRP6. Adaptation and vulnerability to climate change with GRP5 is a cross cutting area and will be closely linked to GRP2 as a part of the context for Agroforestry systems research. The work conducted in GRP6 on policies and environmental services will be in part informed by GRP2 outputs.

The primary impact that this GRP targets is: Agroforestry management and tree-based intensification options on farm are understood and used by smallholders to match livelihood strategies and available resources

Output GRP2.1 is expected to contribute to this type of impact via a number of outcomes, specified for various groups of stakeholders. These are:

1. More diverse Agroforestry principles and options for smallholder farmers to will be adapted and applied by research and development organizations in face of climate change.
2. Development programs for smallholder farmers include Agroforestry management options among intervention choices they consider, and use improved tools and knowledge to make more informed choices on integrating Agroforestry into farming systems.
3. Researchers targeting Agroforestry systems for smallholder farms have access to and use improved methods of system analysis, experimentation and support of farmer-level learning, as well as information critical for adjusting research agendas.

4. Smallholder farmers across the tropics maintain and enhance intensified and diversified farming systems with more productive and sustainable tree-based options for the supply of products for local use and markets, and the provision of local services.

This output is expected to enhanced use of knowledge and economic decision support systems in agroforestry praxis. The intended users include researchers in NARS, ARIs and universities, project developers, planners in government, Ministries of agriculture and natural resources and other development institutions, extension systems, NGOs, CBOs, private sector, land users and smallholder farmers. Policy makers and policy shapers concerned by large-scale scale development will benefit from the output of this subproject.

Output GRP2.2 is expected to contribute to this type of impact via a number of outcomes, specified for various groups of stakeholders. These are development organizations and policy makers use principles and techniques (for nutrient, water, pest and disease, etc.) for more effective Agroforestry development.

The beneficiaries of the outputs generated in this project include researchers in NARS, ARIs, universities, UN institutions, Ministries of agriculture and natural resources and other development institutions. Policy makers and policy shapers, extension systems, NGOs, CBOs, private sector, land users and smallholder farmers will benefit from theses outputs. I think it is best to say that land users and farmers are the end users – they will not directly use the outputs as will the other organizations listed above. The end beneficiaries of the information will be smallholder farming communities, benefiting from the uptake of the project's outputs.

Target ecoregions for GRP2 are:

Sub-Saharan Africa

RAEZ 1: Warm arid and semi-arid tropics (AEZ 1):

- West Africa: Burkina Faso, Guinea, Mali, Niger, Nigeria and Senegal;
- East Africa: Ethiopia, Kenya, Tanzania and Sudan;
- South Africa: Angola, Botswana, Madagascar, Malawi, Mozambique, Zambia and Zimbabwe.

RAEZ 2: Warm sub-humid tropics (AEZ 2):

- East Africa: Kenya, Uganda, Tanzania;
- South Africa: Malawi, Mozambique, Zambia and Zimbabwe.

RAEZ 3: Warm humid tropics (AEZ 3):

- West Africa: Cameroon, DR Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Ghana, Liberia, Nigeria, Sierra Leone

RAEZ 4: Cool tropics (AEZ4):

- East Africa: Rwanda, Ethiopia, Kenya and Tanzania.

Asia and the Pacific

RAEZ 8: Warm arid and semi-arid tropics (AEZ 1):

- Parts of India and Thailand.

RAEZ 9: Warm sub-humid tropics (AEZ 2):

- India, Sri Lanka and Thailand.

RAEZ 10: Warm humid tropics (AEZ 3):

- Indonesia, Philippines, Vietnam, Kampuchea, Laos, Thailand, South West China, Bangladesh, Sri Lanka

RAEZ 11: Warm arid and semi-arid subtropics with summer rainfall (AEZ 5):

- China, India.

Latin America

RAEZ 17: Warm humid tropics (AEZ 3):

- Brazil, Bolivia, Peru

RAEZ 18: Cool tropics (AEZ 4):

- Bolivia, Peru

GRP2 will collaborate with the reformulated African Highlands Initiative and ASB Partnership for the Tropical Forest Margins in evaluating impacts and tradeoffs of agroforestry-based farming systems. It also works closely with Program 4 'Poverty alleviation and sustainable management of water, land and forest resources' of the CGIAR MTP for West and Central Africa.

International Public Goods (IPGs)

Key IPGs generated by GRP2.1 are:

1. Strength-weakness analysis and appraisal of intensification options for agroforestry systems linking local and scientific ecological knowledge and cost-benefit analyses.
2. Management principles enhancing tree diversity and conservation agriculture on small farms developed.
3. Experiences synthesized and lessons learnt on the adoption, promotion and impact of agroforestry and natural resource management technologies on rural income and welfare, linking farmer management decisions to dynamics of local knowledge and roles for information providers.
4. Analysis of options to increase bioenergy/biofuel production on farm as part of diversification and self-reliance.
5. Analysis of farmer decision making and trade-offs between economical, environmental and cultural benefits of changes in tree species richness and evenness within tropical farming systems.

Key IPGs generated by GRP2.2 are:

1. Modeling approach linking tree architecture, allometry and mixed stand models (FBA and SeXI-FS) to tree diversity and agroforest management options.
2. Tree-soil-crop interaction model (WaNuLCAS) for evaluating water and nutrient management in the context of intercropping design and tree management in agroforestry in relation to soil and climate conditions.
3. Strategies on agroforestry based soil fertility practices developed for smallholder farmers: trees supporting soil fertility for crops, crops supporting nutrient management for trees.
4. Impacts quantified and compared of agroforestry systems on nutrient balance, including water conservation and productivity assessed in Africa and Asia.
5. Lessons learnt from user acceptability of agroforestry and national policy design with implications for scaling up the practices in Africa and Asia

Through this global project, World Agroforestry Centre will focus more on understanding the constraints and opportunities at larger scales (and not about individual farmer circumstances) such as major farming systems to be able to set priority research and development agendas in the development of productive Agroforestry systems for smallholders. World Agroforestry Centre is well placed to deliver IPGs based on their experience in analyzing lessons learnt on systems, strategies, approaches and methods for increasing agricultural productivity.

This global project will focus on developing principles and strategies for improving farming systems through tree diversification and intensification, and on identifying the attributes of species that can play useful functional roles while protecting the environment on-farm. It will also invest in the development of tools, databases, simulation models, guidelines, maps, practices and materials that regional, national and local researchers and development practitioners can use to help identify

Agroforestry solutions appropriate to their respective conditions. Moreover, the information on the management, nutrient and water use and productivity of various exotic and indigenous tree species occurring on-farm in various tropical sites have a critical IPG value as diverse natural and traditional farming systems are replaced by monoculture systems at very high rates in many agricultural systems.

Beyond research, this GRP will be an advocate for national policies that facilitate the adoption and adaptation of new and integrative approaches. GRP2 will also be involved in capacity building of scientists from key institutions on research approaches/methods and principles of Agroforestry in its specific area of expertise. The public will also be better informed about tradeoffs, costs and risks and synergies between ecological and economical benefits of growing different mixtures of tree species within farming systems for their improved livelihoods and sustainable environment.

Elaboration of Partners' Roles

The GRP will collaborate with the following key institutions as per their respective expertise contributing to the project outputs:

- IARC International Agricultural Research Centers: IWMI, ICRISAT, ILRI, Bioversity International, CIAT, TSBF
- ARIs Advanced Research Institute and other centers: CIRAD, ICIPE
- Development institutions: FAO, UNFCCC, Common Fund for Commodities (CFC), International Fund for Agricultural Development (IFAD); ACIAR and SANREM CRSP
- Universities: University of Hohenheim (Germany); Ghent University (tree diversity on farm); University of Copenhagen (Fruit trees on farm in WCA/Sahel), Bogor Agricultural University, Indonesia; University of Malawi; University of Rwanda; Universidade Federal Rural do Rio de Janeiro, Brazil and Universidade Federal do Paraná, Brazil.
- NARI National Advanced Research Institute, representing national agriculture, forestry and livestock research.
- Local governments for Ministries and governmental organizations and agencies
- NGOs Non-governmental institution (e.g. Sahel Eco, World Vision etc).
- Water productivity and use partners (FAO, IWMI, Rainwater Partnership, International Rainwater Catchment Systems Association, Southern and Eastern Africa Rainwater Network (SEARNET), International Rainwater Harvesting Alliance).
- Private sector and Foundations: Mars Inc.

The following table shows the strategic roles of different partners:

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
IARC	ICRISAT	Assist in improved water productivity and diversifying agriculture into high-value crops in the dry lands.	GRP2.1, GRP2.2 & GRP 2.3	Global
IARC	Bioversity International	Offer expertise on methods of assessing and in-situ conservation of the agro-biodiversity for developing strategies of tree genetic conservation on small farms within diversified farming	GRP2.2 & GRP 2.3	Global

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
		systems.		
IARC	IWMI	Collaborative research in improved water productivity in Agroforestry systems and upgrading rain fed agriculture at basin level	GRP2.2	Global
IARC	TSBF	Provide expertise on nutrient cycling and soil fertility issues.	GRP2.2 & GRP 2.3	Global
IARC	CIAT	Assist in assessing constraints and opportunities of Agroforestry systems for improved food security.	GRP2.2 & GRP 2.3	Gobal
IARC	ILRI	Assisting the integration of fodder trees and shrubs into livestock systems particularly on farm level.	GRP2.2 & GRP 2.3	Global
ARI	CIRAD	Give expertise on some tree-based farming systems such as coffee, cocoa and palm oil would facilitate analyzing the potential to integrate Agroforestry in smallholder high-value tree crop systems, and assess various values and trade-offs of such systems.	GRP2.2 & GRP 2.3	Global
ARI	ICIPE	Give expertise on pests associated with farming systems in the tropics for their enhanced management.	GRP2.2 & GRP 2.3	Global
Universities	University of Hohenheim (Germany); Ghent University (tree diversity on farm); University of Copenhagen (Fruit trees on farm in WCA/Sahel), Bogor Agricultural University, Indonesia; University of Malawi; University of Rwanda,	Assisting on the research of various aspects on the adoption and impact of integrating indigenous fruit trees, timber trees, medicinal and pesticidal plants on small farms; and assessing tree diversity on-farm; research tools and methods and results mainstreamed into university curricula.	GRP2.1, GRP2.2 & GRP 2.3	Southeast Asia, West and Central Africa, Eastern Africa, and Southern Africa

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
	Queensland University; Universidade Federal Rural do Rio de Janeiro, Brazil and Universidade Federal do Paraná, Brazil.			
Development organization	FAO	Approaches in market analysis for non-forestry products and taking the developed science and technologies to beneficiaries at multiple levels.	GRP2.2 & GRP2.3	Global
Development organization	UNFCCC	Meetings for international policy formulation	GRP2.1	Global
Development organization	IFAD, CFC, ACIAR, SANREM CRSP	Providing resources for research on economical cultivation on smallholdings through adoption of improved technologies and diversified farming systems	GRP2.1, GRP2.2 & GRP 2.3	Global
Regional Organization	Coffee Network (CAFNET)	Participate in the assessment of coffee-based Agroforestry systems in East Africa.	GRP 2.3	Eastern Africa
Government	Local governments for Ministries and governmental organizations and agencies	Participate and facilitate action research and extension of new technologies to farmers and field workers, and policy/decision makers; scaling up of research output; facilitation in policy review and improvements.	GRP2.1, GRP2.2 & GRP 2.3	Southeast Asia, West and Central Africa, Eastern Africa, and Southern Africa and
NARI	National Advanced Research Institutes for various countries	Nutrient and water productivity and use partners: Rainwater Partnership, International Rainwater Catchments Systems Association (IRCSA), Southern and Eastern Africa Rainwater Network (SEARNET).	GRP2.2 & GRP2.3	National and Global levels
Private Foundation	Mars Inc	Providing resources and	GRP23	West and

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
		intelligence for research on the cultivation and trade of cocoa.		Central Africa

Global Research Project 3: Improving tree product marketing for smallholders

Project Overview and Rationale

Project Goal

Smallholder benefit from tree product and service value chains and strengthened marketing systems, by improved skills and access to markets and information.

Project Objective

1. Enhance smallholders' access to value chains for agroforestry tree product (AFTP)
2. Improve government and NGO support for marketing strategies and market performance for increased rural incomes and improved livelihoods.

Rationale

Small-scale farmers and entrepreneurs usually lack business skills, have limited access to agroforestry tree product markets, and have little access to information on market demand. They are poorly organized and lack assured and stable markets. It is therefore not surprising that they face high marketing risks and costs, and earn low returns from marketing their tree products.

Governmental and non-governmental organizations seeking to facilitate smallholder marketing, also face critical problems. There are few tools available to assess market opportunities, or to help farmers exploit available opportunities like adding value to products from the farm. These facilitating organizations also find that there are few market demand assessments and few business investment models for tree product investors.

To make matters worse, both sets of actors face problems in the enabling environment that act as disincentives to marketing produce. The inadequate institutional support for marketing (e.g. credit, market information) and skewed policies, barriers and disincentives make it difficult for smallholders to market their produce. There is an absence of quality assurance schemes for Agroforestry tree products and services production and marketing. Trade for some products is over-regulated (e.g. on-farm timber) while in other cases it is under-regulated (e.g. herbal medicines). Many policy makers still view private traders as a parasitic class rather than as a resource that can generate wealth in rural areas. Also, they do not often perceive the potential for tree products to generate significant incomes for smallholder farmers.

GRP3 has two research outputs:

GRP3.1: Approaches for improving smallholder access to tree product value chains

GRP3.2: Improved marketing strategies to enhance the performance of tree product value chains and smallholder livelihoods.

Outputs Description

Changes from previous MTP

In GRP 3.1, we broadened the focus on certification systems to include quality assurance systems for production and marketing. In GRP 3.2, we dropped a research question, in order to better focus on the three remaining questions. We also clarified the distinction between the two outputs in terms of research questions, partners, and audiences. There is still some overlap but also greater distinction between the two than previously.

Description (Output level)

GRP3.1: *Approaches for improving smallholder access to tree product value chains*

The development of approaches for improving smallholder access to tree product value chains focuses on three research issues:

- How and under what circumstances can quality assurance systems for production and marketing of Agroforestry products help the poor? How can the poor gain better access to certified markets? The demand for products that have been produced under quality assurance systems is rising rapidly, offering poor farmers potentially high returns. But research is needed to assess how farmers can access these high-return enterprises. Our research compares and analyzes three certification opportunities for farmers, eco-certified jungle rubber in Indonesia, Shea products in the Sahel, and shade coffee in East Africa.
- How can collective action improve farmers' access to markets, enhance livelihoods and help market performance (e.g. outgrower schemes)? What are the drivers and triggers, and how can barriers be overcome? Collective action can help farmers sell produce in bulk, solving a key constraint that smallholders face in marketing their produce. Collective action also helps farmers to reduce input costs, access external assistance, and foster learning and experimentation. Our research focuses on the role of farmer groups in improving market access and how Land Care, farmer organizations for promoting sustainable farming and livelihoods, can improve market access. Areas of research are East Africa and Southeast Asia.
- What key factors contribute to successful and sustainable linkages between farmers and the private sector? How do they vary over space, time, and product type? Here we test approaches for implementing public private partnerships and how to build trust and market arrangements that are mutually beneficial for both smallholders and private enterprises.

Key partners include the Coffee Research Foundation, Kenya, Coopérative pour la Promotion des Activités Café (Rwanda), National Agricultural Research Organization (Uganda), Land Care Australia, and Unilever Ltd.

GRP3.2: Improving marketing strategies to enhance the performance of tree product value chains and smallholder livelihoods.

Our research focuses on three strategies for enhancing value chain performance and improving livelihoods:

- What are the opportunities and constraints of linking smallholders directly to traders and agribusinesses versus promotion of cottage industries? The answer depends on a range of factors: product characteristics, farmer capacities, resource availabilities, and social capital. Guidelines and decision support tools can help facilitating agencies to make informed decisions so as to help farmer organizations to market products in the most beneficial manner. We are conducting research in this area on fruits in central Africa and southern Africa.
- Can vouchers and other innovations help strengthen private seed and seedling markets? Instead of receiving seedlings for free, farmers exchange a ticket (voucher) for seedlings from nursery owners; the nursery owner then receives compensation for the voucher from a project. This system helps promote private supply systems, in that the farmer gets used to procuring seedlings from the nursery and private nurseries are supported instead of project nurseries. We will test the system at three sites, Cameroon, Malawi, and in Kenya.
- How can organizations and entrepreneurs decide which enterprises are most viable in their area? How can models be used to assess ex-ante feasibility and profitability of such enterprises? We are developing a model to assess the feasibility of leaf meal enterprises for marketing fodder; such enterprises are very common in Asia but are found at only one site in Kenya. The model will be tested in Mali and in Rwanda.

Alignment to CGIAR System priorities (Output level)

GRP3.1 aligns to CGIAR System Priorities:

3A: Increasing income from fruits and vegetables
and has secondary links with:

5C: Rural institutions and their governance

5D: Improving R&D options to reduce rural poverty and vulnerability

GRP3.2 aligns to CGIAR System Priorities:

3D: Sustainable income generation from forests and trees

and has secondary links with:

3A: Increasing income from fruits and vegetables

5B: Making international and domestic markets work for the poor

5C: Rural institutions and their governance

5D: Improving R&D options to reduce rural poverty and vulnerability

Countries of Planned Research (Output Level)

GRP3.1: Ethiopia, Kenya, Rwanda, Uganda, Malawi, Tanzania, Cameroon, DR Congo, Mali, Indonesia

GRP3.2: Malawi, Cameroon, DR Congo, Mali

Impact pathways by Outputs

GRP3 is at the interface of the farm and the value chain, and is thus closely linked to the trees and agroforestry systems that produce the outputs that are to be marketed. Actual income from tree products is also a major consideration in the success of land health and landscape services concerns of GRP's 4, 5 and 6.

The primary impact that this GRP targets is: Smallholders have greater access to existing and emerging markets for Agroforestry products

Key outcomes of this output include increased smallholder access to and participation in more cohesive and sustainable farmer organizations, more effective public-private partnerships, and better targeting of certification interventions to smallholders, the rural poor and women. These in turn will lead to increased marketing, better negotiating power, and higher prices, which will all help smallholders to improve their livelihoods. Output GRP3.1 is thus expected to contribute to this type of impact via a number of outcomes, specified for various groups of stakeholders. These are:

1. Quality assurance interventions that is more accessible and beneficial to smallholder farmers.
2. More effective farmer organizations that negotiate higher prices for farmers, lower transaction costs and facilitate flows of market information.
3. Women's organizations and organizations supporting women use improved approaches for engaging women in collective action for marketing.
4. Private companies and public organizations make more informed decisions and enhance collaborative actions.

Main users include organizations facilitating improved smallholder access to markets including non-governmental organizations, government extension services, and policy makers as well as farmer organizations trying to help their members. Outputs will be written up in the form of guidelines, manuals, and policy briefs and capacity building of staff of the facilitating organizations will be an important means of communicating the findings. Other key audiences include private corporations seeking to increase tree product marketing and certification bodies seeking to benefit the poor. In addition to distributing manuals and guidelines to them and conducting capacity building events, we will also communicate our findings directly to such groups via workshops and consultations.

Output GRP3.2 is expected to contribute to this type of impact via a number of outcomes, specified for various groups of stakeholders. These are:

1. Farmer organizations, private companies and entities supporting them making sounder investment and marketing decisions on Agroforestry products.
2. Greater understanding and use of vouchers in seed and seedlings supply systems.

3. Improved policies to support development of Agroforestry related enterprises.

Our main outcomes include stronger linkages between smallholders and the private sector, improved policies to support smallholder marketing and enterprises, more effective farmer organizations, more numerous and more equitable, profitable and sustainable farmer enterprises, including nurseries. Other outcomes include improved representation of smallholder associations in policy making, strengthening of the private sector in seed/seedling marketing, and enhanced entrepreneurial capacity-building among partner organizations such as NGOs and government extension services. These will help farmers improve the prices they receive, reduce transactions costs, improve their incomes and enhance sustainable livelihoods.

Main users include organizations facilitating farmer enterprises including non-governmental organizations, government extension services, and policy makers as well as farmer organizations trying to help their members. Outputs will be written up in the form of models, guidelines, manuals, and policy briefs and capacity building of staff of the facilitating organizations will be an important means of communicating the findings. Other key audiences include private corporations seeking to increase tree product marketing. In addition to distributing manuals and guidelines to them and conducting capacity building events, we will also communicate our findings directly to such groups via workshops and consultations.

Target ecoregions for GRP3 are:

Sub-Saharan Africa

RAEZ 1: Warm arid and semi-arid tropics (AEZ 1):

- West Africa: Burkina Faso, Guinea, Mali, Niger, Nigeria and Senegal
- South Africa: Angola, Botswana, Madagascar, Malawi, Mozambique, Zambia and Zimbabwe

RAEZ 3: Warm humid tropics (AEZ 3):

- West Africa: Cameroon, DR Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Ghana, Liberia, Nigeria, Sierra Leone

RAEZ 4: Cool tropics (AEZ4):

- East Africa: Rwanda, Ethiopia, Kenya and Tanzania.

Asia and the Pacific

RAEZ 10: Warm humid tropics (AEZ 3):

- Indonesia, Philippines, Vietnam, Kampuchea, Laos, Thailand, SW China, Bangladesh, Sri Lanka

International Public Goods

IPGs produced by GRP3.1 are:

1. Decision support tools to assist facilitating agencies and farmer organizations decide whether to seek value adding activities or to link with private sector operations that do so.
2. Guides for governmental and non-governmental organizations to facilitate the establishment and effectiveness of farmer groups and associations; best institutional innovations for collective marketing
3. Diagnostic and analytical tools for identifying market opportunities and assessing the performance of Agroforestry tree product value chains
4. Decision support tool to help farmer groups and organizations decide whether and how a certification scheme can benefit smallholders.
5. Model for assessing the viability of leaf meal enterprises in different locations in Africa as basis for impact studies

IPGs produced by GRP3.2 are:

1. Guidelines on the use of vouchers to promote effective private sector seedling supply systems. . Conceptual framework and decision support tools for guiding different types of partnerships, such as public-private partnerships, and assessing tradeoffs among options.
2. A synthesis of the impacts of different types of farmer enterprises on community structures
3. Publication on best practices for equitable and effective farmer enterprises, considering issues of social stratification, gender and economic differentiation.
4. Action research experience with assisting small scale seed vendors and nursery operators to form associations so as to assess the advantages and disadvantages of such associations and generate lessons (international public goods) for promoting them.

Additional IPGs beyond research include:

'Action research':

- Assisting small scale seed vendors and nursery operators to form associations so as to assess the advantages and disadvantages of such associations and generate lessons (international public goods) for promoting them
- Assisting small scale seedling vendors to market seedlings using vouchers, in order to test the advantages and disadvantage of this system relative to other approaches

Capacity building: Conducting training courses and developing training curricula assists in disseminating best practices and assuring that lessons and international public goods are disseminated to a wide range of partners as well as to teachers and students in educational institutions.

