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Farmers in Ghana tending fruit trees (*Citrus* sp.) intercropped with cereals such as maize, to maximize the use of land and diversify sources of income. Photo: FAO/Pietro Cenini.

Breaking barriers to agroforestry: FAO's global capacity needs assessment

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"Fortunately, the agroforestry community is getting bigger with time [...] Yet, the major challenge is implementing, developing and managing agroforestry in a way that aligns with the interests of stakeholders, mainly smallholder farmers."

Introduction

The Food and Agriculture Organization of the United Nations (FAO) implemented a Global Agroforestry Capacity Needs Assessment (CNA) over the course of July and August 2022, which received extensive responses from a variety of agroforestry stakeholders. The findings reflected known barriers to agroforestry adoption and scaling up and provided nuanced insights into priority areas of work to address these barriers.

In recent years, agroforestry has gained renewed attention within global policy processes. It is often promoted as a strategy for conserving and restoring the environment; contributing to climate change adaptation and mitigation; and improving livelihood resilience and food security for smallholder farmers. The ecological and biophysical aspects of agroforestry are well documented, and its potential benefits have been repeatedly demonstrated. This is the case not only in the last 50 years — since the term

Women workers weed and clean around cocoa trees, Brazil. Photo credit: FAO/K. Boldt

first made its appearance in research and development efforts — but over the hundreds of years that smallholders have successfully been practising various forms of traditional agroforestry around the world.

Despite the longstanding experience with agroforestry and recognition of its benefits, it has struggled to become a widespread practice and still faces challenges in transitioning and scaling up from scientific understanding to widespread implementation. Popular enthusiasm alone is not enough to ensure sustainable agroforestry practices; broad support, at both the policy and technical level, is required. This calls for greater efforts across the globe on improving enabling environments, developing contextually adapted solutions, and strategically strengthening the capacities of all those involved in agroforestry on the ground.

To contribute to these efforts, FAO's Global Agroforestry Capacity Needs Assessment aimed to establish a baseline of existing agroforestry capacities throughout the world and to identify gaps where capacity support may be most beneficial. The global survey was carried out during the summer of 2022 and was completed by 1,572 people working on agroforestry in 145 countries, including governmental officials, researchers, practitioners, donors, community groups and farmers.

The survey assessed individual capacities and access to capacity development in agroforestry research,

design and implementation; it also explored reasons for working on agroforestry and opinions on priority areas for future global efforts. What emerged was a broad picture of ongoing and emerging trends in agroforestry; in particular, three major action areas where further capacities could be developed:

1. transforming agroforestry into an economically viable production system;
2. strengthening enabling environments through agroforestry policies and strategies; and
3. improving agroforestry extension for more biodiverse and agroecological systems.

Global agroforestry capacities: strengths, gaps and opportunities

Barriers to agroforestry adoption and scaling up have been widely discussed in the literature. Many of the barriers relate to the lack of enabling environments for agroforestry, including secure land tenure, supportive policies, and access to markets and value chains (Buttoud et al. 2013). A lack of incentives for farmers is also recognized as a key issue, due to a delay in returns on investment from tree products versus annual crops. The historical division between agriculture and forestry and the lack of coordination between sectors has also adversely affected policy, land-use planning and extension services for agroforestry. Additionally, agroforestry research has predominately focused on

biophysical studies at the farm level, paying limited attention to socioeconomic information (Karlsson 2018). Many of these barriers and gaps in knowledge were reaffirmed by the CNA.

The CNA was designed as a capacity self-assessment, and six main stakeholder groups involved in agroforestry responded: 1) governmental entities; 2) national and international non-governmental organizations (NGOs); 3) land users and community groups; 4) research and academia; 5) private-sector entities; and 6) investors and donors. Most respondents belonged to NGOs, followed by researchers/academia and government.

Survey respondents generally asserted a high level of agroforestry expertise, particularly in agroforestry planning and implementation, along with a strong dedication to and belief in the importance of agroforestry as a sustainable land management system. This was especially true for those in the NGO, government and land-user stakeholder groups. Their environmental capacities, as well as community engagement and inclusion, and training and extension services, were strongest. Further analysis revealed that respondents had more confidence in tree and forest management than in crop management and agriculture.

