Agroforestry Working Paper no.1

# Advancing Agroforestry on the Policy Agenda

## A guide for decision-makers

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## Dedication

*This book is dedicated to Michelle Gauthier, a forestry officer at the FAO Forestry Department, who passed away suddenly in February 2013. Michelle championed urban forestry and agroforestry as important means for improving the livelihoods of millions of peoples, and she was the driving force in the publication of this book.*

*She will be sorely missed.*

# FOREWORD

Agroforestry systems include both traditional and modern land-use systems in which trees are managed together with crops and/or animal production systems in agricultural settings. Agroforestry is practised in both tropical and temperate regions, where it produces food and fibre, contributes to food and nutritional security, sustains livelihoods, alleviates poverty, and promotes productive and resilient cropping and grassland environments. Agroforestry systems may also enhance ecosystems by storing carbon, preventing deforestation, increasing biodiversity, protecting water resources and reducing erosion. In addition, when applied strategically on a large scale, agroforestry enables agricultural lands to withstand weather events, such as floods and drought, and climate change.

Even though these benefits justify increased investment in the development of agroforestry systems, the sector is disadvantaged by adverse policies, legal constraints and a lack of coordination between the governmental sectors to which it contributes – namely, agriculture, forestry, rural development, environment and trade. It has not been addressed sufficiently in policy formulation, and nor has it been integrated into land-use planning or rural development programmes. Thus, the potential of agroforestry to enrich farmers, communities and, by extension, national economies has not been fully exploited.

To promote agroforestry in national policy frameworks and boost its impact, the Forestry Department of the Food and Agriculture Organization of the United Nations (FAO) – in cooperation with the World Agroforestry Centre (ICRAF), the Tropical Agricultural Research and Higher Education Centre (CATIE) and the Agricultural Research Centre for International Development (CIRAD) – has prepared this guide, designed to assist countries to support conditions that will optimize agroforestry's contribution to national development.

**Eduardo Mansur**
**Director**
**Forest Assessment, Management and Conservation Division, FAO Forestry Department**

# ACKNOWLEDGEMENTS

This document is the result of a multi-institutional collaboration involving specialists from various disciplines worldwide. It was initiated by the FAO-Finland Sustainable Forest Management in a Changing Climate Programme (GCP/GLO/194/MUL) and also received financial support from the Government of Belgium. Michelle Gauthier from FAO Forest Assessment, Management and Conservation Division, was responsible for coordination and supervision of the document, which benefited from close collaboration with CATIE, CIRAD and ICRAF.

An open inception workshop with more than 30 experts, held in Rome on 7-8 June 2010, benefited from the advice of two senior consultants: Jean-Marc Boffa and Gérard Buttoud. A participatory process was put in place, with a task force coordinated by Gérard Buttoud (University of Tuscia, Italy) and composed of Frank Place and Oluyede Clifford Ajayi (ICRAF), Emmanuel Torquebiau (CIRAD), Guillermo Detlefsen (CATIE) and Michelle Gauthier (FAO). A questionnaire was sent to specialists in several target countries and 66 experts responded, both from government administrations and non-governmental organizations.

At a taskforce workshop held in Rome on 15–17 March 2011, preliminary results of the questionnaires were presented and participants agreed on a process for developing the policy guidelines and choosing country case studies. The guidelines would not have been as rich without the case studies that were prepared, and special thanks are due to the case-study authors: André Luiz Rodrigues Gonçalves, Martin Meier, Andrew Miccolis, Roberto Porro and Jorge Luiz Vivan (Brazil), Divine Foundjem Tita (Cameroon), Francisco Casasola Coto, Guillermo Detlefsen and Muhammad Akbar Ibrahim (Costa Rica and Guatemala), Carla Cardenas Monroy (Ecuador), Kiros Meles Hadgu (Ethiopia), Emmanuel Torquebiau (France), J. Christine Wulandari (Indonesia), Peter Gachie, Simon K. Kage, Frank Place and Philip W. Wamahiu (Kenya), Phiri Innocent Pangapanga and Oluyede Ajayi (Malawi), Julio Ugarte (Peru), Roberto Visco (Philippines), Luther Lulandala (Tanzania) and Gillian Kabwe (Zambia). The unedited final reports of these case studies, which are listed in the bibliography, are available on demand by contacting FAO. They will be published in 2013 as part of the FAO "Agroforestry Working Paper" series.