Development-support: Facilitating the dissemination and use of training materials and decision-support tools by beneficiaries and end users

Elaboration of Partner Roles

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
University	Univ of Ghent	Expertise on non-forest timber product research in west and central Africa. Build capacity of national research staff.	GRP 3	Central Africa
NARS	IRAD, INERA	Assist in generating research outputs and wide diffusion of research methods and results	GRP 3.1 and 3.2	Central Africa
NGOs	FONJAK, ADEAC, MIFACIG, OPFCR, SNV, WWF,	Wide diffusion of research results; Feedback from communities/clients	GRP 3.1 and 3.2	Central Africa
Government	Ministries of Forest, Commerce, Small and Medium Enterprises	Wide diffusion of research results; joint generation of policy recommendations	GRP 3.1 and 3.2	Central Africa
Dev Org	UNCTAD	Assist in developing and disseminating policies and assist in generating research outputs	GRP 3.1	Global
IARC	ILRI	Expertise in livestock	GRP 3.2	East Africa

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
		systems		
University	Bunda College	Research capacity and knowledge of Malawi	GRP 3.1	Malawi
NGO	Malawi Agricultural Commodity Exchange	Capacity building in market information systems	GRP 3.1	Malawi
NGO	National Small Farmers Association of Malawi	Capacity building and grass roots organizational capacity	GRP 3.1	Malawi
NGO	Technoserve	Business Development Services; Strategies for enterprise development	GRP 3.2	East Africa
Private sector	Unilever	Product development and marketing	GRP 3.1	Africa

We seek to strengthen the science and practice of Agroforestry tree product marketing based on the guidance of a centre-commissioned external review on marketing and the Centre's third External Programme and Management Review (EPMR). We envision strengthening our teams through working more closely with partners. We have already initiated partnerships with national public institutions in southern Africa and South Asia. At the international level, we will work with certification bodies, advanced research institutions, and international NGOs (e.g. Landcare, Technoserve). Our main CGIAR partners are IFPRI, ICRISAT, CIFOR, and the Collective Action and Property Rights Initiative. At the national and local level, we work with agricultural research institutions (NARS), universities, NGOs, (including micro-finance institutions) community based organizations, private businesses and farmer associations.

Key partners with whom we conduct collaborative research on certification include the Coffee Research Foundation, Kenya, the Rwandan Coffee Office, and the Coopérative pour la Promotion des Activités Café (Rwanda) in East Africa. The Kunming Institute of Botany, Yunnan (China) is collaborating on Shea product research, conducting laboratory analyses of Shea products. Concerning collective action, key partners include National Agricultural Research Organization (Uganda) and Land Care International. On public-private partnerships, Unilever Ltd. and SNV (Netherlands) are key partners.

On issues of adding value vs. linking with private sector, we work with Bunda College of Agriculture and Dariboard Ltd. in Malawi and IFPRI, Technoserve and Sunny Industries in Kenya. On vouchers, our main research partner is ICRISAT. On equitable enterprises, we work with Tschang University of Agriculture (Cameroon) and with CIFOR. On models for assessing the viability of leaf meal, we work with the Institut de l'Economie Rurale in Mali and the National University of Rwanda.

Presently, at the multinational private sector level we work with Unilever, Mars Inc., AAK and ITC, and expect other private sector actors and policy makers to use our tools for improving linkages with farmers and certification bodies, and to adopt recommendations for increasing smallholder access.

Global Research Project 4: Reducing land health risks

Project Overview and Rationale

Project Objectives

GRP4's objectives are to:

1. Develop multi-scale and widely usable land health surveillance methods that can provide information on where land problems exist and where the major risks are.
2. Quantify and map these major risks to land health in the tropics, target land management and Agroforestry interventions to reduce and reverse these risks at different scales, and evaluate outcomes of intervention programmes
3. Develop national capacity in operational land health surveillance methods and tools.

Rationale

Land degradation is a global threat to habitat, economy and society, and is the overarching environmental issue of concern in Africa, threatening food security, ecosystems and livelihoods. Soil degradation and fertility decline is a major concern for food security in developing countries. However, current measurement and information systems on land degradation in developing countries are grossly inadequate for the task of planning and evaluating land health¹ and Agroforestry policy and practice. In particular, there is a lack of systematic data on land health risks to enable efficient targeting of land management and Agroforestry interventions² and to answer questions such as:

- What are the socioeconomic and biophysical determinants of land degradation (land health risks) and how are they geographically distributed?
- How much future land degradation can be avoided or reversed through targeted action to reduce risks?
- What is the impact of preventative and rehabilitation Agroforestry intervention programmes under different conditions?

GRP4 has two research outputs:

GRP4.1: Effective land health surveillance methods developed

GRP4.2: Land health risks assessed and Agroforestry interventions to reduce and reverse land degradation well targeted

Outputs Description

Changes from Previous MTP

None

Description (Output Level)

GRP4.1: Effective land health surveillance methods developed

¹ Land health is the capacity of land to sustain delivery of essential ecosystem services (the benefits people obtain from ecosystems). Ecosystem services are defined by the Millennium Ecosystem Assessment.

² Intervention means any promotive, preventive, curative, or rehabilitative activity where the primary intent is to improve land health and human well-being. GRP4 focuses on targeting and evaluations of programmatic interventions (as distinct from individual technology interventions).

Recent World Agroforestry Centre research advances in land health surveillance³ are based on principles adapted from public health surveillance, where accurate measuring and monitoring of changes and improvements in the health of populations is closely integrated with statistical methods to form a scientific basis for policy development, priority setting and management. GRP4.1 builds on these advances and tackles the key methodological question: How can land health surveillance systems deploy modern science and technology to strengthen evidence-based decision-making on land and Agroforestry management at multiple scales, to help better (i) understand hazardous and protective factors affecting land health risk, (ii) target Agroforestry options, (iii) allocate resources and set priorities, and (iv) learn through quantitative monitoring and impact assessment?

GRP4.2 Land health risks assessed and Agroforestry interventions to reduce and reverse land degradation well targeted
Through application of the land health surveillance methods, GRP4.2 aims to address the following research questions:

1. What are the main environmental and behavioural⁴ risk factors associated with land and soil degradation syndromes in the tropics, and how are they distributed in relation to different settings and factors such as ecoregions and poverty levels?
2. What types of Agroforestry interventions can help reduce or reverse key risk factors associated with land degradation and what are the cost efficiencies of alternative preventative and rehabilitation interventions under different circumstances?

Alignment to CGIAR priorities (output level)

GRP4.1 aligns to CGIAR System Priorities:

4A: Integrated land water and forest management at landscape level

4D: Sustainable agro-ecological intensification in low and high-potential areas

and has secondary links with:

4C: Improving water productivity

5A: Science and technology policies and institutions

GRP4.2 aligns to CGIAR System Priorities:

4A: Integrated land water and forest management at landscape level

4D: Sustainable agro-ecological intensification in low and high-potential areas

and has secondary links with:

3D: Sustainable income generation from forests and trees

5D: Improving R&D options to reduce rural poverty and vulnerability

Countries of Planned Research (Output Level)

GRP4.1: Kenya, Malawi, Tanzania, Mali

GRP4.2: Kenya, Sudan, Uganda, Angola, Botswana, Malawi, Mozambique, Tanzania, Zambia, Zimbabwe, Cameroon, DR Congo, Gabon, Burkina Faso, Equatorial Guinea, Ghana, Guinea, Liberia, Niger, Nigeria, Sierra Leone, Madagascar, Mauritania, Namibia, South Africa

³ The ongoing, systematic collection, analysis, and interpretation of data essential to the planning, implementation, and evaluation of land management policy and practice, and application of these data to the promotion, protection, and rehabilitation of land and ecosystem health. A surveillance system includes a functional capacity for data collection, analysis, and dissemination linked to land health programmes.

⁴ Risk factors are attributes that are associated with an increased probability of a specific land health problem or outcome. Risk factors include biophysical and socioeconomic factors or exposures, and include behavioural as well as inherent characteristics. Protective as well as hazardous risk factors are also considered.

Impact pathways by outputs

GRP4 Outputs build on the technology level assessment of trees on agroforestry farms and their market relations, studied in GRP's 1 and 3. GRP4 adds a programmatic perspective to the assessment of land health and the spatial targeting of interventions. GRP4 outputs also interact with those of GRP5 where climate change is an additional risk factor for land degradation, and GRP6 where land health is linked to a broader set of environmental services. The primary impact that this GRP targets is thus the widespread adoption of Agroforestry systems that avoid/revert land degradation problems and risks.

Output GRP4.1 is expected to contribute to this type of impact via a number of outcomes, specified for various groups of stakeholders. These are:

1. Governments, UN agencies and funding agencies aware of benefits of land health surveillance science and technology.
2. Researchers use improved methods for land degradation and soil quality assessment.
3. Development implementers use improved tools and knowledge to make informed choices on improving land management and targeting Agroforestry interventions to enhance land productivity.

We expect that governments will take up the land health surveillance methods as an integral part of land management planning and practice. This assumes investments by Governments in new soil analytical equipment, geoinformatic facilities and staff capacity in associated quantitative techniques. To increase the likelihood of these outcomes, the project will play a key role in building capacity of tropical developing countries in modern scientific and technical approaches and tools for land assessment and management, e.g. geoinformatics and associated statistical analysis. Training and capacity building is needed to support a new generation of soil scientists and natural resource management professionals to ensure that the generated information can be used to improve land management and policy decision-making. The benefits of application of these methods by national programmes are summarized in GRP4.2. The increasing acceptance of the methods by national governments will depend on increasing their recognition by other advanced research institutes and donors in the short term – hence the project aims to integrate the methods into a range of project and programmes.

External partnerships include advanced research institutes such as the Earth Institute and Center for International Earth Science Information Network (CIESIN) at Columbia University in remote sensing, cyber infrastructure and biometrics; Michigan State University on methods development in remote sensing for carbon measurement; and national soil survey institutes and universities in Africa for capacity building in land health surveillance methods. The project is also working closely with the United Nations Environment Programme (UNEP), United Nations Development Program (UNDP), the World Bank, and NEPAD on integrating research and assessment methods into major land management programmes, such as TerrAfrica. Institutions helping to test and further develop soil-testing methods using infrared spectroscopy include Egerton, Jomo Kenyatta and Nairobi universities in Kenya, and with National Agricultural Research (IIAM) in Mozambique, Kenya Agricultural Research Institute in Kenya, Institut d' Economie Rurale (IER) in Mali, and the Tanzanian Agricultural Research Institutes. The same national research organizations and Ministries of Agriculture also help with land health surveillance (GRP4.2). The private sector works with the project on new technological developments, such as low cost infrared spectrometers for soil analysis in developing countries. For example Bruker Optics (Germany) is providing technical support to World Agroforestry Centre's network of near-infrared spectroscopy laboratories in Africa and the development of high throughput mid-infrared soil analysis.

Output GRP4.2 is expected to contribute to this type of impact via a number of outcomes, specified for various groups of stakeholders. These are: 1) Evidence-based management principles and spatially explicit strategies are used to steer land management research and development programmes. 2) National scientists better target Agroforestry based land management options to specific land degradation problems and risks and assess intervention impacts. 3) Improved Agroforestry based land and soil management options applied and adapted by development organizations.

Improved information on land health risks and spatial targeting of Agroforestry interventions is expected to guide intervention priorities at a range of spatial scales. Better land health policy and management in turn results in healthier ecosystems through the enhancement of environmental services on the landscape, and improved rural livelihoods in developing countries through sustainable and productive management of agricultural landscapes. The project aims to achieve outcomes with a range of beneficiaries at different scales:

Regional scale: Policy development, priority setting and resource allocation decisions on land and soil management programmes by inter-governmental organizations, UN agencies, donors, non-governmental development agencies, and the private sector.

National scale: Policy development, priority setting and resource allocation decisions on land management programmes by governments and development agencies.

Local scale: Design of local extension and development programmes and targeting of land management recommendations to farmer communities by government local planners and extension services.

World Agroforestry Centre's role in ensuring outcomes and impacts is through (i) joint application of approaches and methods in large projects with national partners, (ii) capacity building of national programmes through MSc and PhD training, training courses, and hands-on training, (iii) dissemination of guidelines and training materials, and (iv) scientific and technical backstopping through advisory services to national programmes.

The main assumption is that national programmes and donors see the value of adopting scientific and systematic approaches to targeting land management intervention programmes and that they invest in developing sufficient scientific and technical capacity in national programmes for science-based land management. There is increased interest in addressing land degradation and soil fertility problems in tropical developing countries, especially Africa with the launch of TerrAfrica, AGRA and other initiatives. Demonstrating the value of land health surveillance information for sustainable development is also an important objective of this project. A major vehicle for achieving this is the Africa Soil Information Service Project⁵, funded by the Bill and Melinda Gates Foundation and AGRA, which is implementing land health surveillance methods throughout sub-Saharan Africa.

The land health surveillance system is modeled on surveillance approaches used in public health management. At present there are no consistent, large-area mechanisms for testing the efficacy of Agroforestry and other land management interventions in tropical developing countries. The project will (i) enable governments to provide practical, timely, and cost effective information at high spatial resolution about where specific land degradation processes occur in a given region or country, and how these are changing over time, (ii) provide a framework for rigorous scientific testing and implementation of locally relevant preventative and rehabilitative soil management interventions, addressing what works where, and (iii) provide practical policy and management advice to policymakers, scientists, development specialists, and farmers. The approaches and methods are

⁵ <http://www.africasoils.net/>

globally applicable but have greatest potential to accelerate development progress in tropical developing countries, where data on land condition and knowledge on appropriate targeting of land rehabilitation interventions are completely inadequate for the task at hand.

External partnerships include the Earth Institute and Center for International Earth Science Information Network (CIESIN) at Columbia University on land health surveillance in Africa; WWF, Michigan State University and CIFOR on carbon measurement systems; National soil survey institutes in Africa on field survey of land health; UN agencies (UNEP, FAO, UNDP, World Bank) on joint project implementation; the International Soil Reference Information Centre (ISRIC) on global soil information services; and other CGIAR centres, such as TSBF-CIAT on integrated soil fertility management, and ICRISAT and ICARDA on dryland degradation assessment.

Target ecoregions for GRP4 are:

The primary geographic focus is as for GRP4 is Sub-Saharan Africa but more specifically within the agro-ecological zones below the project will primarily target agro-ecosystems, primarily cultivated land and rangeland.

Sub-Saharan Africa

RAEZ 1: Warm arid and semi-arid tropics (AEZ 1):

- West Africa: Mali, Mauritania, Niger, Senegal, and parts of Burkina Faso.
- East Africa: Parts of Ethiopia, Kenya, Tanzania and Uganda.
- Southern Africa: Parts of Madagascar, Malawi, Mozambique, and Zambia.

RAEZ 2: Warm subhumid tropics (AEZ 2):

- Southern Africa: Parts of Malawi, Mozambique and Zambia.

RAEZ 3: Warm humid tropics (AEZ 3):

- Parts of Kenya and Ethiopia.

RAEZ 4: Cool tropics (AEZ 4):

- Rwanda, and parts of Ethiopia, Kenya, Madagascar and Tanzania.

Asia and the Pacific

RAEZ 8: Warm arid and semi-arid tropics (AEZ 1):

- Parts of India.

RAEZ 9: Warm subhumid tropics (AEZ 2):

- Parts of India.

Latin America and the Caribbean

RAEZ 17: Warm humid tropics (AEZ 3):

- Brazil

International Public Goods

IPGs produced by GRP4.1 include:

1. Conceptual framework and measurement protocols for land health surveillance
2. Method for high-throughput diagnosis of soil and plant quality using infrared and X-ray spectral analysis, incl. protocol for wood moisture, density and carbon analysis using infrared spectroscopy and protocol for combined use of infrared and X-ray spectroscopic analysis of soil quality
3. Methods guidelines for satellite image processing and terrain modeling for soil health surveillance
4. Capacity building materials and technical backstopping service and capacity building materials on land health surveillance methods
5. Barrier analysis for adoption of land health improving practices in the context of comprehensive program design and impact studies

The international public goods envisaged by GRP4.1 include: land health surveillance approaches, methods, standards, tools and protocols; and capacity building in land health surveillance methods. Examples include new scientific concepts for evidence-based assessment of risk factors associated with land degradation, methods for low cost, rapid soil analysis using infrared spectroscopy, new statistical methods for digital mapping of land degradation and soil health that link ground observations to remote sensing information.

IPGs produced by GRP4.2 include:

1. Baseline remote sensing and ground data on soil and vegetation condition in sub-Saharan Africa.
2. Assessment of land health risks in sub-Saharan Africa for targeting agroforestry interventions.
3. Soil spectral and reference method library and interpretation models for soil functional properties for Africa Soil Information Service.
4. Baselines for assessing impacts of agroforestry projects in Africa on soil and vegetation health.
5. Comparative assessment of land health risks in Asian (Tibetan Plateau) and African Highlands.

International public goods from GRP4.2 include: land health risk assessments at multiple scales; spatial targeting and evaluation of Agroforestry interventions in relation to major land degradation problems; and co-development of an Africa Soil Information System. World Agroforestry Centre's comparative advantage is in application of infrared spectroscopy methods to large area land health assessment and systematic ground survey of land health risk factors linked to remote sensing and other geoinformatics, and the application of this data to spatial targeting and evaluation of Agroforestry programmes. The land health surveillance framework is being used in a UNEP capacity-building project to guide strategies for land restoration in five West African dryland countries and in a World Bank-GEF project in Kenya, led by the Kenya Agricultural Research Institute, which is designed to tackle land degradation problems in the Lake Victoria basin. Soil health surveillance has been recommended as part of a NEPAD-endorsed strategy for saving Africa's soils and is proposed for Sub-Saharan Africa as a component of the Global Digital Soil Map of the World project. There is increasing interest in using the land health surveillance methods for landscape and project carbon baselines. GRP4 is working with private wildlife ranches in Kenya to help them establish carbon baselines, and will further develop these methods under GEF's Carbon Benefits Project: Modeling, Measurement and Monitoring, executed by UNEP.

Elaboration of Partner's Roles

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
IARC	TSBF-CIAT	Joint implementation of the Africa Soil Information Service; integrated soil fertility management; agronomic trials.	GRP4.1 & GRP 4.2	Africa
IARC	ICARDA	Co-development of concept papers for UNCCD CST; dryland management.	GRP4.1	Global
IARC	ICRISAT	Co-development of concept papers for UNCCD CST; dryland management.	GRP4.1	Global
IARC	CIFOR	Co-development of carbon measurement and monitoring system; tree allometry, greenhouse gas measurements	GRP4.1	Global
ARI	Earth Institute,	Joint implementation of land health	GRP4.1	Global

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
	Columbia University	surveillance methods, Africa Soil Information System, and Digital Soil map of the World; landscape ecology, cyber infrastructure.	& GRP 4.2	
ARI	Michigan State University	Co-development of carbon measurement and monitoring system; remote sensing.	GRP4.1	Global
NARI	National Agricultural Research (IIAM) in Mozambique, Kenya Agricultural Institute and Kenya Forestry Research Institute in Kenya, Institutd' Economie Rurale (IER) in Mali, and the Tanzanian Agricultural Research Institutes.	Capacity building and joint implementation of land health surveillance in Africa; soil science, natural resources management.	GRP4.1 & GRP 4.2	Africa
University	Egerton, Jomo Kenyatta and Nairobi universities in Kenya	Capacity building in land health surveillance methods; education	GRP4.1	Africa
Development Organization	UNEP	Joint execution of projects on land health surveillance and carbon measurement systems in Africa; project formulation, science-policy linkages.	GRP4.1 & GRP 4.2	Africa
Development Organization	UNDP	Joint execution of projects on land health surveillance and carbon measurement systems in Africa; project implementation.	GRP 4.2	Africa
Development Organization	World Bank	Joint execution of projects on land health surveillance and carbon measurement systems in Africa; project implementation.	GRP 4.2	Africa
RO	NEPAD	MOU on capacity building in land health surveillance methods and implementation; policy, advocacy.	GRP4.1 & GRP 4.2	Africa

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
Private Sector	Bruker Optics	Co-development of infrared spectroscopy methods and capacity building; technical expertise.	GRP4.1 & GRP 4.2	Africa
Private Sector	Meridian Institute	Innovations in Soil Health for Sub-Saharan Africa and South Asia; technical and marketing specialists	GRP4.1	Global
NGO	WWF	Co-development of carbon measurement and monitoring system; environmental policy and advocacy	GRP4.1	Global
NGO	Wajibu MS	Field testing of land health surveillance methods for carbon baselines in wildlife ranches; wildlife management, community engagement, carbon trading.	GRP4.1 & GRP 4.2	Africa
Private Foundations	Bill and Melinda Gates Foundation	Co-development of strategies for sustainable soil management in developing countries and implementation of Africa Soil Information Service; philanthropy, agricultural development, networking.	GRP4.1 & GRP 4.2	
Private Foundation	Alliance for a Green Revolution in Africa	Capacity building in soil health surveillance in Africa; philanthropy, agricultural development, networking.	GRP4.1 & GRP 4.2	

Global Research Project 5: Climate Change Adaptation and Mitigation through Agroforestry

Project Overview and Rationale

Project Goal

Improved resilience of farming systems and livelihood strategies of small holder farmers coping with current climate variability, reducing net carbon emissions and adapting to long-term climate change through increased use of trees for intensification, diversification and buffering of farming systems.

Project Objectives

1. Assess vulnerability and the social, economic, institutional and environmental factors that interact to predispose rural households to climate related shocks and hamper their adaptive response.
2. Assess current and potential impacts of climate change (water availability, temperature, rainfall intensity, inter-annual variability) on trees, agroforestry systems and landscapes, as basis for adaptation strategies to climate change that increase biophysical and socio-economic) buffering and human and social, institutional adaptive capacity.
3. Explore how synergies can be obtained between climate change adaptation and mitigation options for agroforestry, by assessing the carbon sequestration potential of agroforestry systems and the evolving institutional framework for voluntary and mandatory greenhouse gas emission and enhancement of carbon storage.

Rationale

Developing countries are going to bear the brunt of climate change and suffer most from its negative impacts. Mitigation efforts will only provide a partial softening of the effects of climate change. Local climate and terrestrial ecosystems will change, threatening biota and human livelihoods. Yet, even as climate changes, food and fiber production, environmental services and rural livelihoods must improve and not just be maintained.

Climate change is increasing inter-annual rainfall variability and the frequency of extreme events, leading to accelerated rates of degradation of soil and water resources upon which farming communities depend for their livelihoods. These changes are threatening development advances such as the achievement of the Millennium Development Goals. Appropriate response strategies must therefore take account of the expected future impacts to develop more robust and resilient systems for smallholders. Agricultural systems most vulnerable to climate change are those already affected by unsustainable management, and land and resource degradation. Trees have an important role in reducing vulnerability, increasing resilience of farming systems and buffering households against climate related risks. Agroforestry systems are therefore ideally placed to provide the additional resilience of agro-ecosystems to future climate change for a number of reasons.

There are two hypotheses at the centre of this project:

- Trees are deep rooted and have large reserves, and are less susceptible than annual crops to inter-annual variability or short-lived extreme events like droughts or floods. Thus, trees offer diversification options that can reduce production risks for small holder farmers.
- Trees are a perennial resource that can be exploited to provide increased income during difficult periods, thereby reducing income risks associated with climate related shocks for small holder farming families.

The challenge for this global project is to evaluate these two hypotheses in different farming systems, different cultural contexts, and in different landscapes. In conjunction with developing knowledge

about the potential for trees to help facilitate adaptation, a number of supporting research questions will be addressed.

