



Supporting agroforestry adoption for climate-smart landscapes

Lessons from the Working Landscapes programme

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- Contributors: Alphonse Maindo, Charles Mpoyi and Sagesse Nziavake (Tropenbos DR Congo); Tran Nam Thang, Nguyen Thi Quynh Thu, and Tran Huu Nghi (Tropenbos Viet Nam); Kwame Appiah Owusu and Kwame Obeng-Hinne (Tropenbos Ghana); Edi Purwanto, Triana Aryanto, and Kuncaraningrat Edi Yoga (Tropenbos Indonesia), and Rosalien Jezeer and Jinke van Dam (Tropenbos International)
- Layout: Juanita Franco (Tropenbos International)
- Photos: Cover: Agroforest in Thailand – ©Kalyakan - stock.adobe.com; page 4: Tapping rubber near Mekar Raya village, West Kalimantan, Indonesia – Irpan Lamago; page 8: Agroforest in the Amazon, Brazil – ©Alexandre Laprise - stock.adobe.com; page 13: Cocoa agroforest in Bafwasende, DR Congo – Charles Mpoyi; page 17: Coffee agroforestry plot in Viet Nam – ©stock.adobe.com; page 21: Cocoa pods collected from an agroforest in Ghana – Nature and Development Foundation; page 25: Tapping rubber near Kamora Raya village, Ketapang, West Kalimantan – Irpan Lamago; page 28: Agroforest plot, West Kalimantan, Indonesia – Roderick Zagt.



Tropenbos International
Horaplantsoen 12
6717LT Ede
the Netherlands
tropenbos@tropenbos.org
www.tropenbos.org

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Executive summary

Agroforestry—the integration of trees on farms—can contribute to resilient livelihoods, climate change mitigation and biodiversity conservation. As part of the Working Landscapes programme, several Tropenbos International (TBI) members have therefore been promoting smallholder agroforestry, as a key component of climate-smart landscapes.

Tropenbos DR Congo has been supporting communities of shifting cultivators to adopt cocoa agroforestry practices within community forest concessions. Tropenbos Ghana has been supporting the re-integration of trees in cocoa farms, to decrease farmers' vulnerability to changing weather conditions and prolong the lifespan of cocoa trees. Tropenbos Indonesia has been supporting indigenous farmers to revitalize their rubber agroforests, to make them more competitive with monoculture oil palm cultivation. And Tropenbos Viet Nam has been supporting women farmers to cultivate coffee in mixed systems, to help restore degraded lands.

Much of their work focussed on achieving the necessary conditions for agroforestry adoption and upscaling. With this report, we aim to reflect on, and learn from their experiences. The first chapter introduces the (potential) benefits of agroforestry and identifies three general conditions for agroforestry adoption: (i) knowledge; (ii) government support; and (iii) economic feasibility. The subsequent chapters provide accounts of the experiences in DR Congo, Ghana, Indonesia and Viet Nam, based on interviews with TBI staff members. Each chapter describes the main interventions, achieved results, and future priorities. Below we summarize the findings, for each of the general conditions.

Knowledge

The TBI members in DR Congo, Ghana, Indonesia and Viet Nam consider access to knowledge a key condition for the adoption of agroforestry practices. They all adopted a bottom-up collaborative approach

to knowledge development and dissemination. They worked closely with farmers, combining science with local knowledge. Field-level training and workshops addressed technical aspects, building skills that were directly applicable, e.g. related to the introduction of additional species, minimizing the use of chemical fertilizers, improved harvesting techniques, as well as post-harvest treatment and marketing. The training courses helped to increase young farmers' knowledge and awareness of the long-term benefits of diversified agroforestry practices and increased their interest in traditional land-use systems. Field-level training was also an entry point to actively engage women, based on their traditional knowledge of, and experience with maintaining trees in home gardens, and trading non-timber forest products.

Farmers participating in the training courses started diversifying their fields and applying new techniques for planting, harvesting and processing. In this way, access to knowledge directly resulted in better land-use practices. The TBI members also applied strategies to further disseminate knowledge in the landscapes, e.g. by training agroforestry champions to help disseminate best practices in other communities, and organizing exchange visits to stimulate farmer-to-farmer learning, as well as curriculum development. Moreover, by engaging extension agencies—which have the mandate to provide technical support to farming communities within their jurisdictions—TBI members ensured that knowledge about sustainable agroforestry practices was disseminated beyond the focus communities.

For future programmes, there is a need to focus on building business and organizational skills among agroforestry farmers' organizations, as this remains one of the main bottlenecks for upscaling. Future programmes would also have to monitor developments in the landscape and analyse how they influence agroforestry practices. This is important because contextual changes are likely to influence land-use practices. For example, increasing land

scarcity could be an incentive for intensification, while the development of markets for environmentally friendly products and services could be an incentive for diversification and tree planting. Such developments must be better understood, to inform intervention strategies and policies. There is also a need to further deepen our understanding of the relation between land-use choices at the plot level and environmental functions at the landscape level, and to learn how integrated landscape initiatives can better support the upscaling of agroforestry.

Government support

The four TBI members have been working with local and national governments, to enhance their support for agroforestry, as a key condition for upscaling agroforestry practices. This often required the changing of mind-sets. Among government officials in agricultural departments the idea of rural development tends to follow the industrial model, based on specialization through improved crop varieties, external inputs and the strict segregation of agriculture and forestry. Tropenbos members actively engaged government officials in agroforestry training and workshops at community level, which helped to broaden their perspective, acknowledging the long term benefits of diverse and multifunctional production models. It also allowed government technicians to experience first-hand the benefits of a collaborative bottom-up approach to extension services, based on joint experimentation and learning, with specific attention for women and youth.

In addition to engaging government officials in community level training, workshops with government agencies at district and provincial levels were organized. As such, TBI members managed to raise higher level attention for the potential benefits of agroforestry and the need for a more integrated approach to planning. In DR Congo, Ghana and Viet Nam, this resulted in concrete opportunities for TBI members to work with government agencies, helping them to integrate agroforestry objectives in land-use and development plans. TBI members have also been drawing governments' attention to the regulatory changes that are required to facilitate further upscaling, such as legally allowing agroforestry farmers to trade timber and other forest products grown in their own fields, and to the need to secure tenure for agroforestry farmers. In some cases, TBI members assisted communities with applying for collective forest tenure rights, increasing their tenure security, as an incentive for planting and maintaining trees.

As part of the Working Landscapes programme, TBI members managed to guide the attention of local government agencies towards the benefits of agroforestry. But more needs to be done. Future programmes need to focus on facilitating a transition among all relevant government agencies towards a more integrated approach to rural development, climate change and conservation; an approach that pays attention to multifunctionality at the landscape level, and the role of agroforestry in achieving multiple objectives. This would imply, among others: the acceleration of land and tree tenure security to create incentives for smallholder agroforestry, while preventing illegal conversion of forests; better landscape-level planning and enforcement; and the development of smallholder agroforestry support programmes in the context of national climate and biodiversity ambitions.

Economic feasibility

TBI members in DR Congo, Ghana, Indonesia and Viet Nam worked on the conditions to increase the economic feasibility of diverse agroforestry systems. This involved a range of activities. They improved agroforestry practices at the farm level, by introducing new species with commercial value, better harvesting techniques, and options for post-harvest treatment and processing. They also helped farmers to improve their access to markets for agroforestry products, among others through training on entrepreneurship, the organization of farmers in larger groups to increase their bargaining power vis-a-vis buyers, and facilitating connections between farmers and private processing and trading companies. Special attention has been paid to engaging young farmers, and their potential to help develop new markets, for example those for organic products in urban areas. In Viet Nam, a start was made with exploring options for ways in which diverse coffee agroforestry could be promoted through the national Payments for Forest Environmental Services (PFES) programme.

In Indonesia and Ghana, TBI members explicitly aimed to improve agroforestry farmers' access to credit. Tropenbos Indonesia found that formal financial institutions did not have mechanisms in place to provide credit to a newly established collective of rubber farmers, and then decided to provide a zero-interest loan themselves. With this loan, the collective could start operating, bypassing intermediaries, resulting in higher prices for rubber agroforestry farmers. Tropenbos Ghana facilitated community level Village Savings and Loan Associations (VSLAs), in which villagers come together to save and lend money

among themselves. The VSLAs have successfully enabled agroforestry farmers to access small loans for investments in diversification and marketing.