Gérard Buttoud synthesized the various case-study contributions. The peer review process benefited from substantial contributions by external experts and institutions, including Frank Boteler, Jennifer Conje, Hubert de Foresta, Elise Golan, Michael Idowu, Gillian Kabwe, Luther Lulandala, Andy Mason, Andrew Miccolis, Georges Mountrakis, Constance Neely, Linda Parker, Roberto Porro, Sara Scherr, Michael Schoeneberger, Rita Sharma, Richard Straight, Bruce Wight, Christine Wulandari and Jianchu Xu. From FAO, the following officers contributed to the peer review process: Carolin Anthes, Anne Bogdanski, Julien Custot, Theodor Friedrich, Jean Gault, Henri George, Paolo Groppo, Fred Kafeero, Irina Kouplevatskaya-Buttoud, Lars Gunnar Marklund, Ewald Rametsteiner, Cesar Sabogal and Marja Liisa Tapio Bistrom.

Thanks are also owed to Andréanne Lavoie, Ilaria Doimo and Laurence Houssou (junior professionals), who efficiently dedicated their short-term internships to this project.

# EXECUTIVE SUMMARY

Agroforestry systems include both traditional and modern land-use systems where trees are managed together with crops and/or animal production systems in agricultural settings. When designed and implemented correctly, agroforestry combines the best practices of tree growing and agricultural systems resulting in more sustainable use of land. Agroforestry takes place in both tropical and temperate regions, producing food and fibre for better food and nutritional security. It also sustains livelihoods, alleviates poverty and promotes productive, resilient agricultural environments. In addition, when practised at scale, it can enhance ecosystems through carbon storage, prevention of deforestation, biodiversity conservation, cleaner water and erosion control, while enabling agricultural lands to withstand events such as floods, drought and climate change.

The potential of agroforestry to contribute to sustainable development has been recognized in international policy meetings, including the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD), justifying increased investment in its development.

Yet agroforestry continues to face challenges such as unfavourable policy incentives, inadequate knowledge dissemination, legal constraints and poor coordination among the multiple sectors to which it contributes. Nor is it sufficiently addressed in national policy-making, land-use planning and rural development programmes. As a result, its potential contribution to the economy and sustainable development goals has not been fully recognized or exploited. One of the policy challenges facing agroforestry in many countries is the emphasis on monoculture food, industrial agricultural crops and mechanized farming (often subsidized) discouraging the integration of trees into farmland. Moreover, in some countries, the bureaucracy involved for accessing both land and tree-based products, combined with land ownership problems, creates long-term uncertainty that further restricts agroforestry initiatives. Farmers may also perceive trees as incompatible with their farm operations and may not benefit from programmes which offer training or access to tree related inputs (e.g. germplasm) to the extent that they do for other agricultural enterprises. A lack of knowledge of the advantages of agroforestry inadvertently leads to the perception that it is peripheral to agriculture and is a low output subsistence system.

The development of agroforestry is often impeded by legal, policy and institutional arrangements, its environmental benefits are mostly unrewarded, and investment is discouraged by the long time between adoption and returns. Policies are needed, therefore, to promote the benefits of agroforestry. The general objective of this guide is to assist countries to develop policy, legal and institutional conditions that facilitate the adoption of agroforestry and recognize its contribution to national development. This includes better communication between sectors and the mainstreaming of agroforestry in national policies.

These guidelines were developed from a mix of workshops, structured interviews with experts, and detailed national case studies from both the developed and developing world.

According to the lessons learned, there are four critical conditions that encourage agroforestry:

- it should be beneficial to farmers and other land users;
- there must be security of land tenure;
- inter-sectoral coordination is essential;
- good governance of natural resources is crucial.

In conclusion, the guidelines provide ten tracks for policy action:

1. **Spread the word.** Raise awareness of the benefits of agroforestry systems to both individual farmers and global society.
2. **Revise the context.** Appraise and reform unfavourable regulations and legal restrictions.
3. **Secure the land.** Clarify land-use policy goals and regulations.
4. **Create a new approach.** Elaborate new agricultural policies that take into account the role of trees in rural development.
5. **Organize and synergize.** Organize intersectoral coordination for better policy coherence and synergies.
6. **Provide incentives.** Create a clear context for payments for environmental services.
7. **Develop markets.** Strengthen farmers' access to markets for tree products.
8. **Communicate the know-how.** Enhance stakeholder information.
9. **Include the stakeholder.** Formulate or strengthen policy based on local people's needs and rights.
10. **Govern wisely.** Engage in good governance of rural activities.