The international policy framework for reducing net emissions from energy use, land cover change and land use is rapidly evolving. Effective ways to involve smallholders and the trees that they manage in the global mitigation efforts have been scarce. Regulation is often based on a forest - agriculture dichotomy that does not match the agroforestry reality of smallholders. Institutional mechanisms have high transaction costs, as issues of additionally, leakage, permanence, rights to land and monitoring of emissions have yet to be resolved in generic ways.

GRP5 has two research outputs:

GRP5.1: Assessments of vulnerability of, and adaptation options to, climate variability and change through agroforestry.

GRP5.2: Support for negotiations of institutional mechanisms that link carbon sequestration in agroforestry to enhanced and more resilient livelihoods.

Outputs Description

Changes from previous MTP

There are only minor changes in wording of outputs.

Description:

GRP5.1: Assessments of vulnerability of, and adaptation options to, climate variability and change through agroforestry.

Research activities under GRP5.1 include: vulnerability assessment of rural households, assessment of impacts of climate change on Agroforestry systems, and adaptation to climate change. We will assess the social, economic and environmental factors that interact to predispose rural households to climate related shocks. In addition, we will seek to understand the potential impacts of the different dimensions of climate change (water availability, temperature, rainfall intensity, inter-annual variability) at a number of scales: on Agroforestry tree species, on Agroforestry farming systems and on agricultural landscapes. We will determine how tree-based systems can be used to buffer smallholder farmers against climate variability and climate related shocks. Adaptive capacity depends not only on the ability to respond biophysically but also on the economic circumstances and institutional infrastructure.

As yet, the potential for Agroforestry to help solve the problem of climate change is under-appreciated. Agroforestry options may provide a means for diversifying production systems and increasing the resilience of smallholder farming systems. The most worrisome component of climate change from the point of view of smallholder farmers is increased inter-annual variability in rainfall and temperature. Tree-based systems have some obvious advantages for maintaining production during wetter and drier years. First, their deep root systems are able to explore a larger soil volume for water and nutrients, which will help during droughts. Second, increased soil porosity, reduced runoff and increased soil cover lead to increased water infiltration and retention in the soil profile, which can reduce moisture stress during low rainfall years. Third, tree-based systems have higher evapotranspiration rates than row crops or pastures and can thus maintain aerated soil conditions by pumping excess water out of the soil profile more rapidly than other production systems. Finally, tree-based production systems often produce crops of higher value than row crops. Thus, diversifying the production system to include a significant tree component may buffer against income risks associated with climatic variability.

Contributing partners include: United Nations Framework Convention on Climate Change Secretariat; Food and Agriculture Organization of the United Nations (FAO); United Nations Environment Programme (UNEP); Worldwide Fund for Nature (WWF); World Vision; CARE;

Development Agencies in Southeast Asia (Department of Environment and Natural Resources, Philippines; Bureau of Soils and Water Management, Philippines; Ministry of Natural Resources and Environment (MONRE) Vietnam); NGOs in Southeast Asia (Landcare Foundation of the Philippines; Centre for Environment Research, Education and Development (CERED), Vietnam); Universities in Southeast Asia; (University of the Philippines, Institute Pertanian Bogor, National University Lao PDR); Center for International Forestry Research (CIFOR) and Southeast Asian (SEARCA).

GRP5.2: Support for negotiations of institutional mechanisms that link carbon sequestration in agroforestry to enhanced and more resilient livelihoods.

GRP5.2 will explore the synergies in Agroforestry systems between climate change adaptation and mitigation. We will assess the carbon sequestration potential of promising adaptation technologies with the view of capturing carbon finance opportunities to scale up adoption of these systems to reduce vulnerability of smallholder farmers. For example, we will explore ways to compensate small farmers for payments of carbon sequestration services under the emerging carbon market.

The advent of carbon markets over the past decade creates new and significant opportunities for scaling up Agroforestry practices for climate change adaptation and sustainable land management. Projections that the carbon market may exceed US\$1 trillion by 2025 (current ODA = US\$85 billion) suggest that significant funds could potentially be available to finance sustainable rural development and adaptation to climate change. For the moment, the focus of this international discussion is on tree-based solutions because of the obvious carbon sequestration potential of these systems. Unfortunately, as the carbon markets have developed over the past several years, projects focused on rural communities, poverty reduction, and climate change adaptation through improved land management have not materialized. While there was a lot of optimism at the beginning of these markets, there are a number of reasons for the lack of contribution to sustainable development in rural areas. World Agroforestry Centre considers these carbon markets to be one of the primary impact pathways for this research. Given this, World Agroforestry Centre will invest considerable effort in overcoming the main obstacles to the mobilization of carbon finance to scale up Agroforestry practices that facilitate adaptation to climate change.

Contributing partners include: United Nations Framework Convention on Climate Change Secretariat; Food and Agriculture Organization of the United Nations (FAO); United Nations Environment Programme (UNEP); Worldwide Fund for Nature (WWF); World Vision; CARE; Development Agencies in Southeast Asia (Department of Environment and Natural Resources, Philippines; Bureau of Soils and Water Management, Philippines; Ministry of Natural Resources and Environment (MONRE) Vietnam); NGOs in Southeast Asia (Landcare Foundation of the Philippines; Centre for Environment Research, Education and Development (CERED), Vietnam); Universities in Southeast Asia; (University of the Philippines, Institute Pertanian Bogor, National University Lao PDR) and Center for International Forestry Research (CIFOR).

Alignment to CGIAR priorities (output level)

GRP5.1 aligns to CGIAR System Priorities:

4A: Integrated land water and forest management at landscape level

5A: Science and technology policies and institutions

and has secondary links with:

4D: Sustainable agro-ecological intensification in low and high-potential areas

5D: Improving R&D options to reduce rural poverty and vulnerability

GRP5.2 aligns to CGIAR System Priorities:

3D: Sustainable income generation from forests and trees

4D: Sustainable agro-ecological intensification in low and high-potential areas

and has secondary links with:

4A: Integrated land water and forest management at landscape level

5B: Making international and domestic markets work for the poor

Countries of planned research (output level)

GRP5.1: Kenya, Burkina Faso, Bangladesh, India, Sri Lanka, China, Indonesia, Philippines, Thailand, Vietnam, Brazil, Samoa

GRP5.2: Kenya, Malawi, Tanzania, Cameroon, China, Indonesia, Philippines, Thailand, Vietnam, Peru,

Impact Pathways by Output

The primary impact that this GRP targets is: Small-holder agroforesters are better able to adapt to current and future climate, and can benefit from participation in efforts to mitigate climate change ('carbon markets')

Output GRP5.1 is expected to contribute to this type of impact via a number of outcomes, specified for various groups of stakeholders. These are: 1) Local knowledge on climate risk adaptation available and used as basis for climate change adaptation practices and strategies. 2) Regional climate modeling allows better mainstreaming of climate related impacts into GRPs and other institutes within the CG system and external agencies. 3) Policy options identified and implemented for mainstreaming climate change adaptation in agriculture and NRM development.

Improved and sustained agroecosystem productivity in the face of climate change, as well as enhanced income generation from smallholder carbon sequestration projects are targeted impacts of this global project. These impacts will be achieved through the following outcomes:

- Stakeholders using knowledge to enhance climate change adaptive capacity of smallholder farmers in developing countries
- Knowledge utilized on the role of Agroforestry and sound natural resource management for enhancing ability of smallholder farmers to adapt to current and future climate change
- Mainstreaming of Agroforestry knowledge in climate change adaptation and mitigation initiatives in agriculture, environment and forestry

Climate change adaptation has increasingly gained recognition as a major factor in agricultural development throughout the world. The recent 4th Assessment Report from the Intergovernmental Panel on Climate Change (IPCC) emphasizes the potential risks and vulnerabilities in developing countries, where smallholder farmers are subjected to droughts, delayed onset of rainy seasons, and other perturbations to traditional climatic patterns. There is increasing recognition of the potential role of Agroforestry for addressing such vulnerabilities and development partners as well as international policy makers are calling for major investment by the global community.

Target ecoregions for GRP5.1 are:

Sub-Saharan Africa

RAEZ 1: Warm arid and semi-arid tropics (AEZ 1):

- Eastern Africa: Ethiopia, Kenya, Tanzania and Sudan;
- Southern Africa: Angola, Botswana, Madagascar, Malawi, Mozambique, Zambia and Zimbabwe.

RAEZ 2: Warm sub-humid tropics (AEZ 2):

- Eastern Africa: Kenya, Uganda, Tanzania
- Southern Africa: Malawi, Mozambique, Zambia and Zimbabwe.

Asia and the Pacific

RAEZ 8: Warm arid and semi-arid tropics (AEZ 1):

- Parts of India and Thailand.

RAEZ 10: Warm humid tropics (AEZ 3):

- Indonesia, Philippines, Vietnam, Kampuchea, Laos, Thailand, South West China, Bangladesh, Sri Lanka

Latin America

RAEZ 17 Warm humid tropics (AEZ 3):

- Brazil, Bolivia, Peru

Output GRP5.2 is expected to contribute to this type of impact via a number of outcomes, specified for various groups of stakeholders. These are: 1) Smallholder communities have greater opportunities to participate in carbon sequestration projects. 2) Local, regional, national and international agencies, project developers and decision makers have better understanding of how governance tools need to be set up to deliver REDD and A/R CDM schemes to local beneficiaries. 3) There is a clear institutional link between the international carbon markets and carbon-based PES schemes. 4) Agroforestry researchers and supporters have a better understanding how biogeochemical processes and water relations will change as result of climate change.

The advent of carbon markets over the past decade creates new and significant opportunities for scaling up Agroforestry practices for climate change adaptation and sustainable land management. The global carbon market doubled in 2007 to US\$64 billion compared to the previous year (current ODA = US\$85 billion). Projections that the carbon market may exceed US\$1 trillion by 2025 suggest that significant funds could potentially be available to finance sustainable rural development and adaptation to climate change. For the moment, the focus of this international discussion is on tree-based solutions because of the obvious carbon sequestration potential of these systems. Unfortunately, as the carbon markets have developed over the past several years, projects focused on rural communities, poverty reduction, and climate change adaptation through improved land management have not materialized. While there was a lot of optimism at the beginning of these markets, there are a number of reasons for the lack of contribution to sustainable development in rural areas.

World Agroforestry Centre considers these carbon markets to be one of the primary impact pathways for this research. With significant investment in carbon offsets, it is only logical that a significant portion of this investment facilitates adaptation among those who will be most severely affected by climate change, but who have done the least to create the problem – the rural poor. Given this, World Agroforestry Centre will invest considerable effort in overcoming the main obstacles to the mobilization of carbon finance to scale up Agroforestry practices that facilitate adaptation to climate change. These obstacles include:

- Measurement and monitoring of the carbon benefits of improved practices in agricultural landscapes.
- Institutional links between small scale farmers and global carbon markets
- Investor confidence
- Project developer knowledge.

World Agroforestry Centre will develop a toolbox for project managers. This toolbox will synthesize a wide variety of research products into user-friendly tools for carbon sequestration projects. The tools will address measurement of 3 carbon pools in Agroforestry projects (above-ground biomass, below-ground biomass and soil carbon), creation of enabling institutional environments for these projects, sustainable seed supply, biodiversity analysis, social and economic diagnosis and monitoring, etc.

Target eco-regions for GRP5.2 are:

Sub-Saharan Africa

RAEZ 1: Warm arid and semi-arid tropics (AEZ 1):

- Eastern Africa: Kenya, Tanzania
- Southern Africa: Malawi

RAEZ 2: Warm subhumid tropics (AEZ 2):

- Eastern Africa: Tanzania
- Southern Africa: Malawi

Asia and the Pacific

RAEZ 8: Warm arid and semi-arid tropics (AEZ 1)

- Parts of India

RAEZ 10: Warm humid tropics (AEZ 3)

- Bangladesh, Indonesia, Kampuchea, Laos, Philippines, Vietnam, and parts of Sri Lanka and Thailand.

Latin America and the Caribbean

RAEZ 17 Warm humid tropics (AEZ 3)

- Brazil

Beneficiaries and end users

For both GRP5.1 and GRP5.2 the key clients and major users of the outputs generated in this project are:

- Funding agencies (World Bank, FAO, DFID, Asian Development Bank, ACIAR, Ford Foundation)
- Development organizations (notably extension systems and international NGOs such as World Vision, CARE)
- Conservation organizations (WWF, Conservation International, The Nature Conservancy)
- National policy makers and programmes
- Research organizations involved in Agroforestry and researchers involved in evaluation
- Global multilateral environmental agreements, specifically the UN Framework Convention on Climate Change (for mitigation options), UN Convention on Combating Desertification (for adaptation in the drylands)

The end beneficiaries of the information will be smallholder farming communities throughout the developing world, benefiting from the uptake and implementation of the project's outputs by the clients noted above.

International Public Goods

IPGs produced by GRP5.1 include:

1. Vulnerability analyses in rural landscapes with specific focus on role of trees, linked to climate variability and options for CC adaptation.
2. Tests of hypotheses on specific CC adaptation benefits of deep-rooted trees in the context of best practices for climate change adaptation for small farmers.
3. Methods for dissecting impacts on hydrology of the interaction between regional climate change and land cover change.
4. Policy strategies: Strategies for mainstreaming climate change in agriculture and natural resources management (NRM).
5. Rapid appraisal method for the degree of landslide risk protection provided by deep-rooted trees under climate variability and change.

IPGs produced by GRP5.2 include:

1. Protocols for above- and below-ground carbon measurement in agroforestry landscapes, scaling from plot to landscape and national GHG accounting schemes; optimizing community involvement for reduction of transaction costs and increase in transparency.
2. Protocols for tradeoff analysis and appraisal of abatement cost curves for land use change in tropical forest landscape mosaics.
3. Tool box for design of carbon sequestration projects, incl. prospecting designs, barrier analysis (WNoTree), tenure appraisal, cash flow analyses and auction designs for increased efficiency.
4. Analysis of policy options for emission reduction from any land use ('REALU') as umbrella over REDD+ approach, supporting adaptation co-benefits as Nationally Appropriate Mitigation Actions (NAMA).
5. Landscapes with active learning on emission reduction with and through agroforestry, with analysis of fairness and efficiency of benefit sharing approaches, and quantification of leakage and additionality.

As yet, the potential for Agroforestry to help solve the problem of climate change is under-appreciated. The most worrisome component of climate change from the point of view of smallholder farmers is increased inter-annual variability in rainfall and temperature. Tree-based systems have some obvious advantages for maintaining production during wetter and drier years. First, their deep root systems are able to explore a larger soil volume for water and nutrients, which will help during droughts. Second, increased soil porosity, reduced runoff and increased soil cover lead to increased water infiltration and retention in the soil profile, which can reduce moisture stress during low rainfall years. Third, tree-based systems have higher evapotranspiration rates than row crops or pastures and can thus maintain aerated soil conditions by pumping excess water out of the soil profile more rapidly than other production systems. Finally, tree-based production systems often produce crops of higher value than row crops. Thus, diversifying the production system to include a significant tree component may buffer against income risks associated with climatic variability.

Agroforestry has a particular role to play in mitigation of atmospheric accumulation of GHGs. Of all the land uses analyzed in the Land-Use, Land-Use Change and Forestry report of the IPCC, Agroforestry offered the highest potential for carbon sequestration in non-Annex I countries.

Through this project World Agroforestry Centre is well positioned to generate the knowledge to substantiate the above assertions in agricultural landscapes and provide this information to development agencies and policy makers.

Elaboration of Partner's Roles

This global research project will build on strong engagement by World Agroforestry Centre in the UN Framework Convention on Climate Change (UNFCCC), and links with major development agencies and non-governmental organizations that will demand and can act upon the information generated in the project. Because of the range of methodological innovations to be employed, major investments in strengthening capacity of partners and target beneficiaries are envisaged.

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
IARC*	ICRISAT	Assist in improved water productivity and diversifying agriculture into high-value crops in the dry lands.	GRP5.1 & GRP 5.2	Global

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
University	University of the Philippines Brawijaya University (Indonesia)	Assist in research on climate mitigation and adaptation in archipelagic SE Asia; Philippines is one of the most vulnerable countries to climate-related hazards	GRP 5.1 and 5.2	Southeast Asia
Regional organization	The Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)	Assists in policy research, capacity building, information dissemination to partners in the region;	GRP 5.1 and 5.2	Southeast Asia
Ministry/Department of natural resources and agriculture	Department of Natural Resources (DENR), Philippines Ministry of Natural Resources and Environment; (MONRE), Vietnam	Assist in field data gathering and dissemination of research results	GRP 5.1 and 5.2	Southeast Asia
NGOs	Landcare Foundation of the Philippines; Centre for Environment Research, Education and Development (CERED), Vietnam)	Assist in field data gathering and dissemination of research results	GRP 5.1 and 5.2	Southeast Asia

Global Research Project 6: Supporting multi-functional landscapes with trees for environmental services

Project Overview and Rationale

Project Goal

Policies and incentives on the interface of agriculture and forestry are enacted that are effective in maintaining and enhancing the multi-functionality of landscapes with trees and fair in providing benefits that reduce rural poverty.

Project Objectives

Undertake action research, synthesis, stakeholder engagement and targeted dissemination to improve the understanding of:

1. The roles of trees in securing watershed services, carbon storage and biodiversity maintenance in landscape mosaics;
2. The opportunities for reducing negative incentives, and increasing positive incentives, for pro-poor agroforestry solutions; and
3. The relations and tradeoffs between local and more global drivers of land-use change.

Rationale

One of the most significant challenges that humans face is trying to maintain or increase the supply of ecosystem services—e.g. water, soil health, and biodiversity - especially under changing climates that will continue to support both human needs and the functioning of natural ecosystems. The management of these multifunctional landscapes requires research tools and management mechanisms that strike the balance between (a) ‘goods’ and ‘services’, (b) short, medium and long-term objectives, and (c) ‘efficiency’ and ‘equity’ in the pursuit of sustainable development.

From the perspective of trees – the oldest, largest, and most provisioning living organisms -- there are increasing conflicts and trade-offs between tree plantations, natural forests and trees on farms. Tree systems that generate the highest returns to land often generate lower levels of ecosystem services, while old-growth natural forests usually generate high levels of environmental services but relatively little income for farmers. In this context, Agroforestry can emerge as an intermediate land use with potential to balance these two-generate good economic returns and acceptable levels of critical environmental services.

The incentives and disincentives that farmers face when deciding to establish and maintain Agroforestry systems are defined by policies emanating from the agricultural, forestry and environmental sectors. For example, the national and local policies put in place to protect forests and environmental services often have the consequence of reducing incentives for Agroforestry. Multi-lateral environmental agreements establish objectives, obligations and opportunities for national policies and strategies, but rarely harness the potential of Agroforestry to advance environmental objectives.

The role of the different configurations of trees in the provision of environmental services needs to be realistically assessed so that appropriate incentives, property rights arrangements and regulatory approaches can be negotiated and updated through learning. Past World Agroforestry Centre research shows that institutions and arrangements for management of multi-functional landscapes should be assessed in terms of their efficiency (realistic, conditional, voluntary), fairness (pro-poor, pro-women, pro-untitled landholders) and sustainability. Existing results show that there is potential for using new property rights arrangements and flexible policy instruments, often implemented

through decentralized forms of government, to strengthen farmers' incentives to invest in Agroforestry. Mechanisms and contracts that provide conditional rewards for environmental services have potential to provide farmers with incentives to adopt Agroforestry systems and other land uses associated with environmental stewardship or restoration.

There has been considerable study of so-called forestry (= tree cover) transitions: the tendency for increasing population pressure to cause dramatic reduction in tree cover, followed by a period of either stable or increasing cover. Since rural population continues to grow in many areas in the world, assessing whether the promotion of agroforestry can alter the pattern of deforestation is very timely. This is all the more salient given the attention to REDD (Reducing Emissions from Deforestation and Forest Degradation in Developing Countries) in current climate change debate.

Key Research Questions:

The research undertaken in GRP6 will examine:

1. How do landscape-scale watershed and biodiversity services depend on the attributes of Agroforestry systems across climatic, biogeographical, ecological and socio-economic contexts?
2. How realistic are expectations that regulation of and incentives for enhancing tree-based watershed and biodiversity services can enhance these environmental services from the perspective of external stakeholders?
3. What are the tradeoffs between efficiency, fairness, and poverty reduction associated with alternative prototype mechanisms for environmental service rewards involving small farmers?
4. How can cross-sectoral policies and community based forest policy limit or enhance the potential for environmental service rewards, as well as tools, methods, and approaches that enhance the sustainability of financial flows and institutional change in environmental service reward mechanisms?
5. What are the drivers of forest (tree cover) transitions and agroforestry transformations, and where can environmental services-based incentives play a role in these various contexts?

GRP6 has the following research outputs:

GRP6.1: Tools for understanding the roles of trees in watershed services and in maintenance of biodiversity in landscape mosaics, and for assessment of the tradeoffs between these services and direct benefits (subsistence and marketed goods).

GRP6.2: Prototypes for, and lessons learnt from, pro-poor policies and incentives for enhancing tree-based environmental services.

GRP6.3: Analysis of the links between the drivers of land use and tree cover change at global-national-local scales and of the opportunities to negotiate and influence agroforestry transformations.

Outputs Description

Changes from previous MTP Outputs

Minor changes in wording

Description (Output Level)

GRP6.1: *Tools for understanding the roles of trees in watershed services and in maintenance of biodiversity in landscape mosaics, and for assessment of the tradeoffs between these services and direct benefits (subsistence and marketed goods).*

Trees use water while storing carbon; tree crops often replace natural forest while reducing poverty. Market-oriented monocultures compete with risk-averting poly-cultures, trading off income and risk. Plantations displace smallholders, trading off local rights and income opportunities, while national reforestation programmes use public resources, promising an increase in environmental services that may not happen. Trees in all these examples are closely linked to 'tradeoffs' and 'conflict',

exaggerated expectations and disappointment. Integrated natural resource management (INRM) requires site-specific understanding of tradeoffs and synergies between and among the goods and services that trees in agro-ecosystems can provide. It is thus more complex when compared to simpler, readily scalable green-revolution technologies. Replicable, cost-effective approaches are needed in the hands of local professionals with interdisciplinary skills to help stakeholders sort out positive and negative effects of trees in multi-use landscapes ('Agroforestry') on livelihoods, water and (agro-) biodiversity, associated rights and rewards, and, ultimately, on the Millennium Development Goals (reducing poverty, promoting equitable forms of globalization, building peace). Research from different parts of the tropical world has shown that multifunctional Agroforestry systems such as shade coffee or cocoa and jungle rubber are viable alternative land-use practices. It has been demonstrated that such alternative land-use can deliver livelihood benefits while maintaining and enhancing ecosystem function, including its scope for resilience. As a result, such systems are becoming increasingly valuable in landscape management approaches to biodiversity conservation and watershed management. More recently, they are gaining recognition as potential targets for avoided deforestation strategies in climate change mitigation. Making the most of Agroforestry and other tree-based systems, however, requires good information about the ecosystem service values of various systems and practices, the inevitable tradeoffs among those services, and incentives that farmers have to invest in Agroforestry systems, protect other tree-based systems and engage in tree product enterprises. This information will help reinforce the potential importance of multifunctional Agroforestry systems in degradation avoidance and maintaining ecosystem services.