The experience in the Working Landscapes programme suggest that community saving groups are efficient in improving farmers' access to credit in the short term, and future programmes can build on that. To enable access to larger loans, future programmes will also have to work with financial institutions on innovative credit mechanisms, while simultaneously strengthening the capacities among farmer

organizations to develop business plans. There is also a need to experiment with payments for environmental services to increase the economic feasibility of diverse agroforestry. Finally, future programmes will need to make sure that increased national and international funding for restoration will go to providing economic incentives for locally owned and diverse agroforestry practices, providing benefits in terms of livelihood resilience, climate change mitigation and biodiversity conservation.

Lessons learned

- Rather than fixating on preconceived ideas of 'ideal' agroforestry systems, it is necessary to work together with local farmers to develop agroforestry models that align with local needs, preferences, customs and the ecological context. It is crucial to remain flexible, so that strategies can be adapted along the way, in response to changes in local preferences and developments in the landscape.
- Actively engaging government officials in agroforestry projects can help broaden their perspectives on rural development, with greater attention to the benefits of smallholder agroforestry and integrated landscape management. Also, engaging extension officers in developing field-level training courses can trigger changes to government extension programmes, so they pay greater attention to multifunctionality, the benefits of integrating trees in farm systems, local knowledge and experiences, and the role of women and youth. It can be an effective way to upscale agroforestry practices.
- Access to markets for the variety of products and services provided by diverse agroforests is crucial to increase the economic competitiveness of agroforestry in comparison to monoculture plantations.
- Increased economic feasibility of agroforestry could lead to a higher demand for land, potentially putting pressure on forests as more farmers may be attracted to open new fields. It is therefore critical to combine support for agroforestry with developing value chains for deforestation-free products, and investments in land-use planning, monitoring and enforcement.



1. Introduction

Globally, the demand for agricultural crops continues to rise. Smallholders in tropical regions are responsible for producing a significant portion of these crops, but they are facing mounting challenges related to environmental degradation and climate change, among others. There is a need to support agricultural systems that can sustain the livelihoods of these smallholders without jeopardizing the functioning of ecosystems. The integration of trees into farms—known as agroforestry—offers great potential. It can contribute to livelihood resilience, climate change mitigation and biodiversity conservation. However, several conditions need to be met to support the adoption of such practices.

1.1 Background

In the 20th century, agricultural research and technological innovation resulted in the development of improved seed varieties, synthetic fertilizers and pesticides, which enabled the industrialization of agriculture, based on specialization and intensification. This became known as the green revolution. It resulted in an enormous rise of agricultural production levels, which increased the available calories per person for the growing urban populations. Due to the success of industrial agricultural production, it was adopted as the dominant model for rural development.

In the world's tropical regions, monocultures of agrocommodities such as oil palm, soy, coffee and cocoa are rapidly expanding, both by agricultural companies and smallholders. However, the negative consequences on the environment and society are increasingly clear, such as the depletion and contamination of water and increased dependence on chemical inputs. Moreover, monoculture plantations often replace forests and trees in the landscape, increasing carbon emissions, lowering carbon sequestration, and decreasing overall diversity, which enhances the vulnerability of both ecological systems and people. The dominant production model thus contributes to climate change, while at the same time decreasing the capacity of people to adapt to its effects. A lose-lose scenario.

But it does not have to be that way. By supporting sustainable management of forests and trees at the landscape level, synergies between mitigation and adaptation can be achieved, while at the same time contributing to biodiversity conservation and food security (1,2). This has become known as the climate-smart landscape (3–5). To support climate-smart landscapes, the Working Landscapes programme of the Tropenbos International network (Box 1) promotes diversified agricultural production systems, in particular agroforestry.

Box 1. The Working Landscapes programme of Tropenbos International

Tropenbos International (TBI) is a network of autonomous organizations, with members in Viet Nam, Indonesia, Ghana, DR Congo, Colombia, Suriname and the Netherlands, and partners in Bolivia, Ethiopia, Uganda, and the Philippines. They each focus on one or more frontier landscapes in tropical forest and dryland areas, where they work with stakeholders to develop and apply locally owned solutions for climate-smart landscapes. The Working Landscapes programme (2019 – 2023) is one of TBI's flagship programmes. It is built around the following three strategic priorities, which are considered the pillars of climate-smart landscapes:

1. **Sustainable land-use practices:** The adoption of more sustainable land-use practices by smallholders, communities, and large scale producers of agricultural and forestry products, in a way that supports local livelihoods, as well as climate change adaptation and mitigation.
2. **Inclusive landscape governance:** An increase in the participation of local people—particularly women and marginalized groups—in decision making processes related to the landscape, ensuring that decisions adequately reflect their knowledge, experiences and interests.
3. **Responsible business and finance:** Private actors effectively implement environmental, social and governance standards and commitments, and promote the inclusion of smallholders in value chains of agricultural and forestry products.

1.2 The benefits of agroforestry

The term agroforestry refers to the integration of trees on farms. In many parts of the world, farmers have been doing this for ages, leading to complex land-use systems that deliver a variety of goods and services. Such agroforestry systems are often diverse and multifunctional, which allows for the optimum management of ecological and economic risks. They tend to be based on local knowledge, fit the local context, and address local needs. Below we distinguish between three key benefits.

1.2.1 Resilient livelihoods

Agroforestry practices have various livelihood benefits for farmers. A mixed agroforestry system typically contains a range of tree species and perennial plants, which can be used for both cash income and subsistence purposes. They often include a variety of food products, such as vegetables, fruits and nuts, which are important for nutrition. The diversity of these systems helps to spread risks. When income from one crop decreases, for example due to a lower market price or a failed harvest, a farmer still has other products to fall back on. It increases farmers' resilience in the face of climate-induced shocks and stresses, such as drought, excess precipitation and extreme temperatures. The integration of trees on farms increases the productivity of crops through nitrogen fixation and increasing soil fertility, without having to rely on external inputs such as inorganic fertilizers and pesticides. Agroforestry systems also provide ecosystem services that help to sustain agricultural production over the long term, as they improve water and nutrient fluxes, provide natural solutions for pest control, reduce erosion by improving water infiltration and reducing surface runoff, and control the microclimate (6–9). Despite these benefits, agroforestry is often perceived as less profitable than monoculture systems. This is partly because the relationship between productivity and financial performance is not as straightforward in complex agroforestry systems compared to monoculture plantations. To get a full picture of the economic returns of a diverse agroforestry system, rather than focussing on the yield of the main cash crop, one has to look at the returns from all products and services generated, as well as the operational costs of maintaining a mature agroforest, e.g. in terms of external inputs (10,11).

Box 2. Gender and agroforestry

In many parts of the world, female farmers produce a major part of the food. They are often responsible for managing household gardens, and for collecting and marketing forest products, such as nuts, spices, and medicinal plants. However, women typically face various challenges to further diversify their income sources and improve their economic empowerment. They often have limitations in terms of land rights, access to extension services and financial credit, influence in decision-making processes related to land use and forest management, and possibilities to travel to markets. There is a growing body of literature highlighting that the explicit consideration of gender in the design and implementation of agroforestry initiatives can help to address gender-specific needs and constraints, promote gender equality and women's empowerment, while increasing food security and improving household nutrition (12–16).

1.2.2 Climate change mitigation

Agroforestry systems help to mitigate climate change, by increasing carbon storage. Trees absorb carbon from the atmosphere and store it in their biomass and in the soil. The amount of carbon that can be sequestered in agroforestry systems depends on various factors, such as the type of trees, the soil type, and management practices. Although agroforestry systems store less carbon than natural forest, they typically store more than pastures and fields with annual crops. By introducing trees on agricultural lands, agriculture can thus become a net sink of greenhouse gases. Moreover, agroforestry systems tend to rely on natural fertilizers and pest control methods. This means, that agroforestry can also reduce greenhouse gas emissions by replacing or reducing the use of synthetic fertilizers and pesticides, which are energy-intensive and contribute to emissions (9,17).

1.2.3 Biodiversity conservation

Agroforestry systems—in particular the more complex systems with multiple strata—can contribute to biodiversity conservation. At the plot level, the heterogeneous perennial vegetation of complex agroforestry systems provides more niches for native flora and fauna compared to monocultures and pastures. This includes functional biodiversity, such as insects and micro-organisms, which are essential for ecological processes such as pollination and biological pest control, and contribute to productivity and stability of the land-use system. At the landscape level, agroforests may function as an extension of the living environment for forest species. They help to create a biodiversity-friendly mosaic of agricultural and natural vegetation, and may function as a biodiversity corridor between remnants of natural forest. When adopted as an alternative to more extensive practices, such as shifting cultivation, agroforestry practices can also help to reduce pressure on the natural forest, as the income per hectare is higher, without depleting the soils, which reduces the need to clear new lands. Finally, agroforests provide fuelwood, timber and other forest products, further reducing the pressure on natural forests (18). The role that agroforests play in terms of biodiversity conservation depends on the landscape in which they occur. In a remote area, agroforests may help to prevent further encroachment into natural forests. In a fragmented landscape, they may help to maintain connectivity between patches of natural forest. In a landscape where little or no natural forest remains, agroforestry areas play a role as a last remaining habitat for forest dependent species.

