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Enhancing gender equality in agroforestry systems

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1 Introduction

Agroforestry is practised by almost a third of rural smallholders (Miller et al., 2017) on 43% of the world's agricultural lands (Zomer et al., 2014). Agroforestry systems can take many forms, ranging from agrisilvicultural (trees combined with crops) to silvopastoral (trees combined with pastures or animals) and agrosilvopastoral systems (trees combined with animals and crops) (Nair et al., 2021). Agroforestry systems contribute to provisioning food and nutrition, medicine, and income to rural households and play critical cultural roles and regulatory functions (e.g. water regulation, soil fertility, biodiversity conservation, pollination) around the world (ibid.). As such, agroforestry is central to the resilience of rural people and landscapes globally.

Yet these socio-ecological systems embed and (re)produce significant gender differences and inequalities. These range from gender-specific labour, knowledge, and skills to inequalities in decision-making, access to and

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control over resources, and costs and benefits related to agroforestry. Gender relations interact with other social relations, such as those based on ethnicity, age and generation, socio-economic status, and more, to produce differential experiences, outcomes, and inequalities (Colfer et al., 2018) in relation to agroforestry.

The Sustainable Development Goals (SDGs) recognize gender equality as a goal in its own right, and as a key lever for achieving other SDGs. Similarly, gender equality may be its own goal in agroforestry interventions, and a lever for achieving other desirable agroforestry outcomes. Yet gender must be intentionally addressed in agroforestry initiatives if they are to hold promise for social justice and sustainable development (Elias et al., 2023).

This chapter explores the nexus of gender and agroforestry. Specifically, we recognize that gender shapes agroforestry systems and that agroforestry systems can either (re)produce, or alternatively, challenge gender inequalities; and we explore projects and initiatives that have sought to do the latter. To support this analysis, we draw on two frameworks – the Gender at Work framework, and the Reach–Benefit–Empower–Transform framework – to understand, respectively: (1) gender transformative change in and through agroforestry; and (2) a range of programmatic approaches for working with gender to support this change. To bring the discussion to life, we draw on examples of agroforestry projects that have intentionally addressed gender relations and examine how they have fared. In so doing, we highlight entry points for agroforestry interventions to promote greater equality.

2 Conceptualizing gender in agroforestry

2.1 Gender (in)equality in agroforestry systems

To structure our analysis of the gender–agroforestry nexus, we draw on Rao and Kelleher's (2005) 'Gender at Work' framework of 'what needs to change' to achieve gender equality. Adapted from Wilber (1999), the framework highlights the formal and informal barriers to gender equality that must be lifted together, from the individual- to the system level, to support equality (Fig. 1). As shown by the arrows, changes across levels and quadrants are mutually reinforcing.

Broadly explained, in the top left quadrant (quadrant 1), we include aspects related to gendered knowledge, self-awareness, decision-making, and agency (the ability to make strategic life decisions and act upon them in situations where this ability was previously denied (Kabeer, 1999)), which are linked with women's (and men's) capacities, leadership, voice, and influence. These contribute to achieving a rich and reflective understanding of the world (critical consciousness) that underpins action to redress the inequalities described in quadrants 2–4. Women's access to and control over resources

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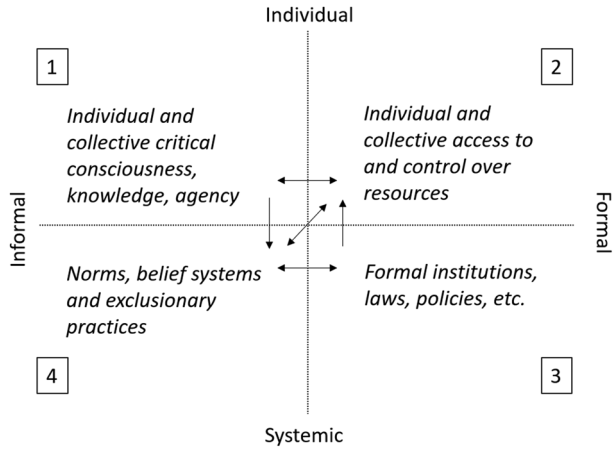

Figure 1 Gender at Work framework: 'What are we trying to change?'. Source: Adapted from: Rao and Kelleher (2005, p. 60).