It is expected that the actions outlined above will contribute to the formulation of coherent, interactive and proactive public policies that support the development of agroforestry systems.


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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AFAF | French Agroforestry Association [Association Française d'Agroforesterie] |
| CATIE | Tropical Agricultural Research and Higher Education Centre [Centro Agronómico Tropical de Investigación y Enseñanza] |
| CBD | Convention on Biological Diversity |
| CIRAD | Agricultural Research Centre for International Development [Centre de Coopération Internationale en Recherche Agronomique pour le Développement] |
| COP | Conference of the Parties |
| FAO | Food and Agriculture Organization of the United Nations |
| GFG Policy | Grain for Green Policy (China) |
| FONAFIFO | National Forestry Financing Fund [Fondo Nacionale de Financiamiento Forestale] (Costa Rica) |
| ICRAF | World Agroforestry Centre |
| IFES | integrated food-energy system |
| iLUC | indirect land-use change |
| IPCC | Intergovernmental Panel on Climate Change |
| NAMA | Nationally Appropriate Mitigation Action |
| NAPA | National Adaptation Plan of Action |
| NGO | non-governmental organization |
| NOEL Program | Nurseries of Excellence Program |
| NSCA | National Steering Committee on Agroforestry (Malawi) |
| PINPEP | Programme of Forestry Incentives for Owners of Small Plots of Land used for Forestry and Agroforestry [Programa de Incentivos para Pequeños Poseedores (as) de Tierras de Vocación Forestal o Agroforestal] (Guatemala) |
| PES | payment for environmental services |
| UNCCD | United Nations Convention to Combat Desertification |
| UNFCCC | United Nations Framework Convention on Climate Change |
| USDA | United States Department of Agriculture |

# LIST OF BOXES

# The guidelines: what, who and why?

These guidelines are aimed primarily at all those involved in making policies at national and regional levels, such as decision-makers, civil servants and key policy advisors. Their function is to support increased recognition of agroforestry benefits, facilitate the development of policies promoting agroforestry systems, and educate those that constrain agroforestry at the national level.

The guidelines present a set of principles rather than prescribed methods. They advise how to integrate agroforestry into policies, particularly helping countries to formulate policies for their specific conditions. They provide examples of good practices and success stories, as well as lessons learned from challenges and failures.

They are designed as an entry point for policy creation or change. In cases where agroforestry policy is completely absent, they can assist in creating awareness of agroforestry systems and show how policy issues can be addressed, through innovative policy design taking trees, crops and animal production into account. In other cases, where agroforestry is recognized in policy frameworks, the guidelines can assist in improving the economic, social and policy context, so that incentives for practising agroforestry are strengthened.

Indonesia, Banada Aceh – A woman buying fruits from a vendor at an open air market. Tree crops play an important role in the household economies of rural Aceh. As a result of the tsunami and civil conflict many tree gardens were damaged resulting in insufficient supply of fruits and vegetables. ICRAF and WINROCK's Nurseries of Excellence (NOEL) Program aims to support post-tsunami Aceh rehabilitation and reconstruction efforts by improving tree gardens with productive tree crops produced in community-based nurseries of excellence.

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# Agroforestry: strategy and policy

## Why develop agroforestry?

Almost half the world's agricultural lands has at least a 10 percent tree cover, suggesting that agroforestry, an integrated system of trees, crops and/or livestock within a managed farm or agricultural landscape, is widespread and critical to the livelihoods of millions of people.

In fact agroforestry is significant in the production of both local commodities (such as fuelwood, timber, fruit and fodder) and global ones (such as coconut, coffee, tea, cocoa, rubber and gum). It can also play a strategic role in helping many countries meet key national development objectives, especially those related to poverty eradication, food security and environmental sustainability. In towns and villages, its positive outcomes can be seen in food, fuelwood and watershed management, contributing to a more resilient food system.

Agroforestry is present throughout tropical regions of the world and to a significant extent in temperate areas. Within broad agroforestry systems, such as the parklands of West Africa, there are a diversity of species and practices, such as intercropping of fruits with cereal crops.

### Optimizing agricultural production and environmental benefits through agroforestry

When designed and implemented correctly, agroforestry combines the best practices of tree growing and agricultural systems, resulting in more sustainable use of land.

For example, agroforestry:

- helps protect and sustain agricultural productive capacity;
- ensures food diversity and seasonal nutritional security;
- diversifies rural incomes;
- strengthens resilience to climatic fluctuations;
- helps perpetuate local knowledge and social and cultural values.