Box 3. Youth and agroforestry

Farmer populations are aging, and young people are increasingly looking for off-farm income earning opportunities. They may view agroforestry as an unattractive career option. Engaging young people in agroforestry may require dedicated efforts to take away existing barriers that discourage young people to adopt agroforestry practises (e.g. related to access to land and finance) and to stimulate innovation. Young people can bring fresh ideas and new approaches to existing agroforestry practices, enhancing productivity and profitability. Engaging youth in agroforestry can also promote entrepreneurship and economic development in rural areas (19).

1.3 Enabling Conditions

Despite the benefits of complex agroforestry systems in terms of resilience, climate change mitigation and biodiversity conservation, poor farmers may prefer monoculture plantations to maximize short term economic benefits (20). Academic literature identifies a range of factors that would help make agroforestry adoption a more attractive option for smallholders, many of which are related to either one of the following general conditions: (i) knowledge; (ii) government support; and (iii) economic feasibility. Below we will shortly address each, based on a selection of academic literature.

Table 1. Enabling conditions for agroforestry adoption as identified in literature

Conditions	Examples
Knowledge	<ul style="list-style-type: none"> • Funding for agroforestry research • Agroforestry is part of the curriculum in agricultural schools • Extension officers have knowledge of agroforestry techniques
Government support	<ul style="list-style-type: none"> • Government extension services provide training and tree seedlings • Government protects or enhances tenure security of agroforestry farmers • Government integrates agroforestry in development plans
Economic feasibility	<ul style="list-style-type: none"> • Access to markets for a variety of agroforestry products • Access to finance to cover agroforestry establishment costs • Financial compensation for environmental functions of agroforestry systems

1.3.1 Knowledge

The adoption and upscaling of agroforestry practices requires knowledge of agroforestry techniques and their benefits. In many countries this remains a bottleneck. Although funding for knowledge development on agroforestry has been increasing over the last decades, it is still dwarfed by the resources that go towards research on monoculture industrial agriculture. This is also reflected in extension services in the field, where the focus is on production of cash crops in monoculture plantations with improved varieties and external inputs. Often agroforestry is not even recognized as an option for land-management, and national extension services are not equipped to support the adoption and scaling up of agroforestry practices. Extension officers have little knowledge of traditional agroforestry systems as they exist in many landscapes, and their formal education usually pays little attention to the science behind diversification and resilience, and ways to improve productivity while maintaining environmental functions within the land-use system (9,21,22).

1.3.2 Government support

Government support can be a key factor contributing to the adoption of agroforestry practices, for example by providing dedicated extension services, improving access to tree seedlings, and incorporating agroforestry in spatial development plans. In practice, government support is often lacking. The above-mentioned focus on conventional industrial agriculture in research and knowledge development is also reflected in the regulations and policies of many governments. Agricultural policies, land-use planning and rural development programmes tend to favour large scale agricultural plantations. Governments may have close connections to large scale agrocommodity companies, as sources of government revenue. Governments will often provide subsidies for industrial agriculture, but seldom for smallholder agroforestry practices. Existing agricultural and forestry regulations often function as disincentives for agroforestry, for example in the form of strict regulations on harvesting and trade of timber and non-timber forest products. Moreover, the state may not recognize farmers' rights to the land and/or the trees they cultivate, so that agroforestry farmers are not sure they can reap the benefits from their investments (9,21 –24).

1.3.3 Economic feasibility

Agroforestry is more likely to be adopted when it is economically feasible and competitive with alternative land-use options. But there are several bottlenecks. First, farmers may not have access to attractive markets. Diverse agroforests typically produce a wide range of marketable products, but in relatively low volumes, which implies relatively high transaction costs to get them to the market. Some products (like fruits) may perish quickly, which can translate into weak bargaining power. A lack of storage and processing capacities means that the

product must be sold immediately, but for traders the volumes may be too small to make it feasible. Second, it may take several years for an agroforestry system to become productive, and many years before it is mature. This means that farmers may need to make an upfront investment in terms of money and time, while they seldom have access to loans. The credit lines of financial institutions such as rural banks and credit unions tend to have a short payback time and high interest rates, making them less suitable for investments in agroforestry (9). Third, agroforestry farmers rarely get compensated for the functions they maintain, such as carbon sequestration, soil and water conservation, biodiversity conservation and microclimate regulation. The economic competitiveness of agroforestry can potentially be improved through programmes for payments for environmental services (25).

Box 4. Agroforestry as part of integrated landscape initiatives

Integrated landscape initiatives typically apply a holistic approach to managing landscapes, emphasizing the interconnectedness of different land uses and the importance of balancing competing demands for resources. Integrated landscape initiatives aim to minimize trade-offs and optimize synergies between different land uses within a given area, with the aim of achieving multiple objectives, such as biodiversity conservation, watershed management, and sustainable livelihoods. Agroforestry fits well within this perspective, because it has the potential to combine ecological, economic, and social objectives at the landscape level. Integrated landscape initiatives typically involve various stakeholders, including farmers, NGOs, and government agencies, and this can be key to overcome challenges related to the scaling of agroforestry, through coordinated action towards incentive structures that accelerate adoption (26).

1.4 Structure of this publication

As part of the WL programme, TBI members in DR Congo, Ghana, Indonesia and Viet Nam have been supporting the cultivation of agrocommodities in agroforestry systems. Much of their work focussed on achieving the necessary conditions for agroforestry adoption and upscaling. This publication documents their experiences and draws lessons for future programmes. It is based on interviews with staff of the Tropenbos members, using the three general conditions introduced above as a framework. The following chapters provide an account of the experiences in DR Congo, Ghana, Indonesia and Viet Nam. Each chapter describes the main interventions, examples of achieved results, and future priorities. The final chapter synthesises the country-level experiences, highlighting commonalities and drawing general lessons.



2. Cocoa agroforestry, Bafwasende, DR Congo

Takeaways

- Tropenbos DR Congo built capacity among local farmers — women and youth in particular — to improve their income through cocoa-based agroforestry systems, while preventing deforestation.
- They supported communities with formalizing collective land titles covering 90,000 hectares, offering tenure security needed to invest in agroforestry on lands that were previously deforested.
- They enabled farmers to organize themselves in 20 producer associations and established contacts with financial institutions to increase access to credit for agroforestry.
- They learned that it is crucial for any NGO working with communities to critically reflect on how the land-use practices they promote relate to local preferences, needs and customs.
- It is critical to combine support for agroforestry with developing value chains for deforestation-free produce, and investments in land-use planning, monitoring and enforcement, to ensure that agroforestry expansion does not take place at the expense of natural forests.

2.1 Introduction

The Bafwasende landscape in the Democratic Republic of Congo (DR Congo) stretches over roughly 4,710,000 hectares. The indigenous population is scattered across remote villages, and poverty is widespread. Traditionally, farmers have been practicing shifting cultivation for their subsistence. The landscape remains one of the most densely forested areas in the world, with a forest cover of about 98%, but in recent years the pressure on the forest has been increasing.

In the view of Tropenbos DR Congo, the adoption of agroforestry practices could help decrease the pressure on the natural forest. This is because agroforests are permanent, typically generate higher incomes per hectare than shifting cultivation, and provide all kinds of forest products that people would otherwise collect from the natural forest. Moreover, they are a source of fruit and vegetables for subsistence purposes, as well as cash income, needed to pay for healthcare and education.

In the Bafwasende landscape, the integration of cocoa with other plants and trees is particularly promising, due to an increasing market and high prices for cocoa. As part of the Working Landscapes programme, Tropenbos DR Congo has therefore been working to improve the key conditions for scaling diverse cocoa-based agroforestry practices.

2.2 Knowledge of sustainable land-use practices

Cocoa is an attractive crop for farmers in the Bafwasende landscape. Three years after planting, a farmer can harvest about 2,000 kg of cocoa beans per hectare annually. This equals approximately US\$ 3,000 (at 2023 prices in the local market), which is much higher than the income that is typically derived from shifting cultivation practices. When combined with other crops and trees in an agroforestry system, the cocoa benefits from the shade, while farmers can spread their risks, and maintain diversity at the land-use level.