GRP6.2: Prototypes for, and lessons learnt from, pro-poor policies and incentives for enhancing tree-based environmental services.

There is untapped potential to harness market forces and negotiations between ecosystem stewards, intermediaries, and ecosystem service beneficiaries. Mechanisms and contracts that provide farmers and other ecosystem stewards with conditional rewards for environmental services can enhance the adoption and maintenance of Agroforestry systems and other land uses consistent with good environmental stewardship. Over the 5+ years, the World Agroforestry Centre has established an approach to research on rewards for environmental services that has generated both context-specific impact and understanding, a set of field-tested tools and approaches, and well-recognized contributions to the international literature. This work will continue in the 2010-2012 period, with more emphasis on Africa, extension of the tools and approaches to more sites, and more emphasis on the role of the public and private sectors.

GRP6.3: Analysis of the links between the drivers of land use and tree cover change at global-national-local scales and of the opportunities to negotiate and influence agroforestry transformations.

GRP6.3 considers Agroforestry and particular policy interventions within a long-term and wide geographic context. Over long time periods, land use systems tend to respond to changes in population pressure, emerging market opportunities, and changes in the public policy context. There has been considerable study of so-called forestry transitions: the tendency for increasing population pressure to cause reducing, stable and ultimately increasing, forest cover. There has been less study of the role of Agroforestry in those transitions. Such an understanding is important for understanding the potential for Agroforestry to enhance livelihoods and ecosystem function both in situ (i.e. offering a better agricultural land use) and ex situ (i.e. reducing pressure for conversion of forest land). This information will be critical for policy processes and development planning.

Alignment to CGIAR priorities (output level)

GRP6.1 aligns to CGIAR System Priorities:

4A: Integrated land water and forest management at landscape level

4D: Sustainable agro-ecological intensification in low and high-potential areas

and has secondary links with:

- 1B: Promoting conservation and characterization of under-utilized plant genetic resources to increase the income of the poor
- 4C: Improving water productivity

GRP6.2 aligns to CGIAR System Priorities:

- 3D: Sustainable income generation from forests and trees
- 4A: Integrated land water and forest management at landscape level

and has secondary links with:

- 5B: Making international and domestic markets work for the poor
- 5C: Rural institutions and their governance

GRP6.3 aligns to CGIAR System Priorities:

- 3D: Sustainable income generation from forests and trees
- 4A: Integrated land water and forest management at landscape level
- 4D: Sustainable agro-ecological intensification in low and high-potential areas

Countries of planned research (output level)

- GRP6.1: Kenya, Uganda, Tanzania, Guinea, Mali, India, Nepal, China, Indonesia, Philippines, Thailand, Vietnam, Brazil
- GRP6.2: Kenya, Uganda, Malawi, Tanzania, Guinea, Mali, Sierra Leone, India, Nepal, China, Indonesia, Philippines, Thailand, Vietnam
- GRP6.3: Kenya, Uganda, Malawi, Tanzania, Mali, China, Indonesia, Philippines, Thailand, Vietnam, Brazil, Peru

Impact Pathways by Output

The primary impact that this GRP targets is: Realistic use of trees for transforming lives and landscapes and attaining critical ecosystem services in multifunctional landscapes with adoption of conditional contracts negotiated and adopted.

Output GRP6.1 is expected to contribute to this type of impact via outcomes that imply that local re-source managers in multi-use landscapes with trees use cost-effective, replicable tools and approaches to appraise the likely im-pacts of changes in land use on watershed functions, biodiversity and carbon stocks, as well as on economic pro-ductivity of the land-scape

Follow through consists of active engagement in capacity building through universities, NGOs and local government agencies, to support them in the development of appropriate training methods and materials. The intended outcome is our project goal: “Local resource managers in multi-use landscapes with trees use cost-effective, replicable tools and approaches to appraise the likely impacts of changes in land use on watershed functions, biodiversity and carbon stocks, as well as economic productivity of the landscape “

This outcome is expected to contribute to the overall impact of the World Agroforestry Centre’s role of improving lives and landscapes, through more knowledge-based negotiations of changes in landscape mosaics and incentive structures.

In the broad context processes of ‘negotiation support’ in multi-use landscapes as developed by the World Agroforestry Centre and partners, a number of conditioning factors have to be recognized before the outputs and outcomes can be achieved:

- Explicit recognition of multiple perceptions and knowledge systems of various stakeholders that informs tradeoff analysis across the interests involved
- Biodiversity conservation within landscapes including that in ‘domesticated forests’ or complex agroforests
- Upland-lowland negotiations to produce rules and reward mechanisms for watershed functions, that are based on site-specific evidence rather than perceptions alone
- Improved local and national level appreciation of the role of diversity and identity of uplands in supporting niche market opportunities and site-specific development pathways rather than being an obstacle to ‘standardized’ development.

Output GRP6.2 is expected to contribute to this type of impact via a number of outcomes, that are make reflect implementation of pro-poor, realistic, voluntary and transparent environmental service mechanisms implemented in a range of sites across Africa and Asia, with an enabling environment facilitated.

Intended users include researchers, project developers/innovators, policy shapers (including civil society groups) and policy makers. Past experience has shown that the World Agroforestry Centre’s research on rewards for environmental services is attracting interest from a broad spectrum of research organizations, non-governmental organizations, UN agencies, donor agencies and businesses. This interest includes South-North transfer of evidence and experiences. Research outputs that are intended to influence multilateral and regional agreements are targeted at key stakeholders who negotiate and influence particular processes.

The project’s outputs will generate distinct outcomes over time: (1) in the near term, the project will enhance the effectiveness of the diverse organizations that are interested in rights, compensation and rewards for environmental services; (2) in the intermediate term, it will support new and more effective programmes — at the local, national and international levels — that recognize, compensate and reward farmers for environmental services; and (3) in the longer term, farmers involved in environmental service mechanisms will plant and maintain significantly more trees and implement other land conserving practices.

The end users (ultimate beneficiaries) are farmers and communities who will benefit from environmental service mechanisms, more coherent approaches to environmental stewardship and poverty reduction, while “mining” of collectively-owned natural resources will be reduced through effective implementation of environmental stewardship.

The expected impacts are enhanced ecosystem services and human welfare in critical ecosystems around the developing world.

Output GRP6.3 is expected to contribute to this type of impact via outcomes that reflect that international and regional conventions, agreements, action plans and national level policy processes are modified to better facilitate the contributions of smallholder farmers practicing agroforestry.

Intended users include development planners in governmental and non-governmental organizations, policy shapers (including civil society groups) and policy makers concerned with the long-term and large-scale rural development.

The expected outcomes are that the project’s outputs will generate inform overall investment and development planning processes, including public investments and strategies in Agroforestry research and development.

The end users (ultimate beneficiaries) are farmers and communities who will benefit from environmental service mechanisms, more coherent approaches to environmental stewardship and poverty reduction, while “mining” of collectively-owned natural resources will be reduced through effective implementation of environmental stewardship.

The expected impacts are enhanced ecosystem services and human welfare in critical ecosystems around the developing world.

Target ecoregions for GRP6 are:

Sub-Saharan Africa

RAEZ 1: Warm arid and semi-arid tropics (AEZ 1):

- West Africa: Burkina Faso, Guinea, Mali, Niger, Nigeria and Senegal;
- East Africa: Ethiopia, Kenya, Tanzania and Sudan;
- South Africa: Angola, Botswana, Madagascar, Malawi, Mozambique, Zambia and Zimbabwe.

RAEZ 2: Warm sub-humid tropics (AEZ 2):

- East Africa: Kenya, Uganda, Tanzania
- South Africa: Malawi, Mozambique, Zambia and Zimbabwe.

RAEZ 3: Warm humid tropics (AEZ 3):

- West Africa: Cameroon, DR Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Ghana, Liberia, Nigeria, Sierra Leone

RAEZ 4: Cool tropics (AEZ4):

- East Africa: Rwanda, Ethiopia, Kenya and Tanzania.

Asia and the Pacific

RAEZ 10: Warm humid tropics (AEZ 3):

- Indonesia, Philippines, Vietnam, Kampuchea, Laos, Thailand, South West China, Bangladesh, Sri Lanka

RAEZ 14: Cool subtropics with summer rainfall (AEZ 8):

- Bhutan, Nepal, and parts of China, India, North Korea
- Latin America

RAEZ 17: Warm humid tropics (AEZ 3):

- Brazil, Bolivia, Peru

International Public Goods

IPGs produced by GRP6.1 include:

1. Quantitative indicators and appraisal tools (GenRiver & Spatrain; RHA) for relating changes in land use to watershed functions to land productivity in context of spatial planning and rewards for environmental services.
2. Rapid agrobiodiversity appraisal method (RABA) and its application in dynamic land use mosaics.
3. Analyses of tree life cycles and dispersal modes as basis for conservation effectiveness of agroforestry landscape mosaics.
4. Comparative study of buffering at patch, field, hillslope and (sub) watershed scales in relation to rainfall patterns and tree cover change.
5. Integrative model for the way watershed functions, biodiversity and C stocks co-vary during tree cover transitions

IPGs produced by GRP6.2 include:

1. Negotiation Support System for reducing conflict over land use change in forest margins linked to (presumed) impacts on environmental services.

2. Rapid appraisal method for land tenure claims in dynamic landscapes, as basis for reform of land access under local and national legality perspectives.
3. Sustainability appraisal tools for agroforests and enhancement of associated ecosystem services
4. Analytical tool for the fairness-efficiency tradeoff and poverty impacts in design and practice of rewards/payments for environmental services.
5. Landscapes with active learning on co-investment in and/or rewards for environmental services.
6. Analysis of boundary organizations and roles of intermediaries that link knowledge and practice

IPGs produced by GRP6.3 include:

1. Analytical scheme (DriLuc) for the cross-scale linkage of drivers of land use change and their impacts on natural, human, social, physical and financial capitals during tree cover transitions.
2. Synthesis on the way (and conditions under which) market opportunities and intensification options can speed up or slow down tree cover transitions in tropical landscapes.
3. Comparison of different modeling approaches for analysis of the driving forces for land use change in the (sub)-humid tropics and their consequences for livelihoods and environmental services.
4. Policy strategies for nesting of subnational changes in forest cover linked to C footprint studies, biofuel/bioenergy production and planning of clean development.
5. Pan-tropical spatial characterization of agroforestry and its dependence on environmental, socio-economic and policy conditions

The World Agroforestry Centre is becoming a recognized global leader in applied and strategic mechanisms providing rewards for ecosystem services. The World Agroforestry Centre's approach stresses action research in contrasting sites, the possibility of a range of payment types, development of parsimonious assessment tools to clarify the real links between land use and ecosystem services, the importance of the negotiation process itself, cross-site learning and synthesis, and engagement with policy makers and the private sector. From 2003-5, this work focused on Asia and Latin America.

In Asia, our work has been organized around the RUPES project (Rewarding the Poor for Environmental Services) and in Latin America around the ProAmbiente programme in the Amazon basin. The period 2006-7 was a time for generating major syntheses and presenting the work in international fora. It was during this period that the World Agroforestry Centre led a pan-tropical assessment with collaborators from around the world.

From 2008-2010 this research was deepened in Asia and the Brazilian Amazon, and extended to Africa and other parts of the Amazon basin. The operational project in Africa is entitled PRESA — Pro-poor Rewards for Environmental Services in Africa and will be fully operational in the 2010-2012 period. These projects are designed to be engaged with reward mechanisms in action research sites as well as in local and national policy dialogue processes. They are also linked to global expertise and debates and aim at producing international public goods in the fore defined methods, tested hypotheses and policy-relevant syntheses.

Specific IPGs targeted for the 2010-2012 time period are the maturation of a setoff rapid assessment tools for environmental services in landscapes with trees and generic models that can be used in this context. The PRESA and RUPES action research site networks in Africa and Asia will continue to offer opportunities for learning for site-based and international (academic) stakeholders.

Elaboration of Partners Roles

The World Agroforestry Centre advances GRP6 through specific research partnerships as well as consortia of organizations engaged in policy experiments in different ways and at different scales.

Among others, we have research partnerships with CIFOR through the joint CIFOR-World Agroforestry Centre biodiversity platform, Conservation International through the Hotspot Alliance, the Sustainability Science Group at the Kennedy School of Environment at Harvard University, and Hohenheim University.

The RUPES project involves a range of international organizations, national policy groups, national and local research and development organizations working across Asia, including Indonesia, the Philippines, China, Vietnam, India, Nepal, and Thailand. A similar network is being established in Africa in collaboration with Care International, the Katoomba Group for East and Southern Africa, the African Highlands Initiative, national government organizations, local NGOs, and private sector collaborators. In the Amazon Basin, the World Agroforestry Centre conducts similar research on rewards for ecosystem services through the Amazon Initiative Consortium and a number of Brazilian institutions, including the ProAmbiente Programme. At the international scale, we collaborate in the production of international publications with Forest Trends, Rights in Resources Initiative, IUCN, UNEP, IDRC, ACTS (Kenya), CGRR (Ecuador), and ISEC (India).

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
CGIAR and NARS	IITA, CIAT, IFPRI, ASB-Indonesia, ASB-Cameroon, ASB-Peru, ASB-Philippines, ASB-Brazil	ASB Partnership for tropical forest margins	GRP6.1, GRP6.2, GRP6.3	Indonesia, East, Southern and West Africa
International Universities	Universities of Amsterdam (VU), Louvain-la-neuve, Gottingen, Macaulay Land Use Institute	Various work packages in the REDD-ALERT project	GRP6.2, GRP 6.3 and GRP 5.2	Indonesia, Vietnam, Cameroon, Peru
CGIAR	CIFOR	Partner in CIFOR-ICRAF biodiversity platform and Landscape Mosaics project	GRP6.1	Asia, Africa
International NGO	Conservation International	Partner in Hotspot Alliance	GRP6.1	Asia, Africa
International University	Sustainability Science Group at the Kennedy School of Environment at Harvard University	Analysis of and synthesis on boundary organizations in NRM negotiations and payments for ES	GRP6.2	Asia, Africa
International University	University of Hohenheim	TUL-SEA project on tools for trees in multifunctional landscapes	GRP6.1	Asia
NARS and NGO's	National RUPES committees in Indonesia, Philippines, Vietnam and Nepal; ICIMOD	RUPES-II: local action research and national scale learning on policy reform	GRP6.1, GRP6.2	Asia and Africa
NGO	WARSI	Landscape Mosaics and RUPES activities in Jambi	GRP6.1, GRP6.2	Indonesia
International NGO's	IUCN, Care International, the	PRESA: local action research and national scale	GRP6.1, GRP6.2	Kenya, Uganda,

Group	Name of Partner	Strategic Role/Complementary Advantage	Output	Geographical scope
	Katoomba Group for East and Southern Africa	learning on policy reform		Tanzania, Guinea
ACTS (Kenya)	KARI, KEPHIS, GTZ, KEFRI, KIRDI, JKUAT	PRESA: synthesis of best practices for biofuel	GRP6.2	Kenya, Tanzania, Uganda and India
UNEP	Ministry of Agriculture (Kenya), Maseno University, Lake Victoria Basin Commission, NEMA	PRESA: Tradeoff analysis among ecosystem services including drivers of land use change	GRP6.2, GRP6.3	Kenya
Forest Trends,	USAID, Katoomba Group East and Southern Africa Network	PRESA: Capacity building, local action research and community of practice activities.	GRP6.2	Kenya, Uganda, Tanzania, Guinea
Rights in Resources Initiative,	IUCN, CIFOR, SAHEL ECO, nad GTZ-Pact	PRESA: sustainability appraisal of forestry codes to promote agroforestry and associate ecosystem services	GRP6.2	Mali, Niger, Senegal, Burkina Faso
International University	Harvard, Michigan state, Pretoria University of Gottingen, Asian Institute of Technology	PRESA: Design of prototype mechanisms Making Mekong Connected	GRP6.2 GRP6.1, GRP6.3	Kenya, Tanzania, Uganda Asia

ASB Partnership for the Tropical Forest Margins

Project Overview and Rationale

Project Goal

Raise productivity and income of rural households living in the tropical forest margins without increasing deforestation or undermining essential environmental services.

Project Objective

The objective of ASB is to evaluate options for addressing climate change in agriculture – forest landscapes in the humid tropics for improving incomes of rural households, strengthening community engagement and maintaining essential environmental services and proactively provide information on those options to influence relevant policy and programme design processes, particularly national and international policies on AFOLU and REDD.

The main policy focus for ASB, at least through the end of 2011, is Reduced Emissions and enhancement of carbon sequestration in Agriculture, Forestry and Other Land Uses (AFOLU) in the landscape including Reduced Emissions from Deforestation and forest Degradation in Developing countries (REDD). In the long term, the project would seek to promote high carbon stocks rural development by strengthening the incentives for land users in the tropical forest margins to maintain trees and forests for their standing carbon value.

ASB – the partnership, the integration of disciplines and perspective, the methods, the databases, the approach, the brand – is uniquely positioned to bring science-based evidence into the fresh new debates on AFOLU and REDD. This realization brought into new focus, energy and commitment to the work of ASB partnership in 2007.

Rationale

The last 2 years has seen a remarkable resurgence in global concern about the role of tropical deforestation and land use land use change and forestry emissions in climate change. Besides contributing to the loss of biodiversity and other environmental services, it is becoming increasingly apparent that tropical deforestation is a major source of the greenhouse gas (GHG) emissions responsible for climate change. There is a new surge of interest across the globe regarding the possibilities of mitigating GHG emissions through avoided deforestation. The United Nations Framework Convention on Climate Change (UNFCCC) is the main focal point for global-level discussion. At the 13th meeting of the Conference of Parties to the UNFCCC in Dec 2007, nearly every head of state and high profile speaker spoke of the need to explicitly address Reduced Emissions from Deforestation and forest Degradation in Developing countries (REDD) within the convention. The COP passed a resolution that “Encourages all parties, in a position to do so, to support capacity-building, provide technical assistance, facilitate transfer of technology to improve, inter alia, data collection, estimation of emissions from deforestation and forest degradation, monitoring and addressing the institutional needs of developing countries for estimating emissions from deforestation and degradation ...” (Paragraph 2 of Decision -/CMP.3).

In the last year, the discussions within the UNFCCC has moved beyond REDD to include other relevant emissions reduction and carbon sequestration potential in broader Agriculture, Forestry and Other land uses (AFOLU) in the landscape. This landscape approach has been backed by a number of submissions to the UNFCCC SBSTA from the FAO, the United States, India and other countries.

This global-level initiative is being mirrored by national-level initiatives in both developed countries and developing countries. The Government of Norway is investing hundreds of millions of dollars in forest carbon management, while both the United States and Europe are considering the potential for allowing forest carbon credits to be traded in cap-and-trade emission management schemes. There is also strong interest in developing countries. For example as of May 2009, 37 countries from Asia, Latin and Central America, and Africa have been selected into the Readiness Mechanism of the World Bank Forest Carbon Partnership Facility and UN REDD Programme. The selected countries become REDD Country Participants and receive grant support to develop a Readiness Plan, which contains a detailed assessment of the drivers of deforestation and degradation, terms of reference for defining their emissions reference level based on past emission rates and future emissions estimates, establishing a monitoring, reporting and verification system for REDD, and adopting or complementing their national REDD strategy. An array of foundations, and international conservation organizations have expressed support for REDD and AFOLU initiatives.

The ASB Partnership for the Tropical Forest Margins is uniquely well placed to bridge the 'top-down' perspective of global GHG mitigation with a "bottom-up" perspective of the causes and consequences of land use change at the tropical forest margins. Building upon the previous decade of ASB research, ASB partners across the tropics have initiated a major study of the dynamics of land use, carbon gain and loss, and returns to land in ASB benchmark sites across the tropical forest margins. The interim results, released at COP13 in Bali, provide new insight into the role of economics as a driver of land use change and the relatively low returns per unit of carbon loss that are generated by carbon-emitting land use changes. In 2007, ASB partners in Indonesia became heavily involved in national-level discussions about deforestation and the best way for the country to reduce emissions from deforestation and forest degradation. ASB research and insights garnered considerable attention from the international media and research communities.

In December 2007, the Global Steering Group (GSG) that governs ASB reconsidered the relevance of its goal and objective statements in light of the attention being given to the carbon storage value of tropical forests. The GSG noted the distinct comparative advantage of the ASB partnership in working on land use, livelihoods and environmental services at the tropical forest margins. The GSG decided that the goal is still very relevant and should not be changed. The GSG adopted a more tightly-defined medium-term objective that recognizes the importance of the climate change policy context and the need for both high-quality research and effective communication of research results.

For 2010-2012, ASB will have two major outputs which stem from this medium-term objective:

ASB1: Options for addressing climate change in agriculture – forest landscapes in the humid tropics for improving incomes of rural households, strengthening community engagement and maintaining essential environmental services evaluated.

- Opportunity cost analyses
- Estimates of the greenhouse gas emissions (CO₂ and non-CO₂) associated with alternative land uses and land use change
- Methods for measurement of the carbon stocks and fluxes associated with a wide range of forestry, Agroforestry and crop agriculture systems
- Assessment of technical, policy and reward mechanisms for reducing incentives for land users to deforest and increasing incentives for land users to invest in forest

ASB2. Information on those options to influence relevant policy and programme design processes, particularly national and international policies on REDD and AFOLU proactively provided.

- Tested guidelines for REDD and AFOLU demonstration projects and landscape level published
- Policy-relevant information targeted to key decision makers at the national, regional and national levels
- Information on the possibilities for avoided deforestation with sustainable benefits disseminated to the global public

Outputs Description

Changes from previous MTP

No substantive changes were made to the outputs. The Global Steering Group of ASB revisited these outputs in December 2008 and found them still very relevant given the global interest in ASB work.

Description (output level)

ASB1. Options for addressing climate change in agriculture – forest landscapes in the humid tropics for improving incomes of rural households, strengthening community engagement and maintaining essential environmental services evaluated.

ASB research examines policies and programmes for avoided deforestation, REDD and AFOLU through the perspective of sustainable rural development in the tropical forest margins.

Current discussions of REDD and AFOLU at the international policy level are focusing on the potential for different types of financial transfers from industrialized countries to developing countries that maintain and restore forest and tree cover. Research by ASB partners does support the proposition that avoided deforestation and reducing emission reductions in agriculture, forestry and other land uses will require real changes in the financial rewards provided to those who make land use decisions in the tropical forest margins and agricultural landscapes. ASB also supports the proposition that a comprehensive land based accounting of GHG including all land management practices at landscape or national level is needed to enable real emission reductions. Hence REDD alone as currently proposed is unlikely to be successful. International transfers may contribute to those changes in incentives but will not be sufficient without accompanying changes in policies and development strategies. The ASB research agenda focuses on livelihoods, land use, landscape management and environmental services in the multiple-use landscapes found at the tropical forest margins. Issues of particular interest to the ASB partnership include the carbon implications of different agricultural development pathways, the effects of high-carbon land uses on other environmental services, multi-stakeholder approaches to management for multi-use landscapes, reduction in disincentives for on-farm tree management, and the potential for enhancing security of property rights to land, trees and carbon .

ASB2. Information on options for addressing climate change in agriculture – forest landscapes in the humid tropics is synthesized and proactively disseminated to influence relevant policy and programme design processes, particularly national and international policies on avoided deforestation with sustainable benefits.