The main capacity gaps were related to socioeconomic aspects and strengthening enabling environments, namely business planning, policy analysis and implementation, and improving land tenure and resource use rights. Economic capacities, such as creating a market-based strategy, developing a value chain, and mobilizing finance, consistently ranked as weakest across most survey respondents.

The survey revealed stronger capacities within certain stakeholder groups. **Governmental stakeholders** featured community engagement, inclusion and capacity support as key strengths, along with providing technical assistance and extension services. The principal capacity gaps related to the enabling environment and the farm-level support needed to ensure the economic viability of agroforestry, including facilitating access to markets, mobilizing finance and developing business plans. They also identified strengthening formal and traditional rules and regulations governing land ownership, resource tenure and use rights for local communities as capacity gaps. Since governmental stakeholders are theoretically the main actors who can contribute to addressing structural barriers related to access to markets and tenure, this gap is significant and may explain why the enabling environment continues to be a major barrier

to wider agroforestry adoption. It is important to note, however, that the respondents in this group may be technicians rather than policymakers, which could also explain the gap.

The **NGO respondents** claimed similar strengths to the governmental stakeholder group. The strongest capacities related to community engagement and inclusion, knowledge sharing, and capacity development. For instance, the group had expertise related to engaging youth, women, Indigenous peoples, and other marginalized groups in agroforestry-related decision-making processes and ensuring gender sensitivity. Meanwhile, strengthening enabling environments and ensuring the economic feasibility of agroforestry were this group's weakest capacities, including measures such as facilitating access to markets and value chains, strengthening tenure and use rights, developing market-based strategies and engaging with the private sector.

The **land user group**, which included smallholder farmers, pastoralists, community leaders and other local-level interest groups, demonstrated high capacity levels across the range of activities related to the successful planning and implementation of agroforestry, especially in terms of sustainably managing agroforestry systems and collaborating with their community. As with the other stakeholder groups, the main areas with capacity gaps were economic: developing a market-based strategy, assessing the costs and benefits of agroforestry interventions, and mobilizing finance.

Research and academia were well-represented in the survey results and their expertise lay mostly in identifying benefits, barriers and linkages related to agroforestry and environmental services, and in communicating this knowledge through various means. Self-identified gaps were generally linked to cost-benefit analyses, modeling and policy analysis. Interestingly, despite being confident in engaging with decision-makers, they identified the assessment of how policies influence implementation and agroforestry intervention outcomes as a weaker capacity.

The remaining stakeholder groups (the private sector, investors/donors, research and academia) showcased a range of capacities given the varied nature of their involvement with agroforestry. Perhaps unsurprisingly, the **private-sector group** had economic expertise in many of the areas that represented capacity gaps in the other groups; including, for instance, the development of profitable business models, facilitating access to funding, and value chain development. Selecting investments was a strength for this group, while developing risk mitigation

Local farmers, also known as *Sempre-vivas* **flower gatherers, have developed an effective agricultural system that combines flower gathering, agroforestry gardening, livestock grazing and crop cultivation, Southern Espinhaço Mountain Range, Minas Gerais State, Brazil. Photo: FAO/Joao Roberto Ripper**

measures and securing long-term funding commitments were areas with capacity gaps.

Investors and donors were not only the stakeholder group with the lowest response rate, but also self-assessed a low level of agroforestry-related capacities, identifying more gaps than strengths. Their strengths were linked to selecting agroforestry investments and facilitating access to funding. The main gaps included developing risk mitigation measures, establishing long-term innovative financing solutions, and value chain development.