At the start of the Working Landscapes programme, Indigenous communities in the landscape had little knowledge of cocoa agroforestry. One of the first objectives of Tropenbos DR Congo was therefore to raise awareness among local communities about the benefits of mixing cocoa trees with other trees and shade-tolerant crops. They started working in several indigenous communities, where they organized training courses and workshops, sharing information from research, and facilitating exchanges with migrant farmers from North Kivu province, where farmers have been practicing cocoa-based agroforestry for many years. Tropenbos DR Congo made sure to engage women in all activities, which challenged existing gender roles, as women in the area traditionally cultivate food for home consumption and are not involved in agricultural production for the market. They also paid special attention to involving youth. Up until a few years ago, young people were leaving the landscapes in large numbers, going to cities to look for work. Recently, however, this outmigration slowed down, because young people saw new income earning opportunities due to the growing cocoa market. In the view of Tropenbos DR Congo it was therefore essential to actively engage them in their training and awareness building activities.

After the training and workshops, Tropenbos DR Congo started working with community members on developing agroforestry plots combining cocoa and bananas on community lands. The idea was for these farms to be managed collectively, but this did not work out as expected, as farmers showed little interest to work on the collective farms. In response, Tropenbos DR Congo changed its strategy. The communal farm was transformed into a training plot. The field technicians provided technical support to develop and maintain community nurseries, and to transplant seedlings into farms of individual farmers. From then onwards things started moving rapidly. People from all over the landscape started requesting support for agroforest establishment.

The experience of Tropenbos DR Congo in the Bafwasende landscape underlines that building capacity and knowledge on sustainable land-use practices is never a one-way street, where external experts come into a community and tell farmers what they need to do. Field workers may come into a village with all kinds of assumptions that may not be valid. For knowledge about sustainable land use to be effective, it needs to be tested and discussed with the users of that knowledge, not just in terms of technical applications, but also in terms of the social constellation in which the new knowledge is to be applied. It requires attentive listening to local farmers about their needs and preferences, and the flexibility to adapt planned activities.

2.3 Tenure security

In the Bafwasende landscape, Indigenous farmers have been practicing shifting cultivation for many generations. They would open a piece of land, cultivate food crops for a couple of years, and move on after the soils were depleted. Over the last few decades, with growing commercial interests in land and natural resources, the traditional livelihoods of these shifting cultivators have increasingly been disrupted. Traditional leaders and local elites would strike deals with commercial parties and local administrators, handing out large parts of the forests for logging, increasing the livelihood insecurity of traditional farming families.

In response to this situation, the government introduced a national strategy for community forestry, enabling communities to apply for Local Community Forestry Concessions (CFCLs). These are meant to reduce the risk of land grabbing, while empowering indigenous and local communities to practice sustainable forest management. Within a community forest concession, a community is allowed to exploit the forest for subsistence

and commercial purposes, forever, as long as it follows a management plan that has been approved by the authorities. A concession is governed by a community forest committee, which consists of several elected community members. This implies that traditional leaders and powerful elites can no longer make decisions about the land and forest resources on their own behalf; all decisions regarding the CFCL are to be made in consultation with the committee members who are accountable to the community. As of January 2023, Tropenbos DR Congo had helped establish community forest concessions covering 90,000 hectares, and more applications are in process. These communities can benefit from the management of their concessions through locally controlled selective logging of the natural forest, in combination with permanent cocoa-based agroforestry on fallow lands.

The community forest concessions provide a basic level of tenure security needed for farmers to establish agroforests on lands that were previously deforested. However, formalized community forest concessions do not guarantee that the pressure on the forest will decrease, and the expansion of cocoa agroforestry may even become a new threat. After all, higher profitability of cocoa cultivation is likely to serve as an incentive for farmers to expand further, leading to more, rather than less deforestation. To minimize this risk, Tropenbos DR Congo has been supporting farmers to develop cocoa agroforests on the condition that they are established on degraded lands. But this alone is not enough. There is also a need for better planning, monitoring and enforcement. Tropenbos DR Congo has therefore been helping to develop land-use plans at the community level, as well as at the provincial level. These plans, if enforced, will ensure that agroforestry expansion does not go at the cost of natural forests.

Box 5. Individual land titling programmes

Tenure insecurity is not only a barrier for traditional communities living in forest areas, but also for farmers in areas where the forest has largely disappeared. Individual land titling programmes can help to promote agroforestry in those areas. Such programmes can learn from recent experiences in several urban areas in DR Congo, where an innovative government programme enabled inhabitants to get land titles at very low costs. Also, lessons may be derived from a UNDP funded programme called PIREDD (Programme Intégré REDD+), which is currently supporting individuals to secure their perennial crop plantations in various provinces throughout the country.

2.4 Economic feasibility

At the start of the Working Landscapes programme, Tropenbos DR Congo wanted to convince farmers to mix cocoa with banana trees, as this has been a successful system in North Kivu province. However, the cocoa-banana combination was met with very little enthusiasm among local farmers. Farmers saw bananas primarily as a food crop for their own consumption. In the absence of a nearby market for fresh fruits, the production of more bananas would only become economically attractive if they could be processed into products with a longer shelf life. Rather than intercropping cocoa with bananas, farmers indicated to be more interested in planting avocado, lemon, mango and orange trees, as well as certain tree species that host edible caterpillars (*Albizia gummifera* and *Pentaclenthra*), which had become increasingly scarce in recent years due to deforestation. Field staff of Tropenbos DR Congo then started working with farmers to collect seedlings of these species, develop nurseries, and transplant the seedlings into their farms. It is an example of how agroforestry systems can be co-developed with farmers, based on local preferences, customs and needs.

In recent years, the demand for cocoa beans has been consistently high, and traders are willing to travel to remote villages, where they are paying the same price for cocoa as they do elsewhere. Access to the market is therefore not considered a major obstacle. And market access is likely to further improve, as one of two approved cocoa buyers in the province (*Société Commerciale de Cacao de Kivu*) is planning to set up a buying point in Bafwasende. Access to finance is more complicated for smallholders. In the view of Tropenbos DR Congo, improving smallholders' access to credit could potentially help them with investing in agroforestry practices, which take a couple of years before they start generating income.

Tropenbos DR Congo started talking with banks and microcredit organizations active in the region, to discuss options to develop financial services catered to the development of sustainable smallholder cocoa production.

One bank expressed interest in developing such a credit programme if a third party (e.g., an NGO or a government agency) could provide them with a guarantee, to cover their risks. Tropenbos DR Congo also started facilitating farmers to organize themselves in producer associations, which is expected to eventually increase their opportunities for accessing credit. This resulted in 20 producer associations that are close to being formalized at the time of writing (January 2023).

2.5 Considerations for future programmes

- There are currently no market incentives for sustainable cocoa production in the Bafwasende landscape. This could change through the integration of cocoa producers into existing and emerging value chains for deforestation-free cocoa, by developing connections with traders, and working with farmers' producer associations to comply with social and environmental requirements.
- Notwithstanding considerable progress over the last couple of years, there is still a long way to go to secure tenure for smallholders across the landscape. This can be done through community forest concessions, as well as through innovative programmes for the titling of individual lands for agroforestry farmers adjacent to community forest concessions (see Box 5).
- Integrated land-use plans have been developed, but community forest committees and local governments will need support with the implementation and enforcement of these plans, to avoid that the expansion of cocoa agroforestry practices results in deforestation.
- Customary authorities in the landscape have a lot of power, and must be actively engaged in an ongoing multi-stakeholder dialogue, to consolidate their support for community forest concessions, where community members can combine selective logging of the natural forest with cocoa-based agroforestry on fallow lands.




3. Coffee agroforestry, Srepok River Basin, Viet Nam

Take aways

- Expansion of coffee monocultures on the slopes of the Srepok River Basin has resulted in land degradation. Research by Tropenbos Viet Nam and partners showed that diverse coffee agroforests can help to restore these lands, while increasing smallholders' resilience.
- Tropenbos Viet Nam collaborated with government extension agencies to provide training on coffee agroforestry, with special attention to women in communities of ethnic minorities. This inspired the government's Department of Agriculture and Rural Development to provide similar training in many more communities.
- Tropenbos Viet Nam facilitated government agencies to host restoration dialogues, resulting in the joint identification of areas where coffee agroforestry can be used for restoration.
- Tropenbos Viet Nam learned that the mindsets and approaches within government agencies can be influenced by actively engaging government officials from the very start of interventions.
- To upscale sustainable coffee agroforestry, it is necessary to further increase the economic attractiveness of agroforestry, e.g., through the national Payments for Forest Environmental Services (PFES) programme.