The combination of trees, crops and livestock mitigates environmental risk, helps create a permanent soil cover against erosion, minimizes damage from flooding and enhances water storage, benefitting crops and pastures. In addition, trees bring nutrients from deeper soil layers,

or in the case of leguminous trees, through nitrogen fixation, which can convert leaf litter into fertilizer for crops.

Agroforestry serves to improve the resilience of farmers and increase their household income through the harvesting of diverse products at different times of the year. It also brings job opportunities from the processing of tree products, expanding the economic benefits to rural communities and national economies.

Agroforestry systems can be conceived for spaces varying from plots to farms to landscapes. At plot level, farmers may combine nitrogen-fixing trees with cereal crops. At farm level, they may plant trees in woodlots or along boundaries, and at landscape scale communities may rehabilitate degraded areas through trees and other vegetation. Effective agroforestry systems make the most of positive interactions between their various components, so that the final product is more valuable than in the absence of trees, while the risks of failed harvests and dependence on chemical inputs are reduced. Even at plot level, where trees may compete directly with crops, experiments demonstrate that in well-managed agroforestry plots, trees have added value that exceed any loss in crop production value. However, these outcomes are not guaranteed, so attention must be paid to the type of agroforestry system used and species selected.

### Box 1 – Cameroon: mixing fruit trees and cocoa – the benefits

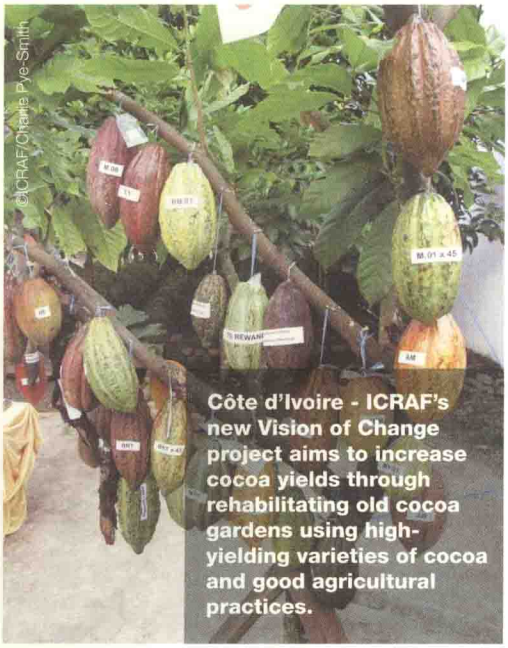
The association of fruit trees with cocoa or coffee plantations in Central and South Cameroon is a traditional way to enhance land and resource use. This system was developed during the mid-1980s and 1990s, when the price of major export crops, including coffee and cocoa, dropped.

This agroforestry system:

- reduces land degradation and provides beneficial shade cover to cocoa plants, while playing an important role in stocking carbon and thus mitigating climate change;
- provides an important alternative source of income when other main cash crops are not in production, thereby contributing to regular and stable rural incomes.

Cocoa agroforestry systems, enriched with fruit trees, both indigeneous and exotic, may increase annual household income substantially. This system is very helpful to small-scale farmers with limited land.

Today, some of these fruit tree-based agroforestry systems are ageing and need to be renewed to maintain the optimum benefits.