The results of the CNA clearly reaffirmed how socioeconomic considerations are lacking in both agroforestry knowledge and practice. This includes gaps in farm-level support (including business planning and system design), enabling environments related to supply and to value chain development, access to markets, and design of incentives. Policy design and implementation were also repeatedly flagged as areas that need additional support. Although respondents had much expertise in community engagement and capacity development, they nonetheless called for further capacity support in developing agroforestry systems that maximize their potential to sustainably produce food. Based on these identified gaps and experiences shared by respondents, the three action areas — economically

viable agroforestry, agroforestry policies/strategies and agroforestry extension — represent priorities that all those in the global agroforestry community can contribute to by leveraging their comparative advantages.

Action area 1. Transforming agroforestry into an economically viable production system

At the core of success is making agroforestry economically attractive to and feasible for farmers. Many agroforestry interventions are not successful in the long-term, or are not even adopted in the first place, because of insufficient recognition that they are production systems that need to ensure livelihoods and generate a sustainable cash flow (Gosling et al. 2020). Agroforestry should be promoted not only to address environmental, social or governance issues, but also in terms of business development and financial considerations. Therefore, addressing the capacity gaps that can transform agroforestry into an economically viable production system is crucial.

This involves improving the collection of economic data and supporting holistic cost-benefit analyses to address some of the information gaps related to the economics of agroforestry. Developing business models, case studies and guidance to showcase and increase the financial

viability of agroforestry is also crucial. As one survey respondent working at a research institute in Uganda put it: "Agroforestry will remain a theoretical practice unless we strive to exhibit more and more successful case studies." Another goal is to enhance the capacities of practitioners to develop market-based strategies and investment proposals to finance their agroforestry businesses. At the market level, there is a need to improve access to financing, and to further develop sustainable value chains and markets for agroforestry products.

Risk perception and risk management are two of the main barriers to agroforestry uptake. Farmers, especially smallholders, perceive the longer-term investment of growing trees as riskier than agriculture with annual crops, or even unfeasible (Jerneck and Olsson 2014). Financial incentives — when well-designed, with short-, medium- and long-term outlooks — can play an important role in addressing this challenge. For instance, the popular topic of payments for ecosystem services, including carbon finance, is increasingly being discussed in the context of agroforestry. However, these incentive mechanisms should be implemented only as a supplementary source of income for farmers, especially in the start-up phase; the agroforestry system needs to be economically viable and sustainable without these additional payments.

Action area 2. Strengthening enabling environments through agroforestry policies and strategies

In order to successfully scale up agroforestry, holistic agroforestry policies and strategies to strengthen enabling environments are needed. Although many countries mention agroforestry in their sustainability and climate strategies, and advocacy for agroforestry is on the rise, only two countries — India and Nepal — have national policies for agroforestry in place, and more such policies are needed. Meanwhile, the CNA revealed that the lack of an enabling environment was a major gap for all stakeholders, including those working in governance-related institutions. As one survey respondent working as a researcher in Germany mentioned: "The major bottlenecks [in agroforestry support] really seem to be about policy and scaling up."

Addressing this policy gap has historically proven complex given agroforestry's position at the intersection of multiple sectors, including agriculture, forestry, environment and rural development; this has often resulted in agroforestry falling into jurisdictional cracks (FAO 2013). Therefore, improving cross-sectoral collaboration across government agencies and leveraging various types of expertise will be necessary to develop effective agroforestry policies. This is no easy task, but inter-regional knowledge exchange can help countries learn from the experiences of others in developing and implementing these kinds of policies. Design of effective incentives also needs to be addressed at the policy level. This can include adapting agricultural and tree growing subsidies to agroforestry systems and developing innovative ways to incentivize uptake through improved tenure and use rights.

Action area 3. Improving agroforestry extension for more biodiverse and agroecological systems

In order to maximize the regenerative and sustainable potential of agroforestry, perspectives need to shift towards a more holistic understanding of agroforestry as a food production system, and to emphasize its nutritional and agricultural benefits. Agroforestry systems should be designed and promoted in a way that is contextually appropriate, and that ideally strives to be as agroecologically diverse and biodiverse as possible. The need to mainstream biodiversity in agroforestry design and implementation was repeatedly mentioned by survey respondents, as expressed succinctly by an NGO officer working in Cameroon: "Agroforestry landscapes need to incorporate biodiversity conservation strategies." When effectively implemented, agroforestry can also contribute to halting deforestation and improving tree cover loss, particularly in critical areas where there may be competing land uses by agriculture and forestry (dos Reis et al. 2023).