3.1 Introduction

In Viet Nam, the Working Landscapes programme focusses on the Srepok River Basin landscape, located in the Central Highlands, and measuring around 1,530,000 hectares. With a forest cover of approximately 45%, and some large areas of primary forests remaining, it is one of Viet Nam's most forested regions, with a high level of biodiversity. The forested hills are home to communities of various ethnic minorities, but these areas are rapidly encroached upon, mostly by farmers from elsewhere. The rate of deforestation is high. The expansion of coffee plantations is one of the main drivers of deforestation. Moreover, when coffee is cultivated in non-shade monocultural systems on slopes, it results in depleted water levels and degraded soils. This adds to the already large area of degraded lands in the landscape.

 [Click here for a short video about the work of Tropenbos Viet Nam to promote coffee agroforestry](#)

As part of the Working Landscapes programme, Tropenbos Viet Nam has been promoting diversified coffee-based agroforestry practices, both in existing non-shade monoculture fields as well as on previously degraded lands. Together with stakeholders in the Srepok River Basin landscape and beyond, they have focussed on the conditions for the widespread adoption of diverse coffee agroforestry, with particular attention to the role of women in communities of ethnic minorities.

3.2 Knowledge of sustainable land-use practices

The Srepok River Basin landscape has been experiencing serious ground water depletion and soil degradation in the last decades, with negative consequences for agricultural production and local livelihoods. Under the Working Landscapes programme, Tropenbos Viet Nam started working with Thuy Loi University to study the relationships between water shortage, forest loss and agricultural land-use. The research suggested that shifting from non-shade coffee monocultures to diverse coffee agroforests will not only help to restore a healthy water cycle in the landscape, but will also improve the micro-climate, provide alternative sources of income, and increase the resilience of coffee farmers. Furthermore, they found that coffee agroforestry has great potential to help restore degraded lands in the landscape.

These findings highlighted a common-concern as an entry point for the rest of the Working Landscapes programme in Viet Nam and were used to convince stakeholders in the landscape to embrace coffee agroforestry for restoration. Tropenbos Viet Nam then started collaborating with Tây Nguyên University and the provincial Department of Agriculture and Rural Development (DARD) to assess different agroforestry systems suited for degraded lands. The assessment resulted in a recommended model of coffee combined with indigenous fruit and timber tree species. Tropenbos Viet Nam discussed the outcomes of the assessment with provincial and district government agencies, which resulted in the DARD offices in Lắk and Krông Bông — two districts with large areas of degraded lands — signing decrees that formally endorse the recommended coffee-based agroforestry models. The decrees opened the door for Tropenbos Viet Nam to work together with local DARD officers, who provide extension services in the villages and are trusted by the local people.

To persuade farmers to establish mixed systems on degraded lands, Tropenbos Viet Nam then worked with the district DARD and district extension centres to set up field models and provide training on diverse coffee agroforestry systems. There was a focus on women in communities of ethnic minorities, because they are seldom reached by training and extension services. In the view of Tropenbos Viet Nam, women can play an important role in restoration through agroforestry, because they are often the ones who are already planting and caring for trees in home gardens. As a result of the training provided by Tropenbos Viet Nam and district extension officers, a growing number of women farmers started combining coffee and indigenous tree species in agroforestry systems. Inspired by the results, the district level DARD then instructed local extension stations to continue supporting women farmers with developing the coffee agroforestry model.

3.3 Government support and planning

According to Tropenbos Viet Nam, a barrier to upscaling coffee agroforestry has been the lack of guidance from the government related to what type of land-use systems are best suited for different areas in the landscape, specifically on the degraded slopes. To draw attention to this, Tropenbos Viet Nam facilitated the DARD and the Department of Environment and Natural Resources (DONRE) to host restoration dialogues at the provincial level, with a wide range of stakeholders from the Srepok River Basin landscape, including representatives of farmers, women groups, NGOs, companies, universities and local government agencies. One of the main outcomes of these dialogues was the joint identification of areas where coffee agroforestry could be used for restoration, resulting in a detailed map prepared by Tây Nguyên University.

Tropenbos Viet Nam also worked with DONRE to facilitate participatory land-use planning at both the district and province level. One of the roles of Tropenbos Viet Nam was to provide scientific information concerning the social and environmental outcomes of different land use options. These joint activities will result in detailed land-use plans that are based on local conditions and needs, and which will provide a basis for government efforts promoting restoration through agroforestry, as well as for the provision of loans for initiatives related to coffee agroforestry.

Box 6. Preventing encroachment of coffee farmers in forest areas

In the view of Tropenbos Viet Nam, achieving a climate-smart landscape requires not only the widespread adoption of coffee-based agroforestry practices, but also the halting of illegal expansion of coffee on forest lands. Expansion of coffee farms often takes place on forest lands that the government has allocated to certain actors (as part of a national forest land allocation programme), but which are de facto left unmanaged and uncontrolled. To resolve this situation, Tropenbos Viet Nam supports the allocation of forest lands to communities of ethnic minorities, which often have a long-standing relation to the forest, and a direct interest to manage it sustainably. Community forest allocation will enable these communities to benefit from their forests, while also preventing illegal conversion for coffee plantations.

3.4 Economic feasibility

Diverse agroforestry systems as recommended by Tropenbos Viet Nam and the DARD combine coffee with indigenous fruit and timber tree species. Incorporating these trees into a coffee plantation has long-term benefits, as it helps to spread risks, reduces water usage, and maintains the environmental integrity of the land-use system, ensuring its productivity in the long-term. However, many coffee farmers in the landscape are poor and have short-term needs that need to be met. Recognizing this, Tropenbos Viet Nam has been working with farmers to mix coffee not only with trees, but also with non-timber forest products (NTFPs), such as edible mushrooms and medicinal plants that are native to the area. These only take one to three years before they can be harvested, and have much marketing potential, especially in nearby towns and cities.

Another barrier to the economic feasibility of diverse coffee agroforestry has been the lack of local possibilities to process fresh fruits. During the harvesting season of a certain fruit tree species, there is an abundance of fruits, flooding the market, and lowering prices. Access to processing facilities would help to add value locally and increase the shelf life. However, developing processing facilities requires relatively large upfront investments, which are unattainable to individual farmers. Tropenbos Viet Nam therefore explored the possibilities to develop such facilities through farmers' cooperatives, but found that the necessary administrative procedures were complex and time consuming. Tropenbos Viet Nam started organizing and facilitating meetings between communities and other landscape stakeholders to discuss possibilities for local farmers to sell their produce to fruit processing factories, and to learn about quality requirements for post-harvest processing techniques.

According to Tropenbos Viet Nam another promising way to increase the economic feasibility of diverse coffee agroforestry is through the existing national Payments for Forest Environmental Services (PFES) programme. Through the PFES system, the users of forest environmental services pay those who maintain the services. The system is currently primarily focused on the environmental services that forests provide for water companies, electricity companies, certain industries, and ecotourism. It means, among others, that the general public pays PFES fees as part of their electricity and water bills and as part of tickets to enter ecotourism areas. These fees are transferred to the government's Forest Protection and Development Fund, which uses them to compensate the actors who manage the forest resources. The government is now also exploring options for additional sources for the PFES funds. In the view of Tropenbos Viet Nam, coffee production could be included in the PFES system, to create incentives for smallholders to invest in agroforestry. As monoculture coffee farms benefit from environmental services provided by the natural forest, PFES fees would need to be paid for coffee produced in non-shade monocultures, but not for coffee produced in agroforestry systems. Tropenbos Viet Nam has been discussing the practical possibilities of integrating coffee into the PFES system with government agencies. This resulted in a request from the government to provide more detailed quantitative information about the environmental services.

3.5 Considerations for future programmes

- Viet Nam is a pioneer in an innovative approach to forest management through its national PFES programme. There are possibilities to expand the scope of this programme, so it will also act as an incentive for agroforestry practices on degraded lands, but revising the current PFES policy requires further studies and discussions between state agencies and other stakeholders.
- Detailed spatial plans have been developed, indicating areas that can be restored through coffee agroforestry. These plans now need to be implemented in a participatory manner.
- Action researchers and government extension agencies need to work together to monitor the uptake of agroforestry practices, and the impacts on livelihoods and the environment, with particular attention to the role of women in communities of ethnic minorities.
- Restoration through coffee agroforestry needs to be incorporated in local and national climate action plans and other climate policy frameworks (such as the Nationally Determined Contribution).
- Alternative value chains and niche markets need to be further developed, for certified sustainable coffee produced in agroforests (with a focus on international markets), as well as for NTFPs (with a focus on local and national markets).
- The forest land allocation programme needs to be used to improve tenure security of local communities of ethnic minorities, which is expected to help prevent further expansion of coffee plantations at the expense of natural forests.