Compared to other sectors and issues, policies relevant to climate change are evolving quite rapidly. International climate negotiations and national policy formulation processes create time-bound windows of opportunity for researchers to enhance the base of evidence on which policies are founded. The 2010 to 2012 period is an important window of opportunity in the UNFCCC process for harnessing the GHG mitigation potential of Reduced Emissions from REDD and AFOLU. Broad agreements on principles of REDD are likely to be decided in December 2009, ushering in negotiations on the details (modalities and procedures) of post 2012 mechanisms on the same in 2010 – 2011. Discussions on AFOLU are likely to increase in the same period. There now appears to be a similar window of opportunity to influence the shape of new climate legislation in the United States. New windows of opportunity are likely to open over the next months, in both developing and developed countries. The ASB partnership has developed an important corpus of research results over the last 10 years and will be generating results through the current portfolio of very relevant research projects. These research results need to be refined, synthesized and effectively communicated before they can really become part of the evidence base for policy formulation. ASB experience in 2007 and 2008 indicates that this requires a combination of excellent science and a strategic approach to communication. ASB will also develop feedback loops from communications to research. That is, research priorities in this fast moving area need to take account of likely future windows for policy influence.

Alignment with CGIAR priorities (output level)

ASB1 aligns with CGIAR System Priorities:

3D: Sustainable income generation from forests and trees

4A: Integrated land, water and forest management at landscape level

5B: Making international and domestic markets work for the poor

ASB2 aligns with CGIAR System Priorities:

3D: Sustainable income generation from forests and trees

4A: Integrated land, water and forest management at landscape level

5B: Making international and domestic markets work for the poor

Countries of planned research

ASB1: The ASB partnership is based on intensive engagement in a small number of core countries namely Brazil, Peru, Cameroon, Indonesia, Philippines and Thailand. Thailand is on hold as activities have been low in the country. Some additional activities are carried out in Vietnam on the REDD_ALERT project.

ASB2: The above mentioned countries provide a platform for broader policy engagement across countries in humid and sub-humid Africa (COMESA & COMIFAC), the Amazon basin and South East Asia

Impact Pathways by Output

ASB1: Options for addressing climate change in agriculture – forest landscapes in the humid tropics for improving incomes of rural households, strengthening community engagement and maintaining essential environmental services evaluated.

ASB seeks to contribute to an institutional and knowledge infrastructure for climate change mitigation in avoided deforestation and forest degradation, agriculture, forestry and other land uses at the international and national levels that is effective in reducing net CO₂ emissions from tropical forest landscapes, fair to the people dependent on those landscapes for their livelihoods, and sustainable in the terms of livelihood benefits, ecological outcomes and financial inflows.

ASB will achieve this goal through pan-tropical research that establishes the potential cost-effectiveness of REDD; research on the tradeoffs between carbon storage, biodiversity and hydrologic services; development and testing of appropriate tools for baseline assessment and monitoring of REDD and AFOLU programmes; and engagement in REDD, AFOLU and Bio-Carbon demonstration activities.

Our current portfolio of projects include a long term project on Reducing Emissions for Deforestation and Forest Degradation from Alternative Land in the Tropics (REDD-ALERT) project that seeks to develop knowledge on drivers of deforestation, carbon baseline and monitoring and GHG accounting methodology issues, policy and institutional issues and develops tools and models for REDD negotiation processes in five tropical forest countries. Two short term projects with the Commons Market for Eastern and Southern Africa and the Department for Environment Food and Rural Affairs – DEFRA in the UK are focused on reviews and analysis of AFOLU and REDD issues in order to help the respective partner countries set priorities in the current negotiations and national strategy development.

All of our projects build on previous ASB data and results from recent bottom-up studies on opportunity costs for avoided deforestation with sustainable benefits published in 2007 and 2008. It is thanks to the past work that various partners are requesting for support. A new capacity building project is under discussion with the World Bank Forest Carbon Partnership Facility REDD Readiness program to enable 37 participant countries acquire the knowledge and skills and in order to apply ASB opportunity cost and trade-off analysis methodologies in their respective countries. The project would develop training materials, train and provide implementation support to technical staff and policy makers in these countries as necessary. These types of projects exemplify the intended impact pathways that ASB will pursue between 2010 and 2012 for this output. More generally, output ASB2 provides the means to generate outcomes and impacts from the research outputs of ASB1.

ASB2: Information on options for addressing climate change in agriculture – forest landscapes in the humid tropics is synthesized and proactively disseminated to influence relevant policy and programme design processes, particularly national and international policies on avoided deforestation with sustainable benefits.

Intended users include the growing research, development and policy communities who are concerned with rural development, deforestation and environmental services in the tropical forest margins. Most importantly, results from that research will be made disseminated to three audiences: climate change negotiators and their forestry advisors in both developed and developing countries; government and non-government organizations involved in the design of REDD demonstration activities; and the global general public who need to be aware of the importance of deforestation as a source of GHGs, and the need for appropriate incentives and benefit sharing to make avoided deforestation a reality.

In 2007 and 2008, ASB has been able to contribute to shaping the post 2012 climate change discussions by bringing its research results to various international fora (about 15 events in all); these include side-events during UNFCCC meetings and presentations at regional meetings in Africa especially in eth COMIFAC and COMESA. Research results have also been brought to the policy domain through the ASB newsletter, list serve and website. Since ASB's presentation during the UNFCCC COP 13 in Bali, the findings of the ASB study have attracted a good deal of attention from key players in the global debate on REDD and AFOLU. A summary of the media attention is presented on at <http://www.asb.cgiar.org/>

In a current project with COMESA, ASB and ICRAF is providing scientific backstopping to COMESA on the Africa Bio-Carbon Initiative. This consists of reviewing, synthesizing and packaging relevant information in a way that can be useful for climate change negotiators from its 19

countries. For example, in the run-up to the African Ministerial Conference on the Environment (AMCEN) in May 2009 aimed at preparing Africa for the climate change talks in Bonn. ASB is working with COMESA on producing two relevant policy briefs and presentations at different fora of experts, civil society, negotiators and ministerial level officials on key issues for Africa in the negotiations. These exemplify the kind of impact pathways that ASB would pursue in output 2.

In addition, ASB maintains a number of mechanisms to track the uptake of its research results, primarily through use of its publication and downloads from the internet. We have outlined two small projects for more concentrated work, including an ex post analysis of the previous use of ASB results and an ex ante analysis of key targets (clients, processes) for ASB results.

International Public Goods

The ASB Systemwide Programme has been designed to produce international public goods. The Global Steering Group has identified issues and policy problems related to Reduced Emissions from Deforestation and Degradation (REDD) and Agriculture Forestry and Other Land Use (AFOLU) within the UNFCCC climate change mitigation discussions as the main focus for international public goods production in the ASB partnership. Scientists then develop and agree upon the methods to be applied and syntheses to be generated. Site-specific work, using common protocols, is done through teams of national and international scientists. Synthesis teams draw together results by site, theme and across sites and themes. Engagement with international policy processes clarifies the potential for linking site-specific research to global issues.

Examples of International public good to be produced will include;

1. Synthesis papers that draw out the implications of ASB research for avoided deforestation with sustainable benefits are published in high profile journals and summarized into targeted outputs for selected policy processes, particularly the UNFCCC COP in Copenhagen.
2. Analytical papers and policy briefs that consider the implications of 2009 climate agreements and legislation on plans and policies for sustainable development in the tropical forest margins.
3. Synthesis papers and policy briefs summarizing experience with avoided deforestation and REDD and AFOLU pilot studies for key *policy processes*.
4. New methods for baseline assessment and monitoring of landscape-level carbon stock tested in ASB sites.
5. A new spatial analysis of the carbon, livelihood and environmental service tradeoffs associated with alternative development pathways in multiple ASB sites.
6. Dynamic tradeoff studies published for an expanded set of sites in the tropical forest margins, including avoided deforestation and REDD pilot studies.

Elaboration of Partner's Roles

ASB is a multi-level, global consortium of more than 90 institutions governed by a Global Steering Group and coordinated by a Global Coordination Office. The Global Steering Group made up of 11 representative organizations – including 5 IARCs (CIAT, CIFOR, World Agroforestry, IITA and IFPRI) and 6 national research systems (Brazil, Peru, Cameroon, Thailand, Indonesia, and the Philippines). The first advanced research institute (The Macaulay Institute for Land Use Research-MLURI) was invited to join the Global Steering Group in 2008. The Global Steering Group determines priorities and approves annual work programmes, budgets and the allocation of funding. An ad hoc advisory group provides advice to the GSG. The programme is hosted by World Agroforestry Centre, which provides a variety of institutional support, including financial controls.

The 11 Global Steering Group members constitute the core members of ASB. Other institutions include local and national NGOs, national agencies and universities in developing countries, advanced research institutions in developed countries and international organizations. About 1200 people from this global network receive regular updates through the ASB list serve.

A partnership review conducted in 2008 found that only about 27 of the 90 organizations are currently fully involved in ASB research and outreach activities, including several new European research organizations.

In 2010 -2012 ASB plans to develop a framework for assessing partner involvement with a view to focus on a small but efficient network of partners in the long term. It is hoped that this would help improve delivery and participation. The list provided below focuses on members that are currently involved in research and policy work within ASB- hence indicative of the most active members.

Group	Name of Partner	Strategic Role/Complimentary Advance	Output	Geographical scope
IARC	IITA, IFPRI, CIAT, TSBF, ICRAF, CIFOR,	Collaborate in research on the tradeoffs between carbon storage, biodiversity and hydrologic services; development and testing of appropriate tools for baseline assessment and monitoring of REDD and AFOLU programmes; and engagement in REDD Plus demonstration activities in ASB sites in Latin America, Asia and Africa.	ASB1 ASB2	Global - Humid tropics of Africa, Asia, and Latin America
NARI	Indonesia Soil Research Institute, Embrapa, IRAD, INIA, PCARRD, Amazon Initiative These NARS organizations are based in Indonesia, Brazil Thailand, Philippines, , Cameroon, and Peru	Collaborate in research on the tradeoffs between carbon storage, biodiversity and hydrologic services; development and testing of appropriate tools for baseline assessment and monitoring of REDD and AFOLU programmes; and engagement in REDD Plus demonstration activities in Latin America, Asia and Africa. Indonesia organizations will co-lead events on REDD Plus.	ASB1 ASB2	Global - Humid tropics of Africa, Asia, and Latin America
ARI	The Macaulay Institute for Land Use Research, MLURI based in UK, University of Gottingen-	Partners with ASB on the Reducing Emissions from Deforestation and Degradation through Alternative Landuses in Rainforests of the Tropics (REDD-ALERT) project. The	ASB1 ASB2	Humid tropics of Africa, Asia, and Latin America

Group	Name of Partner	Strategic Role/Complimentary Advance	Output	Geographical scope
	Germany; Free University of Amsterdam and University of Louvain in Belgium.	project focuses on a number of key areas including drivers of deforestation (socio-economic etc), measurement of carbon and GHG, policy research, land use change modeling and negotiations. The partner's role is to contribute advanced research methods and skills.		
Inter-Governmental	Common Market for Southern and Eastern Africa (COMESA); and World Bank Forest Carbon Partnership Facility- FCPF	Associated partners on policy research work on REDD Plus and AFOLU. The work includes a variety of policy support actions such as scientific support, knowledge provision to client countries and training.	ASB 2	Eastern and Southern African Countries; and Humid tropics of Africa, Asia, and Latin America

PROJECT LOG FRAMES

Global Research Project 1: Domestication, utilization and conservation of superior Agroforestry germplasm

GRP1.1: Improved agroforestry tree germplasm available with associated information on potential use, benefits and conservation while considering climatic constraints and risks of invasiveness.

Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p>2010</p> <p><i>Materials:</i> (1) Improved sexual and vegetative germplasm of <i>Uapaca Kirkiana</i>, <i>Sclerocarya birrea</i>, <i>Mangifera indica</i>, <i>Strychnos cocculoides</i>, <i>Allanblackia stuhlmannii</i>, <i>Allanblackia parviflora</i>, <i>Phyllanthus emblica</i>, <i>Tamarindus indica</i> and <i>Ziziphus mauritiana</i> developed and procured and corresponding propagation protocols available for partners.</p> <p><i>Practices:</i> (1) Development of a participatory agroforestry domestication manual for partners. The manual will introduce participatory approaches of nursery establishment and management.</p> <p><i>Policy/ strategy:</i>(1) Development of South-South protocol for movement of germplasm (especially to Africa from Asia)</p> <p><i>Capacity:</i> 2 postgraduates trained in multiple disciplines supporting domestication.</p>	<p>The primary beneficiaries are National Tree Seed Agencies, farmers, tree nursery operators, National Forestry and Agroforestry Research Institutes, NGOs, Universities and extension agents. The end users of the tree knowledge and tree germplasm produced by the project include: community based organizations, development agencies, extension agents, farmers, inter-governmental bodies involved in germplasm transfers, international Research Institutions, local policymakers, National policymakers, National Research Institutions, non-governmental organizations, producer associations, regional bodies involved in germplasm regulation, and tree seed marketers.</p>	<p>Increased ability among agroforestry research, development and policy stakeholders to efficiently use and promote improved knowledge on multidisciplinary approaches applicable for tree domestication.</p> <p>Nursery operators, national partners and smallholders farmers contribute to widespread cultivation of quality germplasm of improved varieties</p> <p>Farmers and other stakeholders domesticate and utilize a broader range of important tree species.</p>	<p>Diversified agroforestry systems will contribute towards alleviation of poverty and increase of food security, health and protection of the environment</p>	<p>Bangladesh, Bolivia, Burkina Faso, Cameroon, China, Côte d'Ivoire, DR Congo, Equatorial Guinea, Ethiopia, Gabon, Ghana, India, Indonesia, Kenya, Laos, Malawi, Mali, Mozambique, Niger, Nigeria, .Peru, Philippines, Senegal, Sri Lanka, Tanzania, Thailand, Uganda, Zambia, Zimbabwe.</p>
<p>2011</p> <p><i>Policy/ Strategy:</i> (1) Position paper on improved strategies for the conservation and sustainable use of tree germplasm based on current and emerging global challenges; (2) Position paper on appropriate interventions to stimulate fruit production in Africa; (3) Position paper on the roles and limitations of biotechnology in agroforestry; (4) Position paper on the role of tree genetic resources in biofuel production; (5)Assessment report of conservation activities conducted by ICRAF- NARS partnerships.</p> <p><i>Materials:</i> (1) Improved germplasm of 5 fruit species procured from Asia, evaluated and disseminated in Africa.</p> <p><i>Capacity:</i> (1) Post graduates trained (2 PhDs and 2 M.Sc should be completing)</p>				

<p><u>2012</u></p> <p><i>Policy/ Strategy:</i> (1) Strategies for effective dissemination of seed and seedlings through a ‘rural resource centre’ model for agroforestry tree species; (2) Position paper on conservation and sustainable utilization of medicinal trees in Africa.</p> <p><i>Other knowledge:</i> (1) Molecular tools (ESTs) developed for 50 important tree species along environmental /climatic gradients in eastern Africa based on next-generation sequencing.</p>				
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GRP1.2: Prototypes available for sustainable tree seed and seedling supply systems that promote the use of diverse and productive germplasm by small holder farmers in different social, economic and cultural settings.

Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p><u>2010</u></p> <p><i>Other knowledge</i> (1) Seed source classification and documentation guidelines for one region (pilot)</p> <p><i>Practice:</i> (1) Synthesis of sustainable models of seed and seedling -input supply systems for Agroforestry tree species including fruit trees; (2) Selection and establishment of provenance/family/ model tree integration trials participatively with rural communities and partners; and establishment of gene banks, clonal orchards and mother blocks for improved germplasm, for further dissemination of quality planting materials.</p>	<p>The primary beneficiaries are National Tree Seed Agencies, farmers, tree nursery operators, National Forestry and Agroforestry Research Institutes, NGOs, Universities and extension agents. The end users of the tree knowledge and tree germplasm produced by the project include: community based organizations, development agencies, extension agents, farmers, inter-governmental bodies involved in germplasm transfers, international Research Institutions, local policymakers, National policymakers, National Research Institutions, non-governmental organizations, producer</p>	<p>Efficient operational models of decentralized and privately operated tree seed and seedling systems will be adapted and applied by national and international partners</p> <p>Informed decisions by national and developmental programs supporting tree germplasm supply systems will increase efficiency of dissemination and access to quality tree germplasm by smallholder farmers.</p>	<p>Increased access to quality germplasm will enhance tree diversity within agroforestry systems resulting in more resilient and productive farm environments contribution also to long term conservation of tree genetic resources on-farm while also improving opportunities for smallholder farmers to protect and conserve forests.</p>	<p>Bangladesh, Bolivia, Burkina Faso, Cameroon, China, Côte d'Ivoire, DR Congo, Equatorial Guinea, Ethiopia, Gabon, Ghana, India, Indonesia, Kenya, Laos, Malawi, Mali, Mozambique, Niger, Nigeria, .Peru, Philippines, Senegal, Sri Lanka, Tanzania, Thailand, Uganda, Zambia, Zimbabwe..</p>

GRP1.2: Prototypes available for sustainable tree seed and seedling supply systems that promote the use of diverse and productive germplasm by small holder farmers in different social, economic and cultural settings.

Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p><u>2011</u></p> <p><i>Other knowledge:</i> (1) High-resolution maps and guidelines for selection of tree species and populations, for present and predicted future climates, developed for 7 East and Central African countries; (2) Synthesis of distribution of key tropical fruit species and their varieties (of importance within Africa eg mango, guava, tamarind, ber, pomogranate, garcinia, litchies) with descriptions of agro-ecological requirements and information of performance in targeted sites of South Asia</p> <p><i>Materials:</i> (1) High quality planting material of regional priority tree species and provenances made available for demonstration and further use.</p> <p><i>Policy/Strategy:</i> (1) Models for international organisations, national governments and NGOs to facilitate the sustainable supply of agroforestry tree seed and seedlings for scaling up developed.</p>	<p>associations, regional bodies involved in germplasm regulation, and tree seed marketers.</p>	<p>National institutes, developmental organizations and policy makers will increase support for small scale seed entrepreneurs as part of a commercial commodity chain in a market that encourages the operation of small, competitive seed and seedling retailers.</p> <p>Increased access to quality germplasm by poor farmers will increase its cultivation and therefore enhance tree diversity within agroforestry systems</p> <p>Better tree germplasm is available and used by smallholders to plant and manage trees that meet their demands</p>		

GRP1.2: Prototypes available for sustainable tree seed and seedling supply systems that promote the use of diverse and productive germplasm by small holder farmers in different social, economic and cultural settings.				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p><u>2012</u></p> <p><i>Other Knowledge:</i> (1) Spatial decision-support tool for present and future climates based on ecological suitability and potential application of useful tree species developed.</p> <p><i>Policy/Strategy:</i> (1) Regulatory procedures collated and disseminated to facilitate efficient germplasm dissemination and exchange; (2) Seed sources registration</p> <p><i>Practices:</i> (1) Extension materials for nursery operators developed: guide to seed quality, 60 seed leaflets and Guide to establishment of field demonstrations and trials for trees on small farms).</p> <p><i>Capacity:</i> (1) National or regional training on germplasm quality.</p>				

Global Research Project 2: Enhancing productivity of Agroforestry systems

GRP2.1: Decision support tools for diverse and resilient integration of tree resources on farms developed, in the face of climate change and economic uncertainty, based on consideration of costs, benefits, risks and trade-offs at farm level..				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p>2010 <i>Policy/Strategy:</i> (1) Management principles enhancing tree diversification on small farms developed in South East Asia, West and Central Africa and East Africa.</p> <p><i>Other Knowledge:</i> (1) Experiences and lessons learnt on the adoption, promotion and impact of Agroforestry and natural resource management technologies synthesized.</p> <p><i>Capacity:</i> (1) Tools and approaches on policies developed for an enhanced management of natural resources.</p>	<p>Researchers in NARS, ARIs and universities.</p> <p>Ministries of agriculture and natural resources and other development institutions.</p> <p>Extension systems, NGOs, CBOs, private sector, land users and smallholder farmers.</p> <p>Policy makers and funding agencies.</p>	<p>More diverse Agroforestry principles and options for smallholder farmers to will be adapted and applied by research and development organizations in face of climate change.</p> <p>Development programs for smallholder farmers include Agroforestry management options among intervention choices they consider, and use improved tools and knowledge to make more informed choices on integrating Agroforestry into farming systems.</p> <p>Researchers targeting Agroforestry systems for smallholder farms have access to and use improved methods of system analysis, experimentation and support of farmer-level learning, as well as information critical for adjusting research agendas.</p>	<p>Agroforestry management and tree-based intensification options on farm are understood and used by smallholders to match livelihood strategies and available resources.</p>	<p>Burkina Faso, Cameroon, Ethiopia, Guinea, India, Indonesia, Kenya, Malawi, Mali, Mauritania, Nigeria, Philippines, Senegal, Tanzania, Thailand, Vietnam, Zambia, Zimbabwe</p>
<p>2011 <i>Policy/Strategy:</i> (1) Development of strategies and models promoting agroforestry practices enhancing intensification and diversification as part of the Conservation Agriculture for small farms developed in West and Central Africa, South East Asia, East Africa and Latin America; (2) Tools, approaches and methodologies published for conflict management, land and tree tenure rights of smallholder farmers promoting mixed agroforestry systems on-farms.</p> <p><i>Other knowledge:</i> (1) Guidelines, strategies for climate changes mitigation and biofuels production developed.</p>				

GRP2.1: Decision support tools for diverse and resilient integration of tree resources on farms developed, in the face of climate change and economic uncertainty, based on consideration of costs, benefits, risks and trade-offs at farm level..				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p><u>2012</u></p> <p><i>Practice:</i> (1) Trade-offs between economical, environmental and cultural benefits of changes in tree species richness and evenness within tropical farming systems analysed for Latin America, SEA and WCA; (2) Strategies and support tools developed for promoting mixed agroforests on small farms for climate change adaptation.</p> <p><i>Policy/Strategy:</i> (1) Tools for the adaptation of land use to climate change in Sub-Saharan Africa developed.</p>		<p>Smallholder farmers across the tropics maintain and enhance intensified and diversified farming systems with more productive and sustainable tree-based options for the supply of products for local use and markets, and the provision of local services.</p>		