Attaining these larger objectives requires recognizing agroforestry as a complex system where synergies need to be supported and competition minimized through active management. Although the CNA results showed a high level of individual expertise in capacity development and extension services, respondents expressed a need for further technical and capacity support. Knowledge and management of both crops and trees are two of the main factors that make agroforestry more difficult to practise than other forms of agriculture. This context can become even more complex when designing for improved biodiversity outcomes and applying agroecological practices. Therefore, improved data and ecological specifications on common agroforestry tree and crop species and interactions, and greater efforts in sharing relevant information through more effective means, is needed.

Two young men selling charcoal along the roadside, Cambodia. Photo: FAO/J. Koelen

Overall, overlapping expectations of environmental benefits and economic gains make agroforestry extension and capacity development especially important. Although the global agroforestry community is well equipped in this domain, capacity support is still needed to adapt to the shift towards more biodiverse and agroecological systems. A crucial element that also bears re-emphasizing is that farmers' knowledge, needs and aspirations should be at the core, not only of agroforestry design and implementation, but also of capacity development. This involves continuously ensuring that local and Indigenous knowledge is strengthened and is integrated into all levels of agroforestry interventions, increasing peer-to-peer learning opportunities, and facilitating collective organization. Moreover, addressing barriers to adoption can entail improving research on the sociocultural and behavioural considerations that influence agroforestry uptake, including gender issues and social inequality, social perceptions and cultural norms (Meijer et al. 2014). Eventually, a systematic approach to quantifying and understanding social, economic and environmental cost-benefit trade-offs for and with farmers will be an important step forward.

Conclusion and recommendations

Overall, the capacity needs assessment showcased a widespread, diverse and motivated global agroforestry community. Many respondents acknowledged that agroforestry is — rightly — being promoted and linked to global sustainability goals, but that the challenge remains in connecting global priorities with the realities of those working on the ground. The issue of farmers needing to receive their just benefit was present throughout the survey results; the lack of tangible benefits and of successful, relevant and contextual examples remain some of the main reasons for non-adoption.

Creating accessible agroforestry models and systems that achieve the balance of being profitable for farmers, agroecological and biodiverse is a central challenge. The three action areas — improving economic capacities, establishing effective incentives and policies, and strengthening extension — are critical parts of the solution. This information is not new; the results of the CNA confirmed well-known barriers to the widespread adoption of agroforestry. These barriers have persisted for decades. In order to see successful, scaled-up agroforestry there is a need to effectively address these gaps and build stakeholder capacities.

Each of the various stakeholders involved in agroforestry can contribute in working towards the goals of these action areas. The research community and practitioners can contribute to improving data on the socioeconomics of agroforestry, including economic feasibility, sociocultural factors that influence adoption, and case studies and examples of systems that have worked and those that have not. Policymakers can work with the private sector to improve enabling environments, through

efforts to develop sustainable value chains and markets for agroforestry products.

A cross-cutting solution is to strengthen peer-to-peer knowledge exchanges at local, regional and global levels, and showcase successful agroforestry models and strategies. This can entail strengthening inter-regional connections and collaborations to share experiences between areas with similar ecological and socioeconomic conditions, establishing global and local communities of practice and peer-to-peer knowledge-sharing opportunities, and creating innovation centres and demonstration farms of successful agroforestry models. National NGOs can further contribute to highlighting and integrating local and Indigenous agroforestry knowledge.

In the transition to more sustainable agroforestry, it is imperative to leverage collective strengths to close gaps in agroforestry capacity. The successful scaling up of agroforestry — to contribute to a range of local, national and international goals — depends on different stakeholders with different expertise collaborating on farmer-centred agroforestry. FAO can support countries in developing holistic agroforestry policies and strategies, and can provide guidance and facilitate the implementation of good practices on the ground.

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