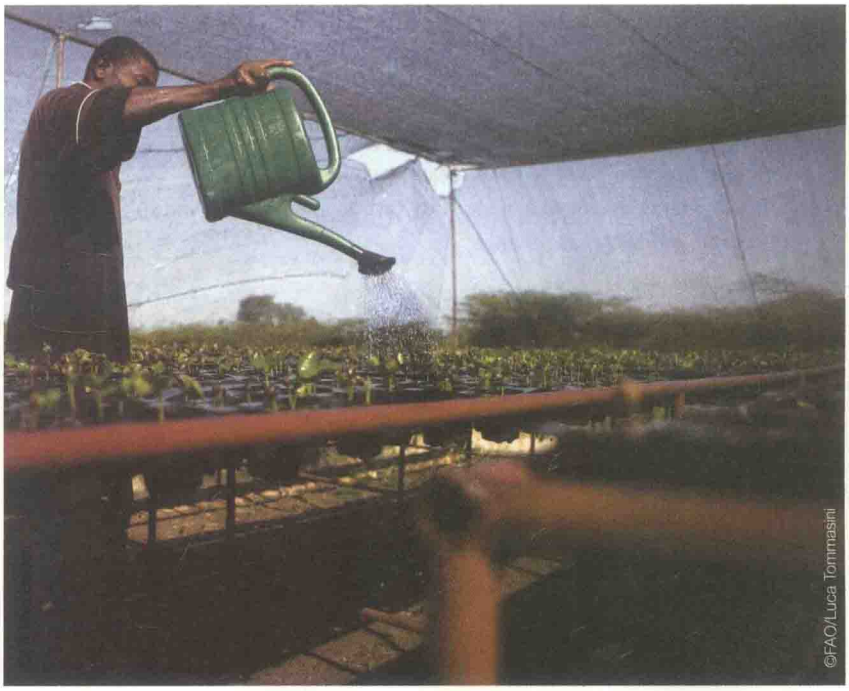

**Côte d'Ivoire - ICRAF's new Vision of Change project aims to increase cocoa yields through rehabilitating old cocoa gardens using high-yielding varieties of cocoa and good agricultural practices.**

## Opportunities for agroforestry development

The potential of agroforestry to contribute to sustainable development has been recognized in international policy meetings. The UNFCCC and the Intergovernmental Panel on Climate Change (IPCC) increasingly acknowledge it as a component of climate-smart agriculture. During the 2011 Conference of the Parties (COP)17 meeting in Durban, agroforestry was frequently mentioned as having a strong potential for climate change adaptation and mitigation. Furthermore, National Adaptation Plans of Action (NAPAs) and Nationally Appropriate Mitigation Actions (NAMAs) talk of agroforestry as an important component in agricultural sector actions.

In addition, the United Nations Convention to Combat Desertification (UNCCD) acknowledges agroforestry's potential to control desertification and rehabilitation. It is also seen as an important practice in the ecosystem approach promoted by the CBD and contributes to its Global Strategy for Plant Conservation.

In a number of countries there have been attempts to harness agroforestry potential by improving the coordination of national activities, through the development of national information networks. New opportunities for agroforestry are also emerging, such as within the miombo woodlands (savannah) of central, eastern and southern Africa. This area covers 3 million $km^2$ over 11 countries and contributes to the livelihoods of some 100 million low-income persons. Similar is the expansion of natural regeneration of dry degraded land in the Sahelian area of Africa with the potential to mitigate climate change and increase rural income; in Niger, new legal conditions encouraged farmers to manage natural tree regeneration, leading to over 5 million hectares of newly generated parkland systems. In the United States, where agroforestry is not universally adopted, there is growing recognition of its ability to help farmers, ranchers, woodland owners and indigenous people to integrate productivity and profitability with environmental stewardship, culture and traditions.




**Haiti, Fort-Liberté – The manager of a local nursery watering seedlings provided by FAO along with tools and equipment to better manage the nursery. The aim of the project is to contribute to the growth and diversification of agriculture, livestock and agroforestry and improve natural resources management for the municipalities of Fort Liberté, Capotille, Ouanaminte, Ferrier, Mont-Organisé.**

**Box 2 – Agroforestry in IFES development**

Integrated food-energy systems (IFES) present numerous benefits, especially for poor rural communities. By maximizing the synergies between wood and crop production, agroforestry may strongly contribute to the success of both.

In these systems, the management of agroforestry plots involves regular pruning. The pruned branches are used as ground cover (mulch) and serve in traditional kitchens for cooking, as well as a resource for pyrolysis. In the latter process, the branches are converted into biochar, which, when mixed with the soil, improves its structure, fertility and ability to store moisture. Using the litterfall of trees to grow crops, farmers save money that is not invested in fossil energy and may use these savings to buy inputs such as improved seed, to increase productivity.

Moreover, combining agricultural crop and fuelwood production saves woodland trees and frees up labour, especially of women, who traditionally collect wood. For example, the "pigeon pea" IFES model in Malawi is a farming system based on intercropping. Smallholder farmers combine the production of staple foods (mainly maize, sorghums, millets) and pigeon peas, a nitrogen-fixing dual purpose plant, which delivers protein-rich vegetables for human consumption, fodder for animals and woody material for cooking. Depending on the variety, the stove technology and the type of meal, one local plant can provide enough energy for a family of five to cook one or two meals in a day.

IFES also provides new opportunities to mitigate climate change, especially through indirect Land-Use Change (iLUC), which increases land and water productivity, thereby also improving food security.

Some frameworks are needed for successful IFES development. In addition to technical means, there is a clear need to improve the policy and institutional environment supporting such systems.