Table 1 Understanding gender in agroforestry through the 'Gender at Work' framework

Quadrant	Examples of manifestations in agroforestry systems
1. Critical consciousness, knowledge, and agency	Agroforestry knowledge, decision-making overuse, management, and sale of agroforestry products and over priority tree species, perceptions of one's own contributions to agroforestry (i.e. recognition of who is a farmer or resource manager)
2. Access to and control over resources	Land tenure, tree tenure, and access to tree products, inputs, labour, information, and income
3. Formal institutions, laws, and policies	National agricultural and agroforestry policies, agricultural extension systems, financial services, rules for membership in farmers' associations, or for participation in agroforestry initiatives
4. Norms, belief systems, and practices	Norms around decision-making, access to land and other resources, distribution of labour, and more, related to agroforestry

(quadrant 2) includes control over assets, income, and information. Following Morgan et al. (2023), we highlight that between the individual and the systemic levels, changes in women's and men's critical consciousness and rights to resources also occur at the collective level. The bottom-right quadrant 3 refers to the changes needed in formal policies and regulations, including those that condition governance processes. Finally, the bottom-left quadrant 4 includes the informal 'rules of the game' (North, 1991), such as gender norms and discriminatory beliefs, traditions, and practices that shape the conditions and processes (decision-making, control over resources, policy-making, and implementation) described in the other quadrants. We apply the framework below to demonstrate some of the ways in which gender and agroforestry are mutually shaped and summarize these in Table 1.

2.1.1 Critical consciousness, knowledge, and agency

Due to socially prescribed roles and responsibilities, rural women and men are often tasked with collecting, using, and managing different tree products (Catacutan and Naz, 2015; Gelinas et al., 2015; Kiptot, 2015; Villamor et al., 2015). This gendered division of labour influences the perceptions, knowledge, and skills women and men acquire about tree resources (e.g. Müller et al., 2015), and the value they place on diverse tree species, traits and products, and environmental services (Kiptot et al., 2014; Degrande and Arinloye, 2015; Gutiérrez Velásquez, 2016; Karambiri et al., 2017).

Despite these gendered knowledge systems and preferences, women are often excluded from decision-making processes related to agroforestry (Kiptot and Franzel, 2011; Gonçalves et al., 2021). The capacity to make decisions about land use, which tree species to safeguard or plant, how to use different parts of trees, whether or not to adopt agroforestry innovations, and more, are shaped by gender and other social identities, such as marital status, lineage, and stage in the life cycle (Assé and Lassoie, 2011; Colfer et al., 2015; Gumucio et al., 2017). Women's influence over decision-making processes is often limited in restoration, climate action (e.g. Reducing Emissions from Deforestation and Forest Degradation (REDD+)), and other agroforestry programmes and initiatives (Larson et al., 2018; Sarmiento Barletti et al., 2019; Kristjanson, 2020; Elias et al., 2022). This partly owes to a lack of recognition of women as agroforesters and resource managers, despite their multiple contributions to managing trees and collecting, processing, trading in, and otherwise using tree products (Islam, 2015). Challenging this misperception, which rural women themselves have frequently internalized (Elias, 2015), is an important step for increasing women's individual and collective self-awareness, critical consciousness, and agency in and through agroforestry.

2.1.2 Access to and control over agroforestry resources

Gender inequalities are also manifest in relation to access to and control over land, trees, and other agroforestry resources. Customary and formal laws, which embed and reproduce gender inequalities, mediate rights to land and incentives and capacity to manage tree resources. In patrilineal systems, women's rights hinge upon their relationship with male relatives – usually a husband, father, or uncle – who are considered primary rightsholders (Colfer et al., 2016; Meinzen-Dick et al., 2019). Rights to plant, harvest, or fell trees are also formed at the intersection of gender and other factors, such as marital and residence status (Kiptot and Franzel, 2011; Elias et al., 2017). In the many contexts where tree planting signals a claim to land, there are commonly prohibitions against women planting trees because of their insecure rights to

land (Kiptot and Franzel, 2012; Colfer et al., 2017). Gendered land and tree tenure regimes affect tree management strategies, as tenure insecurity limits women's incentives to plant and manage trees to which they may not have long-term rights (Howard and Nabanoga, 2007).