4. Cocoa agroforestry, Juabeso-Bia & Sefwi-Wiawso, Ghana

Takeaways

- In Ghana, cocoa is traditionally grown in agroforestry systems, but over time farmers increasingly switched to monocultures, with negative effects on long-term production levels and farmers' resilience. Tropenbos Ghana supports cocoa farmers to bring back trees into their farms.
- They have been sharing best practices for cocoa agroforestry with government agencies and companies, inspiring a major cocoa company to support agroforestry through their extension services, and the government to supply tree seedlings to cocoa farmers.
- They have been facilitating village-level savings groups, which enable cocoa farmers, especially women, to invest in the management of their cocoa agroforests and diversify their livelihood sources.
- They have been raising the government's attention to current tree tenure policies that serve as disincentives for farmers to grow and maintain trees on their farms. They also helped district governments with integrating agroforestry objectives in medium-term development plans.
- Tropenbos Ghana learned that supporting a particular model of agroforestry requires simultaneous collaboration with farmers (so the model fits the local context and needs), trading companies (so it meets market requirements) and government agencies (to align with regulations).
- To upscale sustainable cocoa agroforestry, it is necessary to further engage with government extension agencies, to fundamentally change their approach towards cocoa farming and embrace diversity and multifunctionality.

4.1 Introduction

In Ghana, the Working Landscapes programme focusses on the Juabeso-Bia and Sefwi-Wiawso (JBSW) landscapes in the Western North Region. Together, the two landscapes are home to approximately 470,000 people and stretch over 481,000 hectares, with a forest cover of close to 60%. The majority of smallholders in the area cultivate cocoa. This used to be done in mixed agroforestry

 [Click here for a short video about the work of Tropenbos Ghana to promote cocoa agroforestry](#)

systems, but over the years, non-shaded monoculture plantations have become dominant. The production cycle of the traditional mixed system was about 40 years, while it is only about 20 years for non-shaded cocoa. After that, the soils are exhausted, and farmers move on to look for new lands. Expansion of cocoa farms is contributing to the loss of forest cover, both within and outside of forest reserves. Moreover, non-shaded cocoa is vulnerable to changes in the climate. Under the current system, decreased rainfall is expected to reduce cocoa yields by 28% in 2050 (27). As farmers depend almost entirely on cocoa for their livelihoods, such a decrease in yields would have enormous impacts.

According to Tropenbos Ghana, the widespread adoption of agroforestry practices, mixing shade-tolerant cocoa varieties with fruit and timber trees, will simultaneously decrease the system's vulnerability to changing weather conditions and increase carbon sequestration. It will also have positive effects on biodiversity, as diverse agroforestry systems function as extensions of the natural habitat of forest species, and because agroforestry practices prolong the lifespan of cocoa trees and maintain soil fertility, helping to decrease the rate of forest encroachment. As part of the Working Landscapes programme, Tropenbos Ghana has therefore been supporting the diversification of cocoa production systems in the JBSW landscapes, focussing on some of the key conditions for agroforestry uptake.

4.2 Knowledge of sustainable land-use practices

At the start of the Working Landscapes programme, Tropenbos Ghana conducted a baseline study in the landscapes and found that most cocoa farming systems had minimal tree cover — typically not more than 10%. This is partly explained by the fact that, in the past, extension officers had advised farmers to reduce the number of trees in their cocoa farms, due to the incidence of the black pod disease. Ever since, efforts to re-establish trees in these farms have been largely unsuccessful. Tropenbos Ghana also found that local agricultural extension officers — both those of the government and those associated with cocoa buying companies — had a limited understanding of the benefits of cultivating shaded cocoa in mixed systems. For as far as extension officers would pay attention to the integration of trees in cocoa farms, their focus would be on a small number of timber tree species, and their formal recommendation was to plant not more than eight trees per acre. According to Tropenbos Ghana, this was one of the main barriers to upscaling diverse and resilient agroforestry practices in the landscape.

To fully understand the possibilities and needs in the communities, Tropenbos Ghana organized discussions with farmers to talk about the potential benefits of bringing diversity back into their land-use systems. Rather than presenting a predefined agroforestry model, Tropenbos Ghana started with listening to the farmers' own ideas about the benefits of integrating different kinds of trees and plants, including timber and fruit trees, as well as medicinal plants that can be grown in between the cocoa.

Tropenbos Ghana then organized learning workshops, where they presented their findings from the field, and invited relevant government agencies and cocoa companies to share their experiences. After these workshops, a major international cocoa sourcing company (Olam Food Ingredients) decided to send its extension officers to attend field-level training conducted by Tropenbos Ghana, and the company has now adopted Tropenbos Ghana's cocoa agroforestry approach in its own extension services. Moreover, the Cocoa Health and Extension Division (CHED) of the Ghana Cocoa Board (a governmental organization that supports the production, processing and marketing of cocoa) started supporting the supply of tree seedlings to farmers. Between 2020 and 2022 it is estimated that smallholders in the JBSW landscapes increased tree cover by at least 25% on about 2,000 hectares of farmlands, due to tree planting in cocoa fields as well as farmer managed natural regeneration.

4.3 Tree tenure and planning

In Ghana, tree tenure policies act as a barrier to upscaling agroforestry practices. This is because all naturally occurring timber trees are considered ownership of the state, regardless of where they grow. When a farmer is unable to prove that a tree was planted, the state is legally entitled to issue timber utilization contracts (TUCs) to licensed logging companies, which can then harvest the tree. Although the TUC holder must seek the farmer's consent before logging, this is often flouted. A farmer who grows a timber tree is thus never sure if he or she can harvest it.

In recent years, Tropenbos Ghana has been working closely with other civic organizations to persuade the Ghanaian government to make changes to its policies related to tree tenure and timber harvesting. Together they made concrete suggestions to the Ministry of Lands and Natural Resources and the Parliament of Ghana for an amendment of the Concession Act of 1962, which vests timber resources and naturally occurring timber trees in the President of the Republic of Ghana. Although the proposed amendment was not adopted, it has put the issue high on the government's agenda. The Ministry is now aware that a policy change is needed to promote tree planting on farms, not only to maintain long-term cocoa production, but also to contribute to climate mitigation and adaptation objectives, as set out in Ghana's climate plans and its Nationally Determined Contribution (NDC).

In addition to the national regulations on tree tenure, Tropenbos Ghana identified the lack of integrated landscape planning as a barrier to upscaling agroforestry. They therefore started working with local government planners to improve the process towards medium-term development plans, with more attention to agroforestry. In this, Tropenbos Ghana ensured the active participation of traditional authorities, as they have direct control over land-use decisions at the local level. Three districts (Bia West, Juabeso and Sefwi-Wiawso) have now included agroforestry in their medium-term development plans, and local government agencies and assembly members actively promote tree planting in cocoa fields.

4.4 Economic feasibility

The economic benefits of cultivating cocoa in diverse agroforests include the maintenance of long-term productivity, reduced costs for chemical fertilizers and pesticides, and diversified risks. Moreover, standing trees can provide recurring economic returns, for example through the sale of fruits and essential oils, which have markets with growth potential, especially in nearby cities. However, as some components of the agroforest may take many years to mature, farmers need to be able to adopt a long-term perspective. They also need to make initial investments, e.g., to purchase tree seedlings and other planting materials. Such investments may require more cash than they have on hand. In the view of Tropenbos Ghana it was therefore important to improve smallholders' access to credit to make upfront investments, and to bridge investment periods.

To improve access to credit, Tropenbos Ghana started working with local communities to establish Village Savings and Loan Associations (VSLAs). A VSLA usually consists of between 15 and 25 people who agree to save together. They jointly decide on periodic cash contributions that everyone will make, and on loan conditions and interest rates. When a VSLA is up and running, group members can take out loans with low interest rates. It is an easy and safe way for farmers to have access to cash to make small investments. As part of the Working Landscapes programme, Tropenbos Ghana helped establish 12 VSLAs in 10 communities. Some farmers used VSLA funds to hire labourers to help prune and clear weeds in their cocoa farms, and to buy seeds and seedlings. Hearing of these successes, many other communities wanted to follow suit and Tropenbos Ghana therefore started training community agents to help set up VSLAs throughout the landscape in the coming years.