GRP2.2: Principles, methods and practices for enhanced growth, productivity and efficiency of water and nutrient use of farming systems.				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p><u>2010</u> <i>Policy/Strategy:</i> (1) Strategies on agroforestry based soil fertility practices developed for smallholder farmers.</p> <p><i>Other knowledge:</i> (1) Impacts of agroforestry systems on nutrient balance, including water conservation and productivity assessed in Southern Africa and South Asia.</p>	<p>Researchers in NARS, ARIs, universities, UN institutions.</p> <p>Ministries of agriculture and natural resources and other development institutions.</p> <p>Policy makers, extension systems, NGOs, CBOs, private sector, land users and smallholder farmers.</p>	<p>Development organizations and policy makers use principles and techniques (for nutrient, water, pest and disease, etc.) for more effective Agroforestry development.</p>	<p>Agroforestry management and tree-based intensification options on farm are understood and used by smallholders to match livelihood strategies and available resources.</p>	<p>Burkina Faso, Brazil, Cameroon, China, Ethiopia, Guinea, India, Indonesia, Kenya, Malawi, Mali, Mauritania, Nigeria, Philippines; Rwanda, Senegal, Sierra Leone, Sri Lanka, Tanzania, Thailand, Vietnam, Zambia, Zimbabwe</p>
<p><u>2011</u> <i>Practice:</i> (1) Recommendations on best practices for soil fertility, including water conservation and productivity on small farms produced in South East Asia, South Asia, East Africa and Southern Africa.</p> <p><i>Other knowledge:</i> (1) Lessons learnt from user acceptability of agroforestry and their implications for scaling up the practices in communities in Southern Africa synthesized and published.</p>	<p>Managers of education and training institutions.</p>			
<p><u>2012</u> <i>Capacity:</i> (1) Tools and approaches developed for paradigm shifts in smallholder soil fertility management using fertilizer tree systems for food security in Africa.</p> <p><i>Practices:</i> (1) Cost Benefit Analysis of water harvesting on smallholder farms ssmallholder farmers for intensified and diversified farming systems in East Africa published.</p>				

Global Research Project 3: Improving tree product marketing for smallholders

GRP3.1 Approaches for improving smallholder access to tree product value chains				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p><u>2010</u> <i>Practice:</i> (1) Approaches tested for achieving premium value transfer between ecologically certified producers and end users without complex chain of custody mechanisms; 2) Approaches assessed for enhancing the role of women in collective action for marketing Agroforestry products</p> <p><i>Policy/Strategy:</i> (1) Strategies for public private partnerships to promote tree product marketing developed</p> <p><i>Capacity</i> (1) Training of trainers manuals in marketing of agroforestry products and farmer enterprise development</p>	<p>Farmer organizations, donors, NGOs, governments, Certification bodies, coffee farmer organizations, Policy makers, NGOs, Women's organizations, Public organizations and private companies. Government agencies and private companies seeking to enter public-private partnerships</p>	<p>Quality assurance interventions that are more accessible and beneficial to smallholder farmers.</p> <p>More effective farmer organizations that negotiate higher prices for farmers, lower transaction costs and facilitate flows of market information.</p>	<p>Smallholders have greater access to existing and emerging markets for Agroforestry products.</p>	<p>Kenya, Tanzania, Uganda, Rwanda, Indonesia, Cameroon, D. R. Congo, Mali, Malawi</p>
<p><u>2011</u> <i>Practice:</i> (1) Ziziphus fruit quality analyses published and quality standards defined; (2) 10 pilot rural resource centers established and providing production and marketing services to farmers.</p>		<p>Women's organizations and organizations supporting women use improved approaches for engaging women in collective action for marketing</p>		
<p><u>2012</u> <i>Other knowledge:</i> (1) Scaling up strategy for rural resource centers developed and tested</p>		<p>Private companies and public organizations make more informed decisions and enhance collaborative actions.</p>		

GRP3.2 Improved marketing strategies to enhance performance of tree product value chains and smallholder livelihoods				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<u>2010</u> <i>Policy Strategies:</i> (1) Marketing strategies developed for selected natural products. <i>Practice:</i> (1) Model for assessing ex-ante feasibility and profitability of leaf meal industry tested at one site in East, Southern, and West Africa .	Farmer organizations, organizations supporting such organizations including governments and NGOs, donors Policy makers, researchers and policy analysts for local resource managers. Private companies seeking new investment opportunities, NGOs promoting enterprise development.	Farmer organizations, private companies and entities supporting them making sounder investment and marketing decisions on Agroforestry products. Greater understanding and use of vouchers in seed and seedlings supply systems. Improved policies to support development of Agroforestry related enterprises	Smallholders benefit from existing and emerging markets for Agroforestry products.	Cameroon, Congo, Mali, Malawi
<u>2011</u> <i>Other knowledge:</i> (1) Synthesis of farmer enterprise impacts on community structures WCA; (2) Feasibility and profitability of leaf meal industry in one site in Southern Africa evaluated and published				
<u>2012</u> <i>Other knowledge:</i> (1) Impact of market information systems for AF tree products and methods for establishing them assessed. Cameroon and DRC. <i>Practice:</i> (1) Market information database for Cameroon and DRC developed and disseminated				

Global Research Project 4: Reducing land health risks

GRP4.1: Effective land health surveillance methods developed				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p><u>2010</u></p> <p><i>Practices:</i> (1) Protocol for above- and below-ground carbon measurement in agroforestry landscapes; (2) Soil data standards for Africa Soil Information Service; (3) Methods guidelines for satellite image processing and terrain modeling for soil health surveillance.</p> <p><i>Capacity:</i> (1) Technical backstopping service and capacity building materials on land health surveillance methods in Eastern, Southern and West Africa.</p>	<p>Government policy makers, UN agencies, and funding agencies</p> <p>Scientists at national, international research institutes</p>	<p>Governments, UN agencies and funding agencies aware of benefits of land health surveillance science and technology.</p> <p>Researchers use improved methods for land degradation and soil quality assessment</p>	<p>Adoption of agroforestry systems that avoid/revert land degradation problems and risks.</p>	<p>Burkina Faso, Cameroon, Côte d'Ivoire, DR Congo, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guinea, India, Kenya, Malawi, Mali, Mozambique, Niger, Angola, Madagascar, Nigeria, Rwanda, Senegal, Sudan, Tanzania, Thailand, Gambia, Namibia, Samoa, Botswana, Liberia, Sierra Leone</p>
<p><u>2011</u></p> <p><i>Practices:</i> (1) Handheld/mobile version of field data capture system with data upload capability for land health surveillance surveys; (2) Protocol for wood moisture, density and carbon analysis using infrared spectroscopy; (3) Protocol for combined use of infrared and X-ray spectroscopic analysis of soil quality; (4) Methods guidelines for soil infrared spectral pedal-transfer models.</p> <p><i>Capacity:</i> (1) Technical backstopping and capacity building on land health surveillance methods for national programmes in Africa.</p>		<p>Development implementers use improved tools and knowledge to make informed choices on improving land management and targeting Agroforestry interventions to enhance land productivity.</p>		
<p><u>2012</u></p> <p><i>Practices:</i> (1) Protocol for digital soil mapping combining soil spectral and satellite data; (2) Extended conceptual framework for land health surveillance.</p> <p><i>Capacity:</i> (1) Technical backstopping and capacity building on land health surveillance methods for national programmes in Africa and Asia.</p>				

GRP4.2: Land health risks assessed and Agroforestry interventions to reduce and reverse land degradation well targeted				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p>2010</p> <p><i>Practices:</i> (1) Methods for assessment of land health risks and agroforestry impacts tested at landscape scale across multiple sites in sub-Saharan Africa; (2) Network of infrared spectroscopy laboratories for soil health surveillance established in national programmes in sub-Saharan Africa.</p> <p><i>Other knowledge:</i> (1) Remote sensing databases and indicators for land health surveillance for Tanzania, Mali & Malawi; (2) Soil infrared spectral pedo-transfer models in sub-Saharan Africa.</p>	<p>Government policy makers, UN organizations and international donors</p> <p>Scientists at national, international research institutes</p> <p>Development organizations, extension systems.</p>	<p>Evidence-based management principles and spatially explicit strategies are used to steer land management research and development programmes.</p> <p>National scientists better target Agroforestry based land management options to specific land degradation problems and risks and assess intervention impacts.</p> <p>Improved Agroforestry based land and soil management options applied and adapted by development organizations.</p>	<p>Adoption of Agroforestry systems that avoid/revert land degradation problems and risks</p>	<p>Angola, Botswana, Burkina Faso, Cameroon, Congo, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Sierra Leone, South Africa, Sudan, Tanzania, Uganda, Zambia, and Zimbabwe.</p>
<p>2011</p> <p><i>Other knowledge:</i> (1) Infrared spectral library of 10,000 soil samples collected under the African Soil Information Service; (2) Database of mineralogy and element profiles of Africa soils for prediction of soil functional properties; (3) Remote sensing databases and indicators for land health surveillance in sub-Saharan Africa; (4) Land health surveillance baseline field and lab data for targeting agroforestry and impact assessment at 20 sentinel sites in sub-Saharan Africa.</p>				
<p>2012</p> <p><i>Practices:</i> (1) Digital mapping of soil functional properties demonstrated in Tanzania, Mali and Malawi; (2) Infrared spectral library of 20,000 soil samples collected under the African Soil Information Service.</p> <p><i>Other knowledge:</i> (1) Land health surveillance baseline field and lab data for targeting agroforestry and impact assessment at 40 sentinel sites in sub-Saharan Africa; (2) Land health risks quantified and agroforestry opportunities targeted for sentinel sites throughout sub-Saharan Africa.</p>				

Global Research Project 5: Climate Change Adaptation and Mitigation through Agroforestry Systems

GRP5.1: Assessments of vulnerability of, and adaptation options to, climate variability and change through agroforestry.				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<u>2010</u> <i>Practices:</i> (1) Candidate practices and strategies for climate change adaptation developed; (2) Regional climate impact modeling improved	Agroforestry farmers in developing countries	Local knowledge on climate risk adaptation available and used as basis for climate change adaptation practices and strategies.	Small-holder agroforesters are better able to adapt to current and future climate, and can benefit from participation in efforts to mitigate climate change ('carbon markets').	Bangladesh, Bolivia, Brazil, China, Ethiopia, India, Indonesia, Kampuchea, Kenya, Laos, Malawi, Mozambique, Angola, Madagascar, Peru, Philippines, Sri Lanka, Sudan, Tanzania, Thailand, Gambia, Mauritania, Namibia, Samoa, Botswana
<u>2011</u> <i>Policy strategies:</i> (1) Strategies for mainstreaming climate change in agriculture and natural resources management (NRM)	National development agencies	Regional climate modeling allows better mainstreaming of climate related impacts into GRPs and other institutes within the CG system and external agencies		
<u>2012</u> <i>Practices:</i> (1) Best practices for climate change adaptation for small farmers produced	Researchers Managers of international adaptation funds (e.g. World Bank)	Policy options identified and implemented for mainstreaming climate change adaptation in agriculture and NRM development.		

GRP5.2: Support for negotiations of institutional mechanisms that link carbon sequestration in agroforestry to enhanced and more resilient livelihoods				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<u>2010</u> <i>Practices:</i> (1) Carbon measurement and monitoring system produced; (2) Climate change impacts on biogeochemical processes and water relations identified <i>Other knowledge:</i> (1) Trade-offs between alternative land uses that destroys forests in the context of REDD.	Project developers National agencies in charge of climate change projects NGOs and POs Researchers in developing countries	Smallholder communities have greater opportunities to participate in carbon sequestration projects Local, regional, national and international agencies, project developers and decision makers have better understanding of how governance tools need to be set up to deliver REDD and A/R CDM schemes to local beneficiaries	Small-holder agroforesters are better able to adapt to current and future climate, and can benefit from participation in efforts to mitigate climate change ('carbon markets')	Bangladesh, Bolivia, Brazil, China, Ethiopia, India, Indonesia, Kampuchea, Kenya, Laos, Malawi, Mozambique, Angola, Madagascar, Peru, Philippines, Sri Lanka, Sudan, Tanzania, Thailand, Gambia, Mauritania, Namibia, Samoa, Botswana
<u>2011</u> <i>Practices:</i> (1) Full tool box for carbon sequestration project design produced. <i>Capacity:</i> (1) Guidelines for REDD that will benefit small farmers and local communities.	Climate policy makers, particularly members of G77/China negotiating block NGOs engaged in the UNFCCC process	There is a clear institutional link between the international carbon markets and carbon-based PES schemes Agroforestry researchers and supporters have a better understanding how biogeochemical processes and water relations will change as result of climate change		
<u>2012</u> <i>Practices:</i> (1) Revised carbon measurement system and project developers tool box.	Small farmers who live in forests edge			

Global Research Project 6: Supporting multi-functional landscapes with trees for environmental services

GRP6.1: Tools for understanding the roles of trees in watershed services and in maintenance of biodiversity in landscape mosaics, and for assessment of the tradeoffs between these services and direct benefits (subsistence and marketed goods).				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p><u>2010</u></p> <p><i>Practices:</i> (1) Use of indicators and tools for appraising the likely impacts of changes in land use on watershed functions, biodiversity and economic productivity in context of spatial planning and rewards for environmental services in several new case studies in SE Asia, resulting in method improvement as well as replication in other sites in Africa and Latin America.</p> <p><i>Other knowledge:</i> (1) Test results of biodiversity platform hypotheses at working paper level; (2) Tests of new forms of outcome based rewards (e.g. voucher system) for environmental services, grounded in local monitoring and resource management, rather than input control.</p> <p><i>Capacity:</i> (1) Capacity building materials for intermediaries, local and national stakeholders on 'avoided deforestation with sustainable benefits' (REDD at landscape scale).</p>	<p>Researchers and policy analysts for local resource managers, national governments and non-governmental organizations (NGOs)</p>	<p>Local resource managers in multi-use landscapes with trees use cost-effective, replicable tools and approaches to appraise the likely impacts of changes in land use on watershed functions, biodiversity and carbon stocks, as well as on economic productivity of the landscape.</p>	<p>Realistic use of trees for transforming lives and landscapes and attaining critical ecosystem services in multifunctional landscapes.</p>	<p>Bangladesh, Bolivia, Brazil, Cameroon, China, Côte d'Ivoire, DR Congo, Equatorial Guinea, Ethiopia, Gabon, Ghana, Indonesia, Kampuchea, Kenya, Laos, Nigeria, Peru, Philippines, Rwanda, Sri Lanka, Tanzania, Thailand, Gambia, Mauritania, South Africa, N. Korea, Bhutan, Liberia, Sierra Leone</p>
<p><u>2011</u></p> <p><i>Practices:</i> (1) Further use and development of rapid appraisal methods in regions beyond Southeast Asia.</p> <p><i>Other knowledge:</i> (1) Publications based on comparisons within Southeast Asia; (2) Synthesis on use of locally adapted indicators for landscape-scale monitoring and learning on biodiversity and watershed functions.</p>				
<p><u>2012</u></p> <p><i>Capacity:</i> (1) Synthesis on model validation experience in form of PhD thesis; test of use of the tools for practical PES approaches</p> <p><i>Other knowledge:</i> (1) Publications based on cross-regional comparison of experience across PRESA (Africa), RUPES (Asia) and the landscapes of the CIFOR/World Agroforestry Centre biodiversity platform project.</p>				

GRP6.2: Prototypes for, and lessons learnt from, pro-poor policies and incentives for enhancing tree-based environmental services.				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p><u>2010</u></p> <p><i>Practices:</i> (1) Technology advisory tool developed for guiding the selection of appropriate Agroforestry and conservation agriculture technologies in the East African highlands.</p> <p><i>Policy/Strategy:</i> (1) Series of publications on the role of RUPES as a boundary organization that links knowledge and practice; (2) Publication on agroforestry vouchers as a tool/mechanism for enhancing agroforestry adoption; (3) Guidelines for good practice in national agroforestry policy developed</p> <p><i>Other knowledge:</i> (1) Completed study of the motivations of private sector investors in ecosystem management.</p> <p><i>Capacity:</i> (1) Capacity building materials for researchers from across Africa in economic tools and models for assessing the economic and environmental impacts of alternative Agroforestry systems.</p>	Environmental management agencies, non-governmental organizations, researchers, local government agencies agricultural ministries/agencies.	Pro-poor, realistic, voluntary and transparent environmental service mechanisms implemented in a range of sites across Africa and Asia with an enabling environment facilitated.	Realistic use of trees for transforming lives and landscapes and attaining critical ecosystem services in multifunctional landscapes with adoption of conditional contracts negotiated and adopted.	Bangladesh, Bolivia, Brazil, Burkina Faso, Cameroon, China, Côte d'Ivoire, DR Congo, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guinea, Indonesia, Kampuchea, Kenya, Laos, Malawi, Mali, Mozambique, Niger, Angola, Madagascar, Nigeria, Peru, Philippines, Rwanda, Senegal Sri Lanka, Sudan, Tanzania, Thailand, Gambia, Mauritania, Namibia, Samoa, South Africa, N.Korea, Bhutan, Botswana, Liberia, Sierra Leone
<p><u>2011</u></p> <p><i>Practices:</i> (1) Technology advisory tool is used to select and spatially target Agroforestry and conservation agriculture technologies in at least 3 sites in the East and West African highlands.</p> <p><i>Policy/Strategy:</i> (1) Prototype reward mechanisms implemented in at least 3 sites in the East African highlands and 3 sites in Asia.</p> <p><i>Other knowledge:</i> (1) Completed study of the production and ecological economics of alternative tree production systems.</p> <p><i>Capacity:</i> (1) Policy makers and policy shapers in at least 4 countries are involved in introductory courses on payments for environmental services.</p>				
<p><u>2012</u></p> <p><i>Policy/Strategy:</i> (1) Policy options to facilitate conditional rewards for environmental services are developed with policy makers in Africa and Asia.</p>				

Other knowledge: (1) Completed studies of the economic and social impacts of payments for carbon sequestration				
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GRP6.3: Analysis of the links between the drivers of land use and tree cover change at global-national-local scales and of the opportunities to negotiate and influence agroforestry transformations.				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p>2010</p> <p><i>Practices:</i> (1) Tools, methodologies and approaches to understand multiple drivers, multiple response, multiple outcomes across spatial scale and time developed.</p> <p><i>Policy/Strategy:</i> (1) The concerns and interests of Agroforestry producer groups are brought into important agriculture and environment policy processes in Southern Africa.</p> <p><i>Other knowledge:</i> (1) Synthesis on the role of Agroforestry in the 'forest transition' or recovery of tree cover after a phase of deforestation, with analysis of the driving forces and policy constraints that need to be removed; (2) Synthesis on the role of Agroforestry in the 'forest transition' or recovery of tree cover after a phase of deforestation, with analysis of the driving forces and policy constraints that need to be removed.</p>	<p>Negotiators for multi-lateral environmental agreements; planners for regional environmental plans (e.g. NEPAD); Environmental Facility; regional organizations; international policy shapers (e.g. World Bank, IUCN), national level agricultural research institutes and policy makers.</p>	<p>International and regional conventions, agreements, action plans and national level policy processes are modified to better facilitate the contributions of smallholder farmers practicing Agroforestry.</p>	<p>Realistic use of trees for transforming lives and landscapes and attaining critical ecosystem services in multifunctional landscapes.</p>	<p>Bangladesh, China, Indonesia, Kampuchea, Laos, Philippines, Sri Lanka, Thailand, Mauritania, South Africa, N.Korea, Bhutan</p>
<p>2011</p> <p><i>Practices:</i> (1) Tools, methodologies and approaches for understanding multifunctionality (multiple drivers, response and outcomes) shared and replicated across similar contexts.</p> <p><i>Policy/Strategy:</i> (1) At least one avoided deforestation pilot study designed and implementation begun.</p> <p><i>Other knowledge:</i> (1) Comparison of different modeling approaches for analysis of the driving forces for land use change in the sub-humid tropics and their consequences for livelihoods and environmental services.</p>				
<p>2012</p> <p><i>Policy/Strategy:</i> (1) At least one avoided deforestation pilot study designed and implementation begun.</p> <p><i>Other knowledge:</i> (1) Pan-tropical spatial characterization of Agroforestry and its dependence on environmental, socio-economic and policy conditions.</p>				

ASB Partnership for the Tropical Forest Margins

ASB1. Options for addressing climate change in agriculture – forest landscapes in the humid tropics for improving incomes of rural households, strengthening community engagement and maintaining essential environmental services evaluated.				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p><u>2010</u> <i>Other Knowledge:</i> (1)_A new spatial analysis of the carbon, livelihood and environmental service tradeoffs associated with alternative development pathways in multiple ASB sites; (2) New analysis of data availability, drivers of deforestation , baseline methodologies and criteria and indicators a for choosing demonstration sites and investments for REDD</p>	<p>National and international researchers. UN agencies, donors, national environment agencies, UNFCCC negotiators</p>	<p>Researchers working at the tropical forest margins conduct research that is more effective and better linked to important policy processes.</p> <p>REDD / AFOLU analysts and policy makers in a number of developing countries trained using ASB Opportunity costs of avoided deforestation training manual.</p>	<p>Appreciable slowing in the rate of tropical deforestation in countries that consider ASB outputs in the design of policies, incentive systems and negotiation approaches. Smallholder farmers living in the tropical forest margins have more secure land rights and incentives to undertake investments and land uses consistent with essential environmental services</p>	<p>Brazil, Peru, Cameroon, Philippines, Indonesia Thailand and possibly Vietnam</p>
<p><u>2011</u> <i>Other knowledge:</i> (1) Dynamic tradeoff studies published for an expanded set of sites in the tropical forest margins, including avoided deforestation and REDD pilot studies.</p>				
<p><u>2012</u> <i>Other knowledge:</i> (1) New methods and tools for landscape / national level REDD / AFOLU accounting (measurement and monitoring), analyzing drivers of deforestation, REDD planning and negotiations tested in ASB sites; (2) Conceptual frameworks for High Carbon Stock Rural Development Pathways developed and tested in ASB sites</p>				

ASB2. Information on options for addressing climate change in agriculture – forest landscapes in the humid tropics is synthesized and proactively disseminated to influence relevant policy and programme design processes, particularly national and international policies on avoided deforestation with sustainable benefits.				
Output Targets	Intended Users	Outcomes	Impacts	Potential Beneficiary Countries
<p><u>2010</u> <i>Policy/Strategy</i> (1) Analytical papers and policy briefs that consider the implications of 2009 climate agreements and legislation on plans and policies for sustainable development in the tropical forest margins; (2) Synthesis papers that draw out the implications of ASB research on Agriculture Forestry and Other Land Uses (AFOLU) are published in high profile journals and summarized into targeted outputs for selected policy processes, particularly UNFCCC processes; (3) A Training manual on Opportunity costs of avoided deforestation and tradeoffs and training in developing countries.</p>	<p>UNFCCC negotiators, Ministries of Forestry, Agriculture and environment personnel, national and international researchers. UN agencies, donors, national environment agencies, UNFCCC negotiators.</p>	<p>Workable organizational structures and processes identified and implemented that link integrative science with policy and practice in the search for better approaches to poverty reduction, natural resource management, and rainforest conservation.</p>	<p>Appreciable slowing in the rate of tropical deforestation in countries that consider ASB outputs in the design of policies, incentive systems and negotiation approaches. Smallholder farmers living in the tropical forest margins have more secure land rights and incentives to undertake investments and land uses consistent with essential environmental services.</p> <p>ASB outputs directly help build consensus and momentum on regional and global level discussions on AFOLU and REDD.</p>	<p>Brazil, Peru, Cameroon, Philippines, Indonesia Thailand and possibly Vietnam</p> <p>COMESA group of countries (21) and chiefly Tanzania, Uganda, Kenya, Malawi etc</p> <p>COMIFAC group of countries (10)</p> <p>REDD Readiness countries within the Forest Carbon partnership Facility-FCPF of the World Bank (37)</p>
<p><u>2011</u> <i>Policy/Strategy</i> (1) Synthesis papers and policy briefs summarizing experience with avoided deforestation, REDD pilot studies for key policy processes.</p>		<p>Policy makers at the national and international scales adopt policies, negotiation processes and institutions that reduce incentives for deforestation and promote high carbon stocks rural development pathway.</p>		
<p><u>2012</u> <i>Policy/Strategy</i> (1) Analytical papers and policy briefs summarizing experiences in REDD / AFOLU and High Carbon Rural Development Pathways published and shared in policy processes at regional and global level.</p>		<p>Policy makers at the national, regional / continental level establish an AFOLU Platform for REDD with the UNFCCC post 2012 discussions framework on REDD / AFOLU in order to share information, discuss issues and formulate relevant strategies and policies..</p> <p>REDD / AFOLU analysts and policy makers in a number of developing countries trained using ASB Opportunity costs of avoided deforestation training manual.</p>		