Although they are dynamic and interrelated, there can also be distinctions between rights to land and to the trees it harbours. For example, in Burkina Faso, rights to shea trees (*Vitellaria paradoxa*) are not automatically conferred to the borrower when land is loaned (Kuusaana, 2022), and access to néré (*Parkia biglobosa*) pods follows a hierarchy based on women's lineage, order of marriage (in polygamous households), and migrant or resident status (Pehou et al. 2020). Rural women's more limited access (as compared to men) to other types of agroforestry assets, such as agricultural inputs, new technologies, means of transport, as well as to labour and to complementary services (information, credit, etc., described below) also hinder women's access to benefits from agroforestry (Degrande and Arinloye, 2015).

2.1.3 Formal institutions, laws, policies, etc.

As mentioned above, women's exclusions from decision-making and from accessing and controlling agroforestry resources are frequently enshrined in formal institutions, laws, and policies. Extension services and input delivery systems, financial services, laws regulating land tenure, and other formal institutions may fail to recognize women as agroforesters, farmers, and resource managers (Kiptot and Franzel, 2011; Degrande and Arinloye, 2015; Quisumbing et al., 2019). Other times, these institutions embed the problematic assumption that rights and services delivered to men will automatically reach and benefit other household members (Quisumbing et al., 2019). Extension systems are themselves largely staffed with men, which complicates contact with rural women when norms discourage interactions across gender groups with non-family members (Ragasa, 2014).

Gender biases in private and public services, such as credit and extension services (Manfre et al., 2013; Kosec et al., 2023), limit women's capacity to participate in agroforestry markets and to build remunerative tree-based enterprises (Catacutan and Naz, 2015; Ingram et al., 2016; Davis et al., 2019). Where benefits from agroforestry are formally linked to land rights, such as in many Payments for Ecosystem Services schemes, women who are not registered on titles receive limited direct benefits from these initiatives (Sunderlin et al., 2018; Kariuki and Birner, 2021; Tseng et al., 2021). When rules of the entry limit the number of members in farmers' associations or cooperatives to one per household, women are usually excluded in favour of their husband, which limits women's direct access to services and benefits from these groups (Kaaria et al., 2016).

2.1.4 Norms, belief systems, and discriminatory practices

Norms and belief systems underpin these exclusions and inequalities. For example, as noted above, gender norms shape the division of labour in agroforestry systems. As Sunderland et al. (2014) show in their global comparative study, although there are regional specificities, rural women typically dominate the collection of non-timber tree products for food, fuel, fodder, medicine, and small-scale trade, whereas men are primary harvesters of structural fibre, such as timber for construction or sale. There are also normative specifications about where women and men should collect tree products, which species they can plant or harvest, which parts of the tree they can draw from, and more (Elias et al., 2017). Claims to land, the most fundamental resource in land-based production systems, are also normatively mediated. For example, even when women's and men's rights to land are equal before the law, social sanctions and stigmas may strongly deter women from claiming these rights (Doss and Meinzen-Dick, 2020).

As noted above, gender norms shape decision-making patterns, including in agroforestry initiatives (Colfer et al., 2015; Gumucio et al., 2017). In many contexts, such norms discourage women from attending public meetings or speaking up in front of their male counterparts (Agarwal, 2001; Elias et al., 2020). At the household level, too, women's participation in certain decision-making processes, including those related to land and tree management, may be frowned upon and limited – though the issue is complex and context-specific (Mwangi et al., 2011; Kiptot, 2015; Gumucio et al., 2017). Taboos, social restrictions on mobility, and time deficits resulting from the gender division of labour further limit women's capacity to engage in agroforestry initiatives and markets (Agarwal, 2011; Kiptot and Franzel, 2011; Degrande and Arinloye, 2015).

2.2 Programmatic approaches for supporting gender equality through agroforestry

Many agroforestry initiatives – programmes, projects, and research – seek to recognize, respond to, and challenge these gender-based constraints. The 'Reach, Benefit, Empower' (RBE) framework (Johnson et al., 2018) offers clear practical guidance for understanding and developing effective strategies to achieve and monitor progress towards these goals. The original RBE framework was adapted to include the 'Transform' (T) dimension (CGIAR Research Program on Fish Agri-Food Systems, 2017), which captures programmatic aims and strategies to lift the barriers to gender equality, moving beyond a focus on individual women and their groups towards reforming the informal and formal discriminatory structures (norms, policies – quadrants 3 and 4 of Fig. 1) that maintain inequality.

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Table 2 Programmatic objectives, strategies, and indicators related to gender, as understood through the RBET framework

	Reach	Benefit	Empower	Transform
Objectives	Include women and ensure their participation in programme activities	Increase women's well-being (e.g. food security, income, health)	Strengthen women's ability to make strategic life choices and put those choices into action	Create deep and enduring change towards gender equality, including more equitable gender norms
Potential strategies (examples)	- Invite women as participants - Reduce barriers to participation - Implement a quota system for women's participation in events	- Address gendered needs, preferences, and constraints to ensure that women benefit equitably from project activities	- Enhance women's decision-making power in households and communities - Address areas of disempowerment	- Encourage critical awareness among men and women about social inequality (e.g. in control over resources, gender-based allocation of responsibilities, and women's and men's access to and influence in decision-making) - Engage women and men as change agents
Potential indicators	- Number or proportion of women participating in a project or activity - Rate of women versus men who speak up during activities and influence project agendas	- Sex-disaggregated data for positive and negative outcome indicators (e.g. productivity, income, assets, nutrition, time use, etc.)	- Women's decision-making power (e.g. over agricultural production, income, and/or household food consumption) - (Reduction of) outcomes associated with disempowerment (e.g., gender-based violence, labour burdens)	- Women's and men's attitudes towards discriminatory gender norms (measured by normative gender attitude assessments)

Source: Dick Frederiksen et al. (2021), who adapted it from Johnson et al. (2018) and CGIAR Research Program on Fish Agri-Food Systems (2017).

Table 2 presents the key elements of the framework, aligning progressively more ambitious objectives for women's empowerment and gender equality with strategies for achieving these, and with indicators that can be used to monitor their achievement. The four dimensions of RBET are not mutually exclusive, but rather reinforcing. As shown in Table 2, goals and strategies to reach, benefit, or empower women, or to transform unequal gender relations and norms are often distinct, however. In this chapter, we draw upon the RBET framework to demonstrate some of the approaches that agroforestry initiatives have taken to reach and benefit women, support their empowerment, and transform discriminatory structures to advance gender equality.

3 Case studies

3.1 Recognizing women as legitimate stakeholders, and addressing gendered knowledge and priorities in agroforestry systems (quadrant 1)

One of the most common ways agroforestry projects attempt to reach and benefit women is by involving them in the selection of tree species. In so doing, projects recognize that women and men are both legitimate stakeholders with overlapping but also distinct knowledge and priorities for tree species. Two illustrative examples of such efforts are presented below.

The first is the study **'Gender and climate mitigation through coffee agroforestry'**, conducted as a complementary research component within four partly overlapping projects implemented in Northwest Vietnam (Dien Bien and Son La provinces) by World Agroforestry, CARE, and *Centre de coopération internationale en recherche agronomique pour le développement* (CIRAD). The northern upland region of Vietnam is populated by ethnic minority groups, now sedentary and characterized by diverse cultural practices and norms. The study focused on the Thai ethnic group, which typically occupies the lower segments of valleys, with access to both paddy fields and some sloping land with forestry and home gardens. Decades of monoculture on deforested hills have resulted in severe land degradation, and in response there has been a recent shift in government policies (e.g. Nationally Determined Contributions) towards more tree planting, both in forests and agroforestry systems, to address livelihood, degradation, and climate change concerns (Mulia et al., 2020).

Project staff had been implementing agroforestry in the region since 2011 and observed that forestry was typically considered men's purview. Men worked in the forests and were therefore assumed to be more knowledgeable about trees in general. Forestry extension officers were men, who tended to talk to male farmers, thereby reinforcing the exclusion of women. Within some ethnic groups, however, fruit trees in home gardens were under women's care; and

despite limited dedicated attention to gender issues, project staff observed that men and women had different priorities for trees.

A complementary applied research component (2018–2020) was thus developed to bring women's tree preferences to the fore. The research aimed to: (1) fine-tune the methodology for collecting data on local socio-ecological knowledge about tree species and related preferences for coffee agroforestry systems, and (2) provide evidence on the importance of a gender-sensitive understanding of agroecological knowledge and priorities. Through structured and semi-structured interviews and participatory group exercises with women and men separately, the project team explored local women's and men's knowledge of priority tree species, and their valuation of ecosystem services associated with each species in *Arabica* coffee agroforestry systems compared to coffee monocultures. Simelton et al. (2021a) provide more detail on how the study followed the prompts from the 'ShadeTree Advice' methodology (Rigal et al., 2022) to identify gender-specific tree species preferences.

Findings, presented in Simelton et al. (2021a) and Nguyen et al. (2020), showed that men prioritized tree species for inclusion in coffee agroforestry systems according to three main criteria, namely, soil quality (species contributing to soil fertility, soil moisture, low root competition, litter provision, erosion control), coffee production (species that do not negatively impact coffee yields), and income generation (Fig. 2). In comparison, women valued more types of benefits related to: labour requirements, shade provision, micro-climate, pest and disease resistance, coffee production, income generation, and soil quality (Fig. 3). Despite its importance to women, income generation was not a primary criterion for them to prioritize tree species. Instead, they considered fruit tree species and others that reduce household expenditures because their products are consumed within the home as priorities.

The overall preferred species for men was honey locust (*Fructus gleditschiae (Gleditsia)*), whereas for women it was plum (*Prunus salicina*), a multipurpose species (Table 3). The three species that men prioritized were also included among women's priorities so this rendered no conflicting result (Table 3). Instead, because women's priorities were based on a wider range of criteria, also consulting them resulted in a larger number (nine) of potential tree species for inclusion in agroforestry systems.

Several reasons account for differences in men's and women's tree species preferences. For one, rural men from ethnic minorities in Vietnam generally have more years of formal schooling than their women counterparts and are more likely to be bilingual and speak Vietnamese, the national language. They are therefore better able to access public information and communicate with extension and project officers, which are predominantly done in Vietnamese. Preferences are also shaped by gender roles. Because women weed and pick coffee cherries under the sun, they value trees with canopies that provide

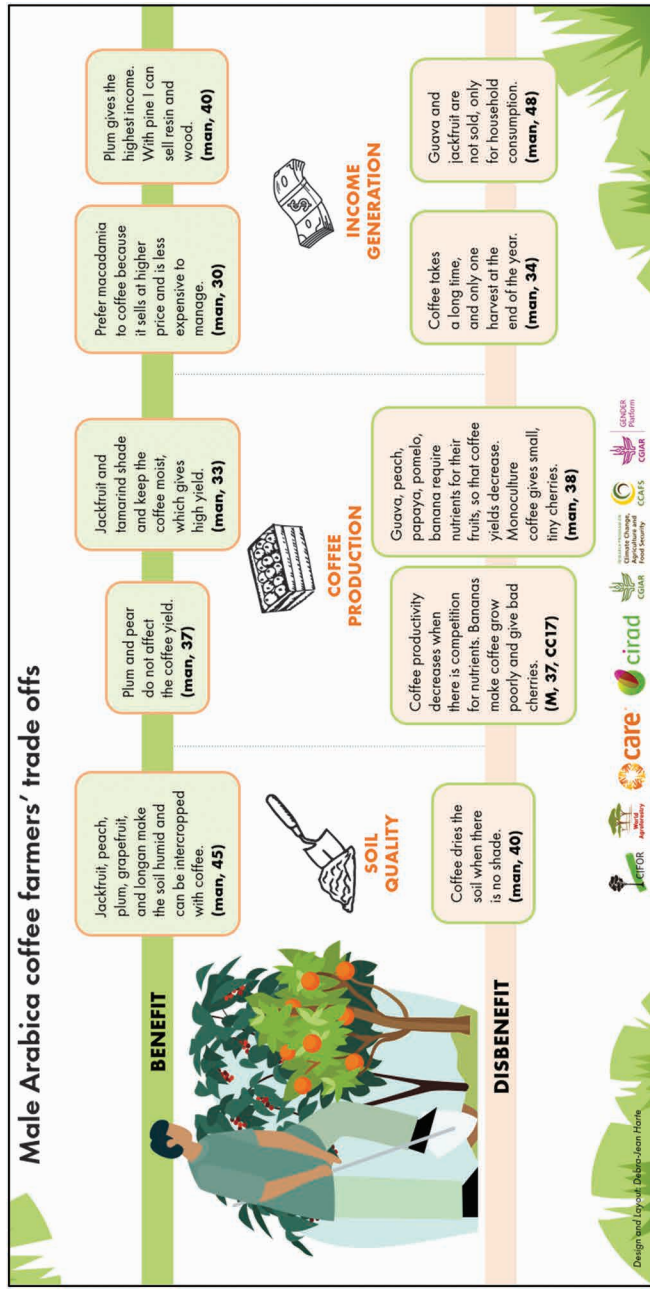

Figure 2 Criteria shaping men's preferences for tree species for inclusion in coffee agroforestry systems. Source: Simelton et al. (2021a) (Design and layout: Debra-Jean Harte).