## Conditions for agroforestry development

While the actual and potential benefits of agroforestry have been well documented in several parts of the world, it is important to note that agroforestry is not a total panacea against food insecurity and environmental degradation. Even where it would make a valuable contribution, there are a number of conditions that could work against its widespread adoption by farmers.

To be effective and sustainable, agroforestry needs two types of integration: agriculture with trees, and trees with people. To succeed, this integration must have suitable underlying conditions, which may be technical, economic and social.

From a technical perspective, not all combinations of annual and perennial species are viable, and certain tree practices or species may overly compete for water and harbour crop pests – thus suitable species and practices must be used. From an economic perspective, farmers may be interested in tree products only when they do not decrease crop production, or where agroforestry does not limit their ability to farm with large equipment. In addition, farmers need to be informed about the profitability of any new system.

Socially, any innovation needs to be accepted by the groups directly involved in the new activities. Different societies and cultures may require different conditions for success. Within each society, there are early adopters and innovators who can show other farmers the benefits of changing to a system that includes agroforestry. However, more research is needed to determine the factors driving the adoption of agroforestry practices in various rural contexts.

Because agroforestry systems are diverse, vary from one place to another and can be observed at different scales, any decisions regarding management, policy or governance should be based on a rigorous analysis of the advantages of different scenarios. Decisions should be aimed – through specific criteria and indicators of minimum required standards – towards successful agroforestry development that meets local and national priorities. This cannot be done without the clear and sustained involvement of stakeholders, as well as of those with competing interests in existing natural resources.

## Box 3 – Limits on timber harvesting in Central America

A recent study (Detlefsen and Scheelje, 2011) analyses the body of laws and policies governing the environmental and forestry sectors in seven countries of Central America. Regulation and control imposed by governments can either facilitate or constrain the development of agroforestry.

Three countries (Honduras, Nicaragua and Panama) have complex, tedious and demanding permit procedures for the harvesting and transport of timber produced on farms. Belize, El Salvador and Guatemala have designed a simplified permit protocol, although in practice, only Belize and Guatemala have an operationally simplified procedure. In Costa Rica, a permit is easy to obtain only if the harvest involves less than ten trees per year per farm. Similar regulation of tree products on farms is common throughout the tropics.


**Wood harvesting in the Amazon. The majority of wood produced in the Amazon regions is still harvested in a way that is detrimental to the forest. Governments can support agroforestry systems by facilitating permit procedures for harvesting of timber produced on farms.**

## Barriers to agroforestry development

Although there is a growing body of scientific literature to illustrate the benefits of agroforestry, there are also obstacles to its development and expansion. The barriers impeding agroforestry discussed in the following sections are particularly significant.

### Delayed return on investment and under-developed markets

While the conventional production of agricultural crops destined for the market is expected to generate immediate income, investing in agroforestry may present various disadvantages.

Although trees become profitable as they produce positive net present values over time, the breakeven point for some agroforestry systems may occur only after a number of years. This implies that, unlike conventional agricultural, farmers may have to absorb initial net losses before benefitting from their investment, thereby reducing their enthusiasm for investing in agroforestry. Also, many agriculture projects and programmes need to demonstrate an impact within a relatively short period of time to be considered "successful".

Furthermore market information systems introduced in some countries, often do not include tree products. As such, markets for tree products are both less efficient and less developed than for crop and livestock commodities and value chains related to agroforestry systems receive little support.

The lack of well-developed markets for agroforestry products, combined with the emphasis on immediate returns seen in some agriculture projects and the difficulty many farmers face in investing in activities that have a delayed financial return, force many farmers to rule out agroforestry as a viable option.

### Emphasis on commercial agriculture

Agricultural policies can discourage farmers from practising agroforestry. Incentives for agriculture often promote certain agricultural models, such as monoculture systems, and tax exemptions are usually aimed at industrial agricultural production. The amount of credit supporting this may impact negatively on agroforestry development such as in the promotion of oil palm plantations.

In Brazil, for instance, sizeable tax cuts are offered to farmers producing biofuels provided that a portion of the feedstock is sourced from smallholders, regardless of the cropping system adopted. Similar incentives are currently encouraging the rapid extension of oil palm plantations in vast areas of the Brazilian Amazon.

Agricultural product price supports or favourable credit terms which are granted for certain agricultural activities but hardly ever for trees, are also discouraging agroforestry adoption. By not including agroforestry in the benefit package the system is discouraged, even while agricultural production becomes more economically dependent on imports and less ecologically sustainable. Zambia and Malawi are good examples of countries where subsidies for fertilizer are a disincentive for farmers to adopt more sustainable agroforestry systems.