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**WorldAgroforestry Table 1: Allocation of Project Costs by Priority Area and Priorities, 2010
in \$millions**

	Priority Area 1	Priority Area 2	Priority Area 3		Priority Area 4			Priority Area 5				Non-Priority Area			
Project	1B	2D	3A	3D	4A	4C	4D	5A	5B	5C	5D	Development Activities	New Research Areas	Stand- alone Training	Total
ASB					0.605				0.259						0.864
GRP1	0.339	1.697	2.376		0.679						0.339	0.339	0.679	0.339	6.787
GRP2		0.467		0.934	0.934	0.934	0.934					0.234	0.234		4.671
GRP3			1.121	0.673					1.121	0.448	0.448	0.448	0.224		4.483
GRP4					0.339	0.113	1.469				0.113		0.113	0.113	2.260
GRP5				0.146	0.293	0.146	0.439	0.439	0.439	0.293	0.293	0.146	0.146	0.146	2.926
GRP6				0.951	2.852	0.475		1.901		1.426		0.475	0.951	0.475	9.506
Total	0.339	2.164	3.497	2.704	5.702	1.668	2.842	2.340	1.819	2.167	1.193	1.642	2.347	1.073	31.497

WorldAgroforestry-Table 2: Allocation of Project Costs to CGIAR Priorities, 2009-2012				
in \$millions				
Projects Priorities	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
ASB: Alternatives to Slash-and-Burn Systemwide Programme				
4A	0.611	0.605	0.635	0.667
5B	0.262	0.259	0.272	0.286
Project Total	0.873	0.864	0.907	0.953
GRP1				
1B	0.343	0.339	0.356	0.374
2D	1.714	1.697	1.782	1.869
3A	2.399	2.376	2.495	2.620
4A	0.685	0.679	0.713	0.749
5D	0.343	0.339	0.355	0.374
Development Activities	0.343	0.339	0.356	0.374
Stand-alone Training	0.343	0.339	0.356	0.374
New Research Areas	0.685	0.679	0.713	0.749
Project Total	6.855	6.787	7.126	7.483
GRP2				
2D	0.472	0.467	0.489	0.514
3D	0.943	0.934	0.981	1.030
4A	0.943	0.934	0.981	1.030

WorldAgroforestry-Table 2: Allocation of Project Costs to CGIAR Priorities, 2009-2012				
in \$millions				
Projects Priorities	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
4C	0.943	0.934	0.981	1.030
4D	0.943	0.934	0.981	1.030
Development Activities	0.236	0.234	0.246	0.258
New Research Areas	0.236	0.234	0.246	0.258
Project Total	4.716	4.671	4.905	5.150
GRP3				
3A	1.132	1.121	1.177	1.236
3D	0.679	0.673	0.707	0.742
5B	1.132	1.121	1.177	1.236
5C	0.453	0.448	0.470	0.494
5D	0.453	0.448	0.470	0.494
Development Activities	0.453	0.448	0.470	0.494
New Research Areas	0.226	0.224	0.236	0.247
Project Total	4.528	4.483	4.707	4.943
GRP4				
4A	0.342	0.339	0.355	0.372
4C	0.114	0.113	0.119	0.125
4D	1.483	1.469	1.542	1.620
5D	0.114	0.113	0.119	0.125

WorldAgroforestry-Table 2: Allocation of Project Costs to CGIAR Priorities, 2009-2012 in \$millions				
Projects Priorities	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
Stand-alone Training	0.114	0.113	0.119	0.125
New Research Areas	0.114	0.113	0.119	0.125
Project Total	2.281	2.260	2.373	2.492
GRP5				
3D	0.148	0.146	0.153	0.161
4A	0.295	0.293	0.308	0.323
4C	0.148	0.146	0.153	0.161
4D	0.443	0.439	0.461	0.484
5A	0.443	0.439	0.461	0.484
5B	0.443	0.439	0.461	0.484
5C	0.295	0.293	0.308	0.323
5D	0.295	0.293	0.308	0.323
Development Activities	0.148	0.146	0.153	0.161
Stand-alone Training	0.148	0.146	0.153	0.161
New Research Areas	0.148	0.146	0.153	0.161
Project Total	2.954	2.926	3.072	3.226
GRP6				
3D	0.960	0.951	0.998	1.048
4A	2.879	2.852	2.995	3.144

WorldAgroforestry-Table 2: Allocation of Project Costs to CGIAR Priorities, 2009-2012 in \$millions				
Projects Priorities	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
4C	0.480	0.475	0.499	0.524
5A	1.920	1.901	1.996	2.096
5C	1.440	1.426	1.496	1.572
Development Activities	0.480	0.475	0.499	0.524
Stand-alone Training	0.480	0.475	0.499	0.524
New Research Areas	0.960	0.951	0.999	1.048
Project Total	9.599	9.506	9.981	10.480
Total	31.806	31.497	33.071	34.727

WorldAgroforestry-Table 3: Summary of Project Costs, 2009-2012				
in \$millions				
Project	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
ASB: Alternatives to Slash-and-Burn Systemwide Programme	0.873	0.864	0.907	0.953
GRP1	6.855	6.787	7.126	7.483
GRP2	4.716	4.671	4.905	5.150
GRP3	4.528	4.483	4.707	4.943
GRP4	2.281	2.260	2.373	2.492
GRP5	2.954	2.926	3.072	3.226
GRP6	9.599	9.506	9.981	10.480
Total	31.806	31.497	33.071	34.727

WorldAgroforestry-Table 4: Summary of Priority Costs, 2009-2012 in \$millions				
Priorities	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
1B	0.343	0.339	0.356	0.374
2D	2.186	2.164	2.271	2.383
3A	3.531	3.497	3.672	3.856
3D	2.730	2.704	2.839	2.981
4A	5.755	5.702	5.987	6.285
4C	1.685	1.668	1.752	1.840
4D	2.869	2.842	2.984	3.134
5A	2.363	2.340	2.457	2.580
5B	1.837	1.819	1.910	2.006
5C	2.188	2.167	2.274	2.389
5D	1.205	1.193	1.252	1.316
Development Activities	1.660	1.642	1.724	1.811
Stand-alone Training	1.085	1.073	1.127	1.184
New Research Areas	2.369	2.347	2.466	2.588
Total	31.806	31.497	33.071	34.727

WorldAgroforestry-Table 5: Investments by Undertaking, Activity and Sector, 2008-2012 in \$millions					
	Actual 2008	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
Increasing Productivity	3.697	4.548	4.504	4.729	4.967
Germplasm Enhancement & Breeding	1.016	1.249	1.237	1.299	1.365
Production Systems Development & Management	2.681	3.299	3.267	3.430	3.602
Tree systems	2.681	3.299	3.267	3.430	3.602
Protecting the Environment	4.555	5.604	5.550	5.827	6.118
Saving Biodiversity	3.326	4.093	4.053	4.256	4.469
Improving Policies	6.349	7.811	7.735	8.121	8.527
Strengthening NARS	7.925	9.750	9.655	10.138	10.646
Training and Professional Development	4.350	5.373	5.336	5.613	5.894
Documentation, Publications, Info. Dissemination	2.981	3.667	3.631	3.813	4.004
Organization & Management Counselling	0.143	0.176	0.174	0.184	0.193
Networks	0.451	0.534	0.514	0.528	0.555
Total	25.852	31.806	31.497	33.071	34.727

WorldAgroforestry-Table 6: Project Investments by Developing Region, 2008-2012

in \$millions

Project	Region	Actual 2008	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
ASB: Alternatives to Slash-and-Burn Systemwide Programme	Asia	0.136	0.349	0.346	0.363	0.382
	LAC	0.034	0.087	0.086	0.090	0.095
	SSA	0.170	0.437	0.432	0.454	0.476
Total Project		0.340	0.873	0.864	0.907	0.953
GRP1	Asia	3.420	1.072	1.062	1.115	1.170
	LAC	0.084	0.152	0.150	0.158	0.167
	SSA	4.311	5.631	5.575	5.853	6.146
Total Project		7.815	6.855	6.787	7.126	7.483
GRP2	Asia	0.720	0.520	0.515	0.541	0.568
	LAC	0.055	0.150	0.150	0.157	0.165
	SSA	1.360	4.046	4.006	4.207	4.417
Total Project		2.135	4.716	4.671	4.905	5.150
GRP3	Asia	0.133	0.278	0.275	0.289	0.304
	LAC	0.063	0.330	0.327	0.343	0.360
	SSA	2.692	3.920	3.881	4.075	4.279
Total Project		2.888	4.528	4.483	4.707	4.943
GRP4	Asia	0.513	0.112	0.111	0.117	0.123
	LAC	0.028	0.000	0.000	0.000	0.000
	SSA	1.494	2.169	2.149	2.256	2.369
Total Project		2.035	2.281	2.260	2.373	2.492

WorldAgroforestry-Table 6: Project Investments by Developing Region, 2008-2012

in \$millions

Project	Region	Actual 2008	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
GRP5	Asia	0.245	1.652	1.638	1.719	1.805
	LAC	0.000	0.170	0.167	0.175	0.185
	SSA	1.035	1.132	1.121	1.178	1.236
Total Project		1.280	2.954	2.926	3.072	3.226
GRP6	Asia	3.847	4.839	4.793	5.031	5.284
	LAC	0.365	0.817	0.809	0.850	0.892
	SSA	5.147	3.943	3.904	4.100	4.304
Total Project		9.359	9.599	9.506	9.981	10.480
Total		25.852	31.806	31.497	33.071	34.727

WorldAgroforestry-Table 7: Summary of Investments by Developing Region, 2008-2012

in \$millions

Region	Actual 2008	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
SSA	16.209	21.278	21.068	22.123	23.227
Asia	9.014	8.822	8.740	9.175	9.636
LAC	0.629	1.706	1.689	1.773	1.864
Total	25.852	31.806	31.497	33.071	34.727

WorldAgroforestry-Table 8: Expenditure by Object, 2008-2012					
in \$millions					
Object of Expenditure	Actual 2008	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
Personnel	11.007	13.489	14.163	14.871	15.616
Supplies and services	7.401	8.256	7.255	7.619	7.999
Collaboration/ Partnerships	3.023	6.264	6.325	6.640	6.973
Operational Travel	3.471	2.587	2.484	2.607	2.738
Depreciation	0.950	1.210	1.270	1.334	1.401
Total	25.852	31.806	31.497	33.071	34.727

WorldAgroforestry-Table 9: Member and Non-Member Unrestricted Grants, 2008-2010

in \$millions NC = National Currency

Member	Type NC	Actual 2008 (US\$)	Actual 2008 (NC)	Estimated 2009 (US\$)	Estimated 2009 (NC)	Proposal 2010 (US\$)	Proposal 2010 (NC)
Unrestricted Grants							
Member							
Australia	AUD	0.220	0.250	0.243	0.250	0.243	0.250
Belgium	EUR	0.504	0.400	1.043	0.834	1.150	0.932
Canada	CAD	1.005	0.818	0.663	0.818	0.663	0.818
China	USD	0.020	0.020	0.020	0.020	0.020	0.020
Denmark	DKK	1.136	5.400	0.927	5.300	0.927	5.300
Finland	EUR	0.821	0.650	0.802	0.650	0.802	0.650
Germany	EUR	0.442	0.317	0.391	0.317	0.391	0.317
Ireland	EUR	1.478	0.950	0.988	0.800	0.988	0.800
Japan	JPY	0.008	0.008	0.000	0.000	0.000	0.000
Netherlands	EUR	0.735	0.500	0.734	0.500	0.734	0.500
Norway	NOK	1.055	5.500	0.871	5.500	0.871	5.500
Philippines	USD	0.010	0.010	0.005	0.005	0.005	0.005
South Africa	USD	0.060	0.060	0.020	0.020	0.020	0.020
Sweden	SEK	0.416	3.400	0.428	3.400	0.428	3.400
Switzerland	CHF	0.488	0.500	0.433	0.500	0.433	0.500
Thailand	USD	0.010	0.010	0.010	0.010	0.010	0.010
United Kingdom	GBP	1.034	0.630	0.891	0.630	0.891	0.630
United States	USD	0.551	0.551	0.802	0.802	0.722	0.722

WorldAgroforestry-Table 9: Member and Non-Member Unrestricted Grants, 2008-2010

in \$millions NC = National Currency

Member	Type NC	Actual 2008 (US\$)	Actual 2008 (NC)	Estimated 2009 (US\$)	Estimated 2009 (NC)	Proposal 2010 (US\$)	Proposal 2010 (NC)
World Bank	USD	1.630	1.630	1.549	1.548	1.394	1.394
Subtotal		11.623		10.820		10.692	
Non-member							
Aid to Africa	USD	0.007	0.007	0.000	0.000	0.000	0.000
Subtotal		0.007		0.000		0.000	
Total Unrestricted		11.630		10.820		10.692	

WorldAgroforestry-Table 9a: Member and Non-Member Unrestricted and Restricted Grants, 2008-2010

in \$millions

Member / Non-Member	Actual 2008	Estimated 2009	Proposal 2010
Unrestricted Grants			
Member			
Australia	0.220	0.243	0.243
Belgium	0.504	1.043	1.150
Canada	1.005	0.663	0.663
China	0.020	0.020	0.020
Denmark	1.136	0.927	0.927
Finland	0.821	0.802	0.802
Germany	0.442	0.391	0.391
Ireland	1.478	0.988	0.988
Japan	0.008	0.000	0.000
Netherlands	0.735	0.734	0.734
Norway	1.055	0.871	0.871
Philippines	0.010	0.005	0.005
South Africa	0.060	0.020	0.020
Sweden	0.416	0.428	0.428
Switzerland	0.488	0.433	0.433

WorldAgroforestry-Table 9a: Member and Non-Member Unrestricted and Restricted Grants, 2008-2010

in \$millions

Member / Non-Member	Actual 2008	Estimated 2009	Proposal 2010
Thailand	0.010	0.010	0.010
United Kingdom	1.034	0.891	0.891
United States	0.551	0.802	0.722
World Bank	1.630	1.549	1.394
Subtotal	11.623	10.820	10.692
Non-member			
Aid to Africa	0.007	0.000	0.000
Subtotal	0.007	0.000	0.000
Total Unrestricted	11.630	10.820	10.692
Member / Non-Member	Actual 2008	Estimated 2009	Proposal 2010
Restricted Grants			
Member			
Australia	0.146	0.357	0.353
Austria	0.208	0.000	0.000
Belgium	0.038	0.220	0.216

WorldAgroforestry-Table 9a: Member and Non-Member Unrestricted and Restricted Grants, 2008-2010

in \$millions

Member / Non-Member	Actual 2008	Estimated 2009	Proposal 2010
Brazil	0.103	0.073	0.063
Canada	0.452	0.077	0.008
CGIAR	0.015	0.039	0.040
China	0.122	0.101	0.102
Denmark	0.018	0.102	0.102
European Commission	1.883	2.294	2.518
FAO	0.220	0.216	0.212
Finland	0.262	0.208	0.205
Ford Foundation	0.473	0.205	0.208
Germany	0.417	0.868	0.821
IDRC	0.220	0.135	0.131
IFAD	1.001	1.544	1.733
Indonesia	0.074	0.039	0.035
Ireland	1.442	1.163	1.545
Italy	0.345	0.320	0.318
Japan	0.144	0.070	0.078
Kenya	0.011	0.027	0.025
Netherlands	0.542	0.619	0.615
Peru	0.044	0.046	0.039

WorldAgroforestry-Table 9a: Member and Non-Member Unrestricted and Restricted Grants, 2008-2010

in \$millions

Member / Non-Member	Actual 2008	Estimated 2009	Proposal 2010
Rockefeller Foundation	0.099	0.000	0.000
Spain	0.128	0.036	0.038
Sweden	1.206	0.263	0.260
Switzerland	0.021	0.030	0.028
Syngenta Foundation	0.010	0.000	0.000
UNDP	0.081	0.380	0.341
UNEP	0.110	0.432	0.431
United Kingdom	0.336	0.206	0.199
United States	2.046	1.407	1.421
World Bank	0.683	0.871	1.265
Subtotal	12.900	12.348	13.350
Non-member			
African Wildlife Foundation	0.097	0.100	0.094
ASARECA	0.089	0.000	0.000
Bill and Melinda Gates Foundation	0.002	0.000	0.000
Bioversity International	0.004	0.000	0.000
CARE	0.044	0.050	0.055
Centre for Cultural and Technical Interchange	0.049	0.000	0.000
CIAT	0.014	0.535	0.529

WorldAgroforestry-Table 9a: Member and Non-Member Unrestricted and Restricted Grants, 2008-2010

in \$millions

Member / Non-Member	Actual 2008	Estimated 2009	Proposal 2010
CIFOR	0.215	0.219	0.215
CIP	0.007	0.000	0.000
CIRAD	0.149	0.182	0.185
Columbia University	0.034	0.066	0.070
Common Fund for Commodities - CFC	-0.135	1.416	1.415
Conservation International Foundation	0.010	0.000	0.000
Cornell University	0.011	0.000	0.000
CTA	0.010	0.000	0.000
Forum for Agricultural Research in Africa FARA	0.015	0.062	0.062
Global Environment Facility (GEF)	0.098	0.158	0.166
Global Mountain Programme (GMP)	0.086	0.000	0.000
Heifer International	0.497	0.605	0.605
ICRISAT	0.016	0.000	0.000
IFPRI	0.026	0.075	0.065
ILRI	0.018	0.018	0.014
Institute for Law & Environment Governance (ILEG)	0.003	0.000	0.000
IRRI	0.037	0.012	0.015
IUCN	0.008	0.060	0.063
Katholic University y Leuven (KUL)	0.151	0.161	0.150

WorldAgroforestry-Table 9a: Member and Non-Member Unrestricted and Restricted Grants, 2008-2010

in \$millions

Member / Non-Member					Actual 2008	Estimated 2009	Proposal 2010
McKnight Foundation					0.014	0.026	0.027
National Science Foundation (NSF)					0.024	0.000	0.000
Others					0.490	3.029	2.785
Plan International					0.036	0.000	0.000
Unilever					0.057	0.025	0.028
World Food Program (WFP)					0.010	0.000	0.000
World Wildlife Fund					0.124	0.161	0.172
Subtotal					2.310	6.960	6.715
Total Restricted					15.210	19.308	20.065
Total Grants					26.840	30.128	30.757
Summary and Statement of Activities					Actual 2008	Estimated 2009	Proposal 2010
Total Grants					26.840	30.128	30.757
Center Income					2.046	1.100	1.200
Revenue					28.886	31.228	31.957
Total Investment					25.852	31.806	31.497
Surplus (Deficit)					3.034	-0.578	0.460

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member		Actual 2008	Estimated 2009	Proposal 2010
ASB: Alternatives to Slash-and-Burn Systemwide Programme	Member	European Commission	0.000	0.061	0.290
		World Bank	0.169	0.000	0.000
	Non Member	Others	0.007	0.656	0.430
	Unrestricted + Other sources		0.164	0.156	0.144
Project Total			0.340	0.873	0.864
GRP1	Member	Australia	0.060	0.023	0.023
		Austria	0.148	0.000	0.000
		Belgium	0.011	0.136	0.130
		Brazil	0.010	0.003	0.001
		Canada	0.400	0.077	0.008
		CGIAR	0.000	0.004	0.004
		Denmark	0.018	0.102	0.102
		European Commission	0.614	0.734	0.734
		FAO	0.079	0.051	0.040
		Finland	0.011	0.000	0.000
		Ford Foundation	0.057	0.000	0.000
		Germany	0.121	0.086	0.073
		IDRC	0.002	0.000	0.000
		IFAD	0.527	0.286	0.280
		Ireland	0.692	0.285	0.282
		Japan	0.008	0.010	0.010
		Kenya	0.001	0.000	0.000
		Netherlands	0.101	0.082	0.082
		Peru	0.000	0.032	0.030

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member	Actual 2008	Estimated 2009	Proposal 2010
	Rockefeller Foundation	0.014	0.000	0.000
	Spain	0.047	0.001	0.002
	Sweden	0.257	0.000	0.000
	Syngenta Foundation	0.010	0.000	0.000
	UNDP	0.017	0.026	0.002
	UNEP	0.002	0.000	0.000
	United Kingdom	0.017	0.097	0.095
	United States	1.028	0.565	0.565
	World Bank	0.131	0.000	0.000
	Non Member			
	African Wildlife Foundation	0.022	0.013	0.010
	Bioversity International	0.002	0.000	0.000
	CIAT	0.000	0.001	0.000
	CIFOR	0.108	0.001	0.002
	CIRAD	0.008	0.000	0.000
	Columbia University	0.010	0.000	0.000
	Common Fund for Commodities - CFC	-0.036	0.732	0.735
	Conservation International Foundation	-0.008	0.000	0.000
	Cornell University	0.001	0.000	0.000
	CTA	0.009	0.000	0.000
	Forum for Agricultural Research in Africa FARA	0.015	0.006	0.005
	Global Environment Facility (GEF)	0.000	0.001	0.001
	Heifer International	0.000	0.012	0.010
	ICRISAT	0.005	0.000	0.000
	ILRI	0.007	0.002	0.001

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member		Actual 2008	Estimated 2009	Proposal 2010
		Institute for Law & Environment Governance (ILEG)	0.002	0.000	0.000
		IUCN	0.002	0.035	0.035
		Katholic University y Leuveen (KUL)	0.000	0.156	0.150
		Others	0.058	0.566	0.560
		Plan International	0.013	0.000	0.000
		Unilever	0.057	0.025	0.028
		World Food Program (WFP)	0.003	0.000	0.000
		World Wildlife Fund	0.021	0.004	0.004
		Unrestricted + Other sources	3.133	2.701	2.783
Project Total			7.815	6.855	6.787
GRP2	Member	Australia	0.003	0.000	0.000
		Austria	0.060	0.000	0.000
		Belgium	0.003	0.079	0.080
		Brazil	0.001	0.003	0.002
		Canada	0.002	0.000	0.000
		CGIAR	0.000	0.003	0.004
		European Commission	0.008	0.005	0.002
		FAO	0.008	0.000	0.000
		Finland	0.003	0.000	0.000
		Ford Foundation	0.015	0.000	0.000
		Germany	0.000	0.008	0.007
		IFAD	0.195	0.454	0.450
		Ireland	0.204	0.586	0.580
		Japan	0.026	0.010	0.020

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member	Actual 2008	Estimated 2009	Proposal 2010
	Kenya	0.002	0.000	0.000
	Netherlands	0.028	0.161	0.159
	Peru	0.000	0.006	0.005
	Rockefeller Foundation	0.016	0.000	0.000
	Spain	0.007	0.001	0.002
	Sweden	0.072	0.000	0.000
	UNDP	0.003	0.124	0.120
	United Kingdom	0.027	0.032	0.031
	United States	0.261	0.150	0.148
	World Bank	0.019	0.000	0.000
	Non Member			
	African Wildlife Foundation	0.062	0.006	0.005
	CIAT	0.000	0.001	0.001
	CIFOR	0.067	0.034	0.032
	CIRAD	0.139	0.018	0.020
	Columbia University	0.003	0.066	0.070
	Common Fund for Commodities - CFC	-0.017	0.400	0.398
	Conservation International Foundation	0.016	0.000	0.000
	Cornell University	0.001	0.000	0.000
	Forum for Agricultural Research in Africa FARA	0.000	0.004	0.005
	Global Environment Facility (GEF)	0.000	0.001	0.001
	ILRI	0.001	0.001	0.002
	McKnight Foundation	0.014	0.026	0.027
	Others	0.016	0.466	0.460
	Plan International	0.004	0.000	0.000

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member		Actual 2008	Estimated 2009	Proposal 2010
		World Food Program (WFP)	0.001	0.000	0.000
		World Wildlife Fund	0.006	0.000	0.000
		Unrestricted + Other sources	0.857	2.071	2.040
Project Total			2.135	4.716	4.671
GRP3	Member	Australia	0.003	0.004	0.005
		Belgium	0.004	0.001	0.002
		Brazil	0.001	0.007	0.005
		Canada	0.008	0.000	0.000
		CGIAR	0.000	0.003	0.004
		China	0.002	0.000	0.000
		European Commission	0.002	0.000	0.000
		FAO	0.093	0.111	0.108
		Finland	0.004	0.000	0.000
		Ford Foundation	0.021	0.000	0.000
		Germany	0.000	0.002	0.001
		IDRC	0.001	0.001	0.001
		IFAD	0.080	0.137	0.140
		Ireland	0.118	0.103	0.098
		Japan	0.030	0.015	0.013
		Kenya	0.002	0.000	0.000
		Netherlands	0.038	0.054	0.050
		Peru	0.000	0.001	0.001
		Rockefeller Foundation	0.018	0.000	0.000
		Spain	0.031	0.011	0.012

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member	Actual 2008	Estimated 2009	Proposal 2010
	Sweden	0.096	0.000	0.000
	UNDP	0.004	0.005	0.003
	United Kingdom	0.004	0.000	0.000
	United States	0.463	0.421	0.439
	World Bank	0.043	0.168	0.165
	Non Member			
	African Wildlife Foundation	0.001	0.010	0.010
	Bill and Melinda Gates Foundation	0.002	0.000	0.000
	Bioversity International	0.001	0.000	0.000
	CIAT	0.000	0.003	0.002
	CIFOR	0.001	0.000	0.000
	CIRAD	0.002	0.164	0.165
	Columbia University	0.004	0.000	0.000
	Common Fund for Commodities - CFC	-0.023	0.271	0.268
	Cornell University	0.001	0.000	0.000
	Forum for Agricultural Research in Africa FARA	0.000	0.004	0.005
	Global Environment Facility (GEF)	-0.005	0.002	0.001
	Heifer International	0.497	0.593	0.595
	ICRISAT	0.002	0.000	0.000
	ILRI	0.002	0.000	0.000
	Institute for Law & Environment Governance (ILEG)	0.001	0.000	0.000
	IUCN	0.001	0.025	0.028
	Others	0.036	0.047	0.049
	Plan International	0.003	0.000	0.000
	World Food Program (WFP)	0.001	0.000	0.000

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member		Actual 2008	Estimated 2009	Proposal 2010
		World Wildlife Fund	0.024	0.115	0.118
		Unrestricted + Other sources	1.271	2.250	2.195
		Project Total	2.888	4.528	4.483
GRP4	Member	Australia	0.003	0.000	0.000
		Belgium	0.003	0.001	0.001
		Brazil	0.001	0.000	0.000
		Canada	0.002	0.000	0.000
		CGIAR	0.000	0.001	0.003
		European Commission	0.001	0.000	0.000
		FAO	0.004	0.012	0.013
		Finland	0.003	0.000	0.000
		Ford Foundation	0.014	0.086	0.090
		Germany	0.067	0.001	0.000
		IDRC	0.000	0.001	0.000
		IFAD	0.019	0.048	0.050
		Ireland	0.188	0.022	0.020
		Japan	0.016	0.000	0.000
		Kenya	0.001	0.027	0.025
		Netherlands	0.026	0.000	0.000
		Rockefeller Foundation	0.010	0.000	0.000
		Spain	0.007	0.000	0.000
		Sweden	0.066	0.000	0.000
		Switzerland	0.000	0.030	0.028
		UNDP	0.020	0.078	0.075

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member		Actual 2008	Estimated 2009	Proposal 2010	
	Non Member	UNEP	0.074	0.386	0.386	
		United Kingdom	0.180	0.017	0.015	
		United States	0.032	0.008	0.009	
		World Bank	0.018	0.000	0.000	
		CIAT	0.000	0.512	0.510	
		CIFOR	0.001	0.000	0.000	
		Columbia University	0.003	0.000	0.000	
		Common Fund for Commodities - CFC	-0.016	0.000	0.000	
		Cornell University	0.001	0.000	0.000	
		Forum for Agricultural Research in Africa FARA	0.000	0.002	0.001	
		Global Environment Facility (GEF)	0.000	0.003	0.002	
		ICRISAT	0.001	0.000	0.000	
		IFPRI	0.000	0.075	0.065	
		ILRI	0.001	0.000	0.000	
		Others	0.036	0.002	0.002	
		Plan International	0.006	0.000	0.000	
		World Food Program (WFP)	0.001	0.000	0.000	
		World Wildlife Fund	0.001	0.000	0.000	
		Unrestricted + Other sources		1.245	0.969	0.965
		Project Total			2.035	2.281
GRP5	Member	Australia	0.002	0.000	0.000	
		Belgium	0.002	0.001	0.002	
		Brazil	0.001	0.043	0.040	
		Canada	0.002	0.000	0.000	

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member	Actual 2008	Estimated 2009	Proposal 2010
	CGIAR	0.000	0.002	0.001
	European Commission	0.001	0.273	0.273
	FAO	0.002	0.002	0.001
	Finland	0.002	0.000	0.000
	Ford Foundation	0.020	0.070	0.068
	Germany	0.004	0.091	0.090
	IFAD	0.000	0.003	0.001
	Indonesia	0.000	0.039	0.035
	Ireland	0.005	0.078	0.080
	Japan	0.025	0.003	0.005
	Kenya	0.002	0.000	0.000
	Netherlands	0.017	0.035	0.040
	Peru	0.000	0.004	0.002
	Rockefeller Foundation	0.014	0.000	0.000
	Spain	0.004	0.001	0.002
	Sweden	0.043	0.000	0.000
	UNDP	0.003	0.074	0.070
	United States	0.002	0.021	0.020
	World Bank	0.051	0.000	0.000
	Non Member			
	African Wildlife Foundation	0.000	0.001	0.001
	CARE	0.044	0.050	0.055
	CIAT	0.000	0.001	0.001
	CIFOR	0.000	0.002	0.003
	Columbia University	0.002	0.000	0.000

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member	Actual 2008	Estimated 2009	Proposal 2010
	Common Fund for Commodities - CFC	-0.010	0.002	0.005
	Cornell University	0.005	0.000	0.000
	Forum for Agricultural Research in Africa FARA	0.000	0.003	0.004
	Global Environment Facility (GEF)	0.102	0.093	0.103
	ICRISAT	0.001	0.000	0.000
	ILRI	0.001	0.003	0.001
	National Science Foundation (NSF)	0.024	0.000	0.000
	Others	0.059	0.626	0.620
	World Wildlife Fund	0.040	0.025	0.030
	Unrestricted + Other sources	0.810	1.408	1.373
	Project Total	1.280	2.954	2.926
GRP6	Member			
	Australia	0.075	0.330	0.325
	Belgium	0.015	0.002	0.001
	Brazil	0.089	0.017	0.015
	Canada	0.038	0.000	0.000
	CGIAR	0.015	0.026	0.024
	China	0.120	0.101	0.102
	European Commission	1.257	1.221	1.219
	FAO	0.034	0.040	0.050
	Finland	0.239	0.208	0.205
	Ford Foundation	0.346	0.049	0.050
	Germany	0.225	0.680	0.650
	IDRC	0.217	0.133	0.130
	IFAD	0.180	0.616	0.812

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member	Actual 2008	Estimated 2009	Proposal 2010
	Indonesia	0.074	0.000	0.000
	Ireland	0.235	0.089	0.485
	Italy	0.345	0.320	0.318
	Japan	0.039	0.032	0.030
	Kenya	0.003	0.000	0.000
	Netherlands	0.332	0.287	0.284
	Peru	0.044	0.003	0.001
	Rockefeller Foundation	0.027	0.000	0.000
	Spain	0.032	0.022	0.020
	Sweden	0.672	0.263	0.260
	Switzerland	0.021	0.000	0.000
	UNDP	0.034	0.073	0.071
	UNEP	0.034	0.046	0.045
	United Kingdom	0.108	0.060	0.058
	United States	0.260	0.242	0.240
	World Bank	0.252	0.703	1.100
	Non Member			
	African Wildlife Foundation	0.012	0.070	0.068
	ASARECA	0.089	0.000	0.000
	Centre for Cultural and Technical Interchange	0.049	0.000	0.000
	CIAT	0.014	0.017	0.015
	CIFOR	0.038	0.182	0.178
	CIP	0.007	0.000	0.000
	Columbia University	0.012	0.000	0.000
	Common Fund for Commodities - CFC	-0.033	0.011	0.009

WorldAgroforestry-Table 10: Allocation of Member Grants and Center Income to Projects, 2008-2010

in \$millions

Project	Member	Actual 2008	Estimated 2009	Proposal 2010
	Conservation International Foundation	0.002	0.000	0.000
	Cornell University	0.002	0.000	0.000
	CTA	0.001	0.000	0.000
	Forum for Agricultural Research in Africa FARA	0.000	0.043	0.042
	Global Environment Facility (GEF)	0.001	0.058	0.058
	Global Mountain Programme (GMP)	0.086	0.000	0.000
	ICRISAT	0.006	0.000	0.000
	IFPRI	0.026	0.000	0.000
	ILRI	0.006	0.012	0.010
	Institute for Law & Environment Governance (ILEG)	0.000	0.000	0.000
	IRRI	0.037	0.012	0.015
	IUCN	0.005	0.000	0.000
	Katholic University y Leuven (KUL)	0.151	0.005	0.000
	Others	0.278	0.666	0.664
	Plan International	0.010	0.000	0.000
	World Food Program (WFP)	0.004	0.000	0.000
	World Wildlife Fund	0.032	0.017	0.020
	Unrestricted + Other sources	3.162	2.943	1.932
Project Total		9.359	9.599	9.506
Total Restrictied		15.210	19.308	20.065
Total Unrestricted + Other sources		10.642	12.498	11.432
Total		25.852	31.806	31.497

**WorldAgroforestry-Table 11: Internationally and Nationally Recruited Staff,
2008-2012**

in \$millions

	Actual 2008	Estimated 2009	Proposal 2010	Plan 1 2011	Plan 2 2012
NRS	254	257	258	258	258
IRS	63	70	71	71	71
Total	317	327	329	329	329

WorldAgroforestry-Table 12: Currency Structure of Expenditure, 2008-2010

in millions of units and percent

Currency	Actual 2008			Estimated 2009			Proposal 2010		
	Amount	\$ Value	% Share	Amount	\$ Value	% Share	Amount	\$ Value	% Share
EUR	2.815	0.412	2	0.000	0.000	0	0.000	0.000	0
IDR	13,3240.870	1.382	5	18,5482.551	1.924	6	20,1967.747	2.095	7
KES	4072.648	5.745	22	6045.630	8.528	27	5365.071	7.568	24
Others	8,4325.270	3.039	12	106,6590.578	3.843	12	109,4344.691	3.943	13
USD	0.000	12.962	50	0.000	14.683	46	0.000	14.788	47
XOF	1903.336	2.312	9	2327.928	2.828	9	2554.300	3.103	10
Total		25.852	100 %		31.806	100 %		31.497	100 %

**WorldAgroforestry- Table 13: Statement of Financial Position
(SFP), 2008-2010
in \$millions**

Assets, Liabilities and Net Assets	2008	2009	2010
Current Assets			
Cash and Cash Equivalents	21.175	22.075	21.620
Investments	0.000	0.000	0.000
Accounts Receivable			
- Donor	6.936	5.822	6.984
- Employees	0.123	0.100	0.095
- Other CGIAR Centers	0.475	0.465	0.460
- Others	1.828	1.808	1.798
Inventories	0.103	0.100	0.105
Pre-paid Expenses	0.334	0.330	0.335
Total Current Assets	30.974	30.700	31.397
Non-Current Assets			
Net Property, Plan and Equipment	5.285	5.080	5.130
Investments	0.000	0.000	0.000
Other Assets	0.000	0.000	0.000
Total Non-Current Assets	5.285	5.080	5.130
Total Assets	36.259	35.780	36.527
Current Liabilities			
Overdraft/Short Term Borrowings	0.000	0.000	0.000
Accounts Payable			
- Donor	7.742	7.942	8.083
- Employees	0.719	0.730	0.815
- Other CGIAR Centers	0.301	0.280	0.312
- Others	1.399	1.401	1.405
Accruals and Provisions	3.472	3.468	3.458
Total Current Liabilities	13.633	13.821	14.073
Non-Current Liabilities			
Accounts Payable			
- Employees	3.862	4.005	4.040
- Deferred Grant Revenue	0.000	0.000	0.000
- Others	0.000	0.000	0.000
Total Non-Current Liabilities	3.862	4.005	4.040
Total Liabilities	17.495	17.826	18.113

Net Assets			
Unrestricted			
- Fixed Assets	11.668	11.668	11.668
- Unrestricted Net Assets Excluding Fixed Assets	7.096	6.286	6.746
Total Unrestricted Net Assets	18.764	17.954	18.414
Restricted	0.000	0.000	0.000
Total Net Assets	18.764	17.954	18.414
Total Liabilities and Net Assets	36.259	35.780	36.527

World Agroforestry-Table 14: Statement of Activities (SOA), 2008-2010

in \$millions

		IN \$MILLIONS					
		Unrestricted	Restricted		Total		
	Temporary		Challenge Programs	2008	2009	2010	
Revenue and Gains	Grant Revenue	11.630	15.198	0.012	26.840	30.128	30.757
	Other revenue and gains	2.046	0.000	0.000	2.046	1.100	1.200
	Total revenue and gains	13.676	15.198	0.012	28.886	31.228	31.957
Expenses and Losses	Program related expenses	8.186	15.116	0.012	23.314	23.318	23.664
	Management and general expenses	4.406	0.082	0.000	4.488	8.488	7.833
	Other losses expenses	0.000	0.000	0.000	0.000	0.000	0.000
	Sub Total expenses and losses	12.592	15.198	0.012	27.802	31.806	31.497
	Indirect cost recovery	-1.950	0.000	0.000	-1.950	0.000	0.000
	Total expenses and losses	10.642	15.198	0.012	25.852	31.806	31.497
	Net Operating Surplus / (Deficit)	3.034	0.000	0.000	3.034	-0.578	0.460
	Extraordinary Items	0.000	0.000	0.000	0.000	0.000	0.000
	NET SURPLUS / (DEFICIT)	3.034	0.000	0.000	3.034	-0.578	0.460
Object of Expenditure	Personnel	6.662	4.338	0.007	11.007	13.489	14.163
	Supplies and services	1.918	5.478	0.005	7.401	8.256	7.255
	Collaboration/ Partnerships	0.552	2.471	0.000	3.023	6.264	6.325
	Operational Travel	0.912	2.559	0.000	3.471	2.587	2.484
	Depreciation	0.598	0.352	0.000	0.950	1.210	1.270
	Total	10.642	15.198	0.012	25.852	31.806	31.497

ANNEX

Progress Report on Implementation of External Review Recommendations

Recommendation as listed in EPMR Report	World Agroforestry Centre Response Accepted or not accepted	Implementation		
		Milestones	Progress Achieved	Target Date of Completion
Recommendation 1 <i>World Agroforestry Centre consolidate its strategic research priorities into a long-term workable strategic plan that directs more effort towards a small number of relevant emerging research topics. (page 93)</i>	Accepted	The new strategy received Board approval in April 2008; the Hans Gregerson mini-review of December 2007 endorsed the directions taken in the new strategy. We now await additional comments from the Science Council before publication and distribution of the strategy	Completed	
Recommendation 2 <i>An analysis be undertaken of the likely impacts of involvement in large development projects, including the Millennium Villages Project, on World Agroforestry Centre's overall balance between research and development, staff commitments and administrative costs; it is also important to ensure that projects with restricted funds be aligned with World Agroforestry Centre's strategic research goals (page 40)</i>	Accepted	The Gregerson review of 2007 endorsed the Centre's new modalities of science involvement with development projects, and noted that the Centre's approach could be a model for the CGIAR system in this area. The Centre's involvement with the Millennium Villages Project has been modest and has deployed the new modalities that are being used as the basis for all such engagements. Implementation of Centre science through development projects will continue to be reviewed regularly through the Centre's Science Quality Group and the Board review processes, including future CCERs.	Completed	
Recommendation 3 <i>World Agroforestry Centre merges its south Asia and South East Asia programs into an Asia Region, with liaison units posted in India and China with clearly stated roles. (page 46)</i>	Agreed to study the issue and explore alternatives	Programmatic alignment between the two regions has been achieved through the Strategic Plan by early 2008, and formal inter-regional planning processes have now been established. Of even greater importance to the Centre is the possibility for programmatic and administrative alignment in these regions with CIFOR; a joint CCER with CIFOR has been commissioned on this topic by the two Boards for implementation in 2008.	Completed	
Recommendation 4 <i>World Agroforestry Centre ceases to maintain Latin America as a Region but instead retains a liaison unit there, associated with the Amazon Initiative. (page 48)</i>	Accepted	Completed 2007 with the alignment of all World Agroforestry Centre work in Latin America under the auspices of the Amazon Initiative	Completed	
Recommendation 5 <i>World Agroforestry Centre maintains its role in ASB. The Panel concurs that the capacity developed in ASB should be sustained and strengthened to maintain a global platform in which World Agroforestry Centre's innovative research can be validated and implemented (page 55)</i>	Accepted	Completed in 2007; a new ASB Coordinator was appointed, a new strategic direction for the Programme was approved by the Global Steering Group (GSG), the World Agroforestry Centre DG was elected as Chair of the Global Steering Group. ASB was also recommended to continue as SWEP. It will work closely with CIFOR on the successful development of the REDD agenda for the tropical forest margins.	Completed	

Recommendation as listed in EPMR Report	World Agroforestry Centre Response Accepted or not accepted	Implementation		
		Milestones	Progress Achieved	Target Date of Completion
Recommendation 6 <i>The CGLAR commission an external review of the AHI Systemwide Program to seek answers to the questions raised by the Panel and make recommendations on the future role of World Agroforestry Centre in the AHI. (page 57)</i>	Accepted	ICRAF supported review by IDRC completed in 2008. Correspondence with the Secretariat and Science Council indicated a formal CGIAR review was ill-timed given withdrawal of support of SWEF funding and CGIAR reforms. AHI program elements of ICRAF have since been merged with the East Africa Regional program to build on existing strengths and synergies.	Completed	
Recommendation 7 <i>World Agroforestry Centre Board and management strictly enforce their “zero-tolerance” approach to staff and service providers who transgress the rules and procedures governing the use of the Center’s resources, taking prompt, decisive and unambiguous action when malfeasance has been established; the results should be communicated (with appropriate safeguards) to all Center staff and other parties affected. (page 78)</i>	Accepted	Completed, 2006. New Code of Conduct and whistle-blowing policies were adopted and communicated to all staff. The Centre’s zero tolerance approach has continued to be applied, but with faster application in all cases arising.	Completed	
Recommendation 8 <i>Major risk factors be discussed thoroughly at the BoT level and risk management becomes a standing agenda item for each session of the full BoT. (page 78)</i>	Accepted	Completed 2006; Board responsibility for risk management signed annually by the full Board, reports by management are discussed in detail by the Audit Committee and reviewed by the full Board at every meeting.	Completed	
Recommendation 9 <i>A review by the CGLAR audit unit of World Agroforestry Centre management’s BOT secretariat policies and management’s procedures including, but not limited to, the production and dissemination of documents for all board meetings, to provide a foundation for the most expeditious possible improvement program. (page 80)</i>	Accepted	Completed 2006; The recommendations were adopted by the Board in 2007.	Completed	
Recommendation 10 <i>World Agroforestry Centre engage the services of an independent, appropriately qualified and experienced management consultant to work with the three most senior levels of management to clarify and strengthen their respective roles and responsibilities, and to establish appropriate managerial processes. (page 82)</i>	Accepted	Coaching programme was implemented throughout 2006 and completed in 2007. A new senior leadership team has been instituted in 2008. The final report of the executive coach is discussed below.	Completed	

Recommendation as listed in EPMR Report	World Agroforestry Centre Response Accepted or not accepted	Implementation		
		Milestones	Progress Achieved	Target Date of Completion
Recommendation 11 <i>World Agroforestry Centre urgently recruits a qualified and experienced professional Human Resources manager, whose training and experience cover the entire spectrum of HR services, including staff management, staff development, but also compensation and benefits. (page 63).</i>	Accepted	New HR Manager was appointed in 2007. HR policies and practices are being aligned with ILRI. Discussions are in progress with ILRI for their new HR Director to lead in developing the joint higher-order HR strategic issues between the two Centres.	Completed	
Recommendation 12 <i>World Agroforestry Centre appoints a suitably qualified and experienced Chief Operations Officer (at the level of ADG-Operations) with overall responsibility for Financial Services, Human Resources, Operations, a Joint Services Unit to be established with ILRI and all other administrative services. (page 102)</i>	The response to this recommendation will be addressed jointly with the response to recommendation 15 (see below).	Completed, 2007; a new Director of Finance and Operations was appointed to SLT in 2007; HR oversight is with the DDG; Joint Services alignment with ILRI has been proceeding smoothly since 2006	Completed	
Recommendation 13 <i>The Office of Strategic Initiatives be repositioned as a unit reporting directly to the DG and assisting the Office of the DG principally in resource mobilization and external relations. (page 101)</i>	Accepted	Completed 2007.	Completed	
Recommendation 14 <i>A Joint World Agroforestry Centre-ILRI Corporate Services Unit be established as soon as possible, including IT, Research Support and Communications. (page 58, 59, 66, 69)</i>	Accepted	Completed for the joint IT Unit in 2007; completed for the Research Methods Group in 2007; a new Communications Director was recruited in 2007, and use of the CGIAR Media Unit at ILRI has recommenced	Completed	
Recommendation 15 <i>World Agroforestry Centre moves to the following revised organizational structure and staffs it appropriately. (page 102)</i>	Accepted. This response relates to both recommendations 12 and 15.	Completed 2006, and has been further refined with the installation of the new SLT in 2008. The Board reviewed and approved each stage of the restructuring processes in 2006, 2007 and 2008.	Completed	