So far, most VSLA members have been women. Women in the area are traditionally in charge of the cultivation of food crops in home gardens, and the harvesting, processing and trade of Non-Timber Forest Products (NTFPs), such as fruits, spices and nuts. In line with these roles, women have typically been using the VSLA loans to diversify cocoa plantations with vegetables for subsistence purposes and a wide range of NTFPs for trade.

4.5 Considerations for future programmes

- While some private sector extension services have started supporting cocoa agroforestry, local-level government extension agencies are still mostly focusing on unshaded or low shaded cocoa. There is a need to work with these agencies, to help them change their dominant approach and start paying attention to the benefits of trees in cocoa farms.
- There is a need to monitor developments in the landscape to analyse the conditions for, and impacts of, the adoption of cocoa agroforestry. Organizations operating on the interface of research, policy and practice, must use this information to inform the decisions of relevant actors, such as the Forestry Commission, traditional councils, Metropolitan, Municipal and District Assemblies, the Ghana Cocoa Forest REDD+ Programme, and cocoa companies.
- Recently, two planning agencies (the Town and Country Planning Department and the Physical Planning Department) have merged into one Land Use and Spatial Planning Authority (LUSPA), under the Ministry of Environment, Science, Technology and Innovation (MESTI). This has created an opportunity for better and more integrated planning at the landscape level. However, the new agency will need support in the development of participatory planning processes with due attention to the role of agroforestry in agricultural landscapes, as contained in Ghana's latest NDC.
- Civic and research organizations must continue the dialogue with the Ministry of Lands and Natural Resources and the Parliament of Ghana, to ensure that policy changes will effectively remove disincentives for tree planting and farmer managed natural regeneration of trees within farmer's fields.




5. Rubber agroforestry, Simpang Dua, Indonesia

Takeaways

- Many farmers in West Kalimantan have been converting rubber agroforests to monoculture oil palm plantations, decreasing diversity in the landscape. Tropenbos Indonesia wants to reverse this trend, by making rubber agroforestry attractive again.
- Tropenbos Indonesia worked with indigenous rubber farmers in Simpang Dua subdistrict to improve productivity through better land-use practices.
- They helped to organize rubber farmers by establishing a Collective Rubber Processing and Marketing Unit, trained them in post-harvest treatment of the rubber to increase prices, and helped with developing direct linkages with rubber buyers.
- They learned that financial institutions are unlikely to provide loans to new and unexperienced farmers' organizations. Non-profit organizations can help to overcome this barrier.
- Further improving the attractiveness of diverse rubber agroforestry requires, among others, the development of value chains for organic products, and increased tenure security for rubber farmers.

5.1 Introduction

Simpang Dua subdistrict in West Kalimantan is one of the focus landscapes of the Indonesian Working Landscapes programme. It is located in the uplands of Ketapang district, and inhabited mostly by indigenous Dayak communities. Among the Dayak farmers, it used to be common to maintain rubber agroforestry systems, consisting of a mix of rubber trees and a range of fruit and timber tree species. However, in recent years the attractiveness of rubber agroforestry has been decreasing, due to low productivity of existing rubber agroforests, and low and unstable rubber prices. Young people's interest in rubber agroforestry has been waning. And farmers with mature rubber agroforests are tempted to convert them to oil palm, which offers relatively stable prices. Many farmers in other parts of West Kalimantan have already made this choice during the last decades. Massive expansion of oil palm resulted in monotonous landscapes and increased farmers' dependence on the oil palm companies that buy their produce.

 [Click here for a short video about the work of Tropenbos Indonesia to promote rubber agroforestry](#)

In the view of Tropenbos Indonesia, the remaining rubber agroforests play an important role in the landscape. They provide a diversity of products for both cash and subsistence, while also enhancing carbon sequestration and biodiversity conservation. As part of the Working Landscapes programme, Tropenbos Indonesia has therefore been working with communities and other stakeholders to revitalise rubber agroforestry. This should persuade farmers to maintain existing agroforests, and possibly even to convert older, less productive oil palm plantations back to diverse rubber agroforests.

5.2 Knowledge of sustainable land-use practices

According to Tropenbos Indonesia, it is possible to increase the productivity of rubber agroforestry by combining traditional and scientific knowledge. They therefore started organizing farmer field schools, where farmers and technicians work together to improve existing rubber agroforestry practices, for example by using home-manufactured organic inputs (such as a liquid fertilizer made from decomposed bacteria) and by introducing shade tolerant coffee and ginger, which can be certified as organic produce. The farmer field schools also focussed on ways to improve rubber tapping and post-harvest processing.

Rather than having extension officers telling farmers what to do, the farmer field schools were based on the idea that improving agricultural practices requires long-term engagements, where outside experts and farmers work together on developing methods to increase the profitability of rubber agroforestry practices. Tropenbos Indonesia initially focussed on four villages, where they organized farmer field schools every two weeks, totalling 14 meetings in each village. During this period, facilitators of Tropenbos Indonesia would work together with farmers to develop pilot plots and to implement new techniques in the farmers' fields. Special attention was paid to female participation in these training courses, because it is often women who are tapping rubber and maintaining agroforestry plots.

After completion of the farmer field schools, Tropenbos Indonesia selected a number of farmers and government extension officers, and trained them to become trainers in the methods and techniques they had co-developed during the farmer field schools. These trainers then travelled to other villages to work with farmers on improving their rubber agroforestry practices. Simultaneously, Tropenbos Indonesia started working with local middle schools, to introduce 'good agricultural practices' into their local curricula, aimed at raising awareness and interest in agroforestry among younger generations while influencing their parents as well.

5.3 Tenure security

In Simpang Dua, most rubber agroforests were established many decades ago, on lands that the Dayak consider part of their customary territory. The state, however, has classified most of these lands as production forest (Hutan Produksi) or convertible production forest (Hutan Produksi yang Dapat Dikonversi). This means that the government can decide to lease out these lands as concessions to commercial companies, potentially leading to conflicts between companies and communities. Without a legal certificate to the lands they cultivate, rubber farmers are at risk of being evicted from their lands.

Indonesia's social forestry programme makes it possible for communities to apply for various types of permits that give them the legal right to use state forest lands. On lands that are classified as (convertible) production forest, a community can apply for a community forestry (Hutan Kemasyarakatan — HKM) permit, which would formally allow them to maintain their rubber agroforests. However, the permit is only valid for 35 years (with the possibility of extension for another 35 years). Many Dayak communities refuse to apply for such a permit. To them, it would imply the acknowledgement of the state's ownership over the lands they consider theirs.

5.4 Economic feasibility

In addition to the low productivity of existing rubber agroforests, one of the reasons for farmers to switch to oil palm is the low and unstable price of rubber. Farmers can improve their income from rubber through investments in post-harvest processing and the development of direct linkages with rubber buyers, but this requires that farmers get organized, for example in the form of a Collective Rubber Processing and Marketing Unit (Unit Pengolahan dan Pemasaran Bokar — UPPB). Although there is a government programme to facilitate the development of such units, at the start of the Working Landscapes programme there was no UPPB operating in the landscape.

The lack of organization among rubber farmers was seen as a major constraint to increasing the feasibility of rubber agroforestry. Tropenbos Indonesia therefore facilitated the establishment of a UPPB involving 121 rubber farmers, including a technical division to support farmers' capacity for post-harvest treatment, improving rubber quality to meet the standards of larger buyers. The technical division has also been encouraging members to improve their rubber agroforestry management. In the future, the UPPB is expected to accommodate the agroforest's secondary products, such as spices and fruits.

Tropenbos Indonesia also helped the UPPB with developing an agreement with a rubber factory located in the city of Pontianak, to secure offtake. The UPPB then required capital to purchase the first batch of rubber from the participating farmers, but financial institutions operating in the landscape did not have mechanisms in place that make it possible to provide loans to starting farmers' organizations that do not yet have a track record. To overcome this hurdle, Tropenbos Indonesia used its own finances to provide the UPPB with a zero-interest loan. This enabled them to start buying rubber from the participating farmers. The UPPB is now up and running, and it is estimated that the individual farmers' income from selling rubber will increase with 30%. By developing a portfolio, the UPPB will have better possibilities to access loans in the future.

5.5 Considerations for future programmes

- Tropenbos Indonesia will continue to collaborate with local financial institutions to develop mechanisms that make funds accessible for newly starting farmers' organizations.
- Lessons from Simpang Dua must be shared with other UPPBs being established in West Kalimantan, as well as with the provincial government, so it can develop more effective programmes to support UPPBs throughout the province.
- Government extension agencies can learn from the farmer field school approach, with an emphasis on developing and testing innovations together with farmers.
- Rubber farmers need to be linked to promising value chains. In addition to the growing national and international value chains for sustainable natural rubber, possibilities need to be explored to tap into growing markets for organic foods in the rapidly expanding urban centres of West Kalimantan.
- Young people from Simpang Dua who left their villages for secondary education often have strong links to the urban areas where they went to school. There are opportunities to engage them in developing value chains of organic products from rubber agroforests.
- The UPPB is expected to increase rubber prices for farmers, by cutting out the intermediaries and improving rubber quality. However, the global rubber price will remain fluctuating and could decrease. Farmers who grow a variety of marketable products have alternative income sources when the global rubber price is low, which increases their resilience and may prevent them from converting their rubber agroforests to oil palm. There is a need for long-term monitoring in the field to better understand these relationships.
- The issue of Dayak tenure rights within areas that the government considers state forest lands remains highly sensitive. There is a need to continue and open conversation with Dayak communities about the pros and cons of various options. Communities that want to apply for HKM permits may need assistance to go through the administrative steps.
- There is a need to further our understanding of how land-use choices at the plot level (e.g. oil palm plantations, rubber monocultures and diverse agroforests) relate to environmental functions (such as climate regulation and biodiversity conservation) at the landscape level.



6. Synthesis

As part of the Working Landscapes programme, TBI members in DR Congo, Ghana, Indonesia and Viet Nam have been supporting the adoption and upscaling of diverse agroforestry practices for climate-smart landscapes. They have been doing so by focussing on conditions related to knowledge, government support and economic feasibility. Below we synthesise the experiences in the four countries, highlighting some of the main achievements and priorities for future programmes.

6.1 Main achievements

Knowledge: TBI members in DR Congo, Ghana, Indonesia and Viet Nam have been collaborating with farmers to improve agroforestry practices, combining external knowledge with local knowledge, skills and experiences, specifically those of women and young people. Through training, farmer-to-farmer learning and curriculum development, more and more farmers now have better capacities related to agroforestry establishment, processing and marketing. Importantly, by co-developing training courses and workshops with government extension agencies, TBI members ensured the dissemination of knowledge beyond project intervention areas. Throughout the focus landscapes farmers have started applying techniques to diversify their fields, minimize the use of chemical fertilizers, and increase productivity.

Government support: Actively engaging government officials in training and workshops at different levels sparked attitude shifts within local government agencies, towards an integrated perspective on climate-smart landscapes with a key role for smallholder agroforestry. Government officials widened their views on agricultural development with more attention to diversification, resilience and climate change. They also learned about collaborative bottom-up approaches to extension services, based on joint experimentation and learning, with specific attention to women and youth. Moreover, with the help of Tropenbos members, local governments in the focus landscapes improved their land-use and development plans with more attention to the role of smallholder agroforestry. TBI members have also been drawing governments' attention to the regulatory changes that are required to facilitate further upscaling, such as legally allowing agroforestry farmers to trade timber and other forest products grown in their own fields, and to the need to secure tenure for agroforestry farmers. In DR Congo, communities successfully applied for community forestry concessions, which improved their tenure security and is expected to provide further incentives for planting and maintaining trees in agroforestry systems.

Economic feasibility: TBI members helped farmers to improve their access to markets for agroforestry products, among others through training on entrepreneurship, the organization of farmers in larger groups to increase their bargaining power vis-a-vis buyers, and facilitating connections between farmers and private processing and trading companies. In some cases, special attention was paid to engaging young farmers, and their potential to help develop new markets, for example those for organic products in urban areas. Tropenbos Viet Nam has been exploring options to promote diverse coffee agroforestry through the national Payments for Forest Environmental Services (PFES) programme. In Ghana and Indonesia, TBI members managed to increase agroforestry farmers' access to credit, through self-organized saving groups at community level and through external loans, respectively.

Box 7. Examples of working principles for agroforestry projects

- **Assess the context:** While diverse agroforestry systems provide numerous benefits, they are not suitable for all types of crops and all types of environments. It is therefore important to assess the suitability of agroforestry practices for each specific agricultural context and to carefully evaluate the potential risks and benefits.
- **Maintain flexible:** Support for agroforestry must be based on a profound understanding of local biophysical and socio-economic conditions, and their implications for land-use options. Rather than fixating on pre-defined ideals, it is necessary to work with local farmers on locally owned solutions, and maintain flexibility, so that strategies can be adapted along the way.
- **Engage government agencies:** Actively engaging government officials in agroforestry projects can help broaden their perspectives on rural development, with greater attention to the benefits of smallholder agroforestry and integrated landscape management. Also, engaging extension officers in developing field-level training courses can result in changes to government extension programmes, with greater attention to multifunctionality, the benefits of integrating trees in farm systems, local knowledge and experiences, and the role of women and youth. This can be an effective way to upscale agroforestry practices.
- **Monitor trends and trade-offs:** Contextual changes are likely to influence land-use practices. For example, increasing land scarcity could be an incentive for intensification, while the development of markets for environmentally friendly products and services could be an incentive for diversification and tree planting. Such developments must be better understood, because they will greatly influence the types of intervention strategies and policies that are required.
- **Explore new markets:** Access to markets for the variety of products and services provided by diverse agroforests is crucial to increase the economic attractiveness of agroforestry. Without this, increased land scarcity may motivate farmers to replace diverse agroforestry systems with intensively managed monoculture plantations.
- **Link to land-use planning:** Although the adoption of agroforestry practices may help to reduce the pressure on natural forests, the expansion of agroforestry practices can also happen at the expense of natural systems. This is particularly the case when the socio-economic conditions favour occupation of new lands rather than investments in existing agricultural lands. In such cases, efforts to increase the economic feasibility of agroforestry practices may result in extra pressure on the natural forest. Combining support for agroforestry with better land-use planning and enforcement should help to decrease this risk.
- **To improve access to credit, consider the capacity of both farmers and financial institutions:** Farmer organizations often do not have the skills and experience to meet the requirements of financial institutions, while financial institutions may not have credit mechanisms in place that are accessible to agroforestry farmers and their organizations. Financial institutions are therefore unlikely to provide loans to new and unexperienced farmers' organizations. Non-profit organizations can help to overcome this barrier.

6.2 Considerations for future programmes

Knowledge: The economic competitiveness of diverse agroforestry systems will vary from case to case. It is important to better understand and document the short and medium term costs and benefits in different situations, to develop viable business cases and attract financiers. There is also a need to further strengthen business and organizational skills among agroforestry farmer organizations, as this remains one of the main bottlenecks for upscaling. Future programmes would have to monitor and analyse developments in the landscape, how they influence agroforestry practices, and the implications for intervention strategies and policies. There is also a need to deepen the understanding of the relation between land-use choices at the plot level, livelihood resilience, and environmental functions (such as climate regulation and biodiversity conservation) at the landscape level. Finally, there is a need to better understand how agroforestry support can strengthen integrated landscape initiatives, and vice versa (See Box 4).

Government support: More needs to be done to change dominant rural development paradigms within governments. This will require collaboration with government agencies, as well as targeted lobby and advocacy efforts. Governments must be convinced to: (i) discontinue providing preferential treatment to large scale agrocommodity companies; (ii) remove regulations that inhibit the feasibility of smallholder agroforestry (such as policies that exclude smallholders from the legal timber market, and fees for farmers that trade forest products grown in their own fields); (iii) accelerate the implementation of policies to provide Indigenous peoples and local communities with land, forest and tree tenure rights; and (iv) develop and implement integrated landscape-level planning. Also, more attention is needed to translate national climate policies and plans (such as the Nationally Determined Contributions) into concrete measures at lower spatial scales to promote the sustainable use of forests and trees to achieve mitigation and adaptation objectives.

Economic feasibility: More experimentation is needed to improve the access of agroforestry smallholders to finance and markets. There is a need to develop and test financial mechanisms to increase investments in smallholder agroforestry projects, increase smallholders' access to credit, and improve financial incentives for diverse agroforestry (such as payments for environmental services). NGOs can collaborate with the private sector to further develop markets and infrastructure for organic and deforestation-free products. Growing markets in urban centres are promising, with a rising demand for products that can be produced in agroforestry systems, including timber. Finally, future programmes will need to make sure that increased national and international funding for restoration and climate-resilient agriculture will go to providing economic incentives for locally owned and diverse agroforestry practices, providing benefits in terms of livelihood resilience, climate change mitigation and biodiversity conservation.

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Tropenbos International
Horaplantsoen 12
6717 LT Ede
the Netherlands
☎: +31 317 702020
✉: tropenbos@tropenbos.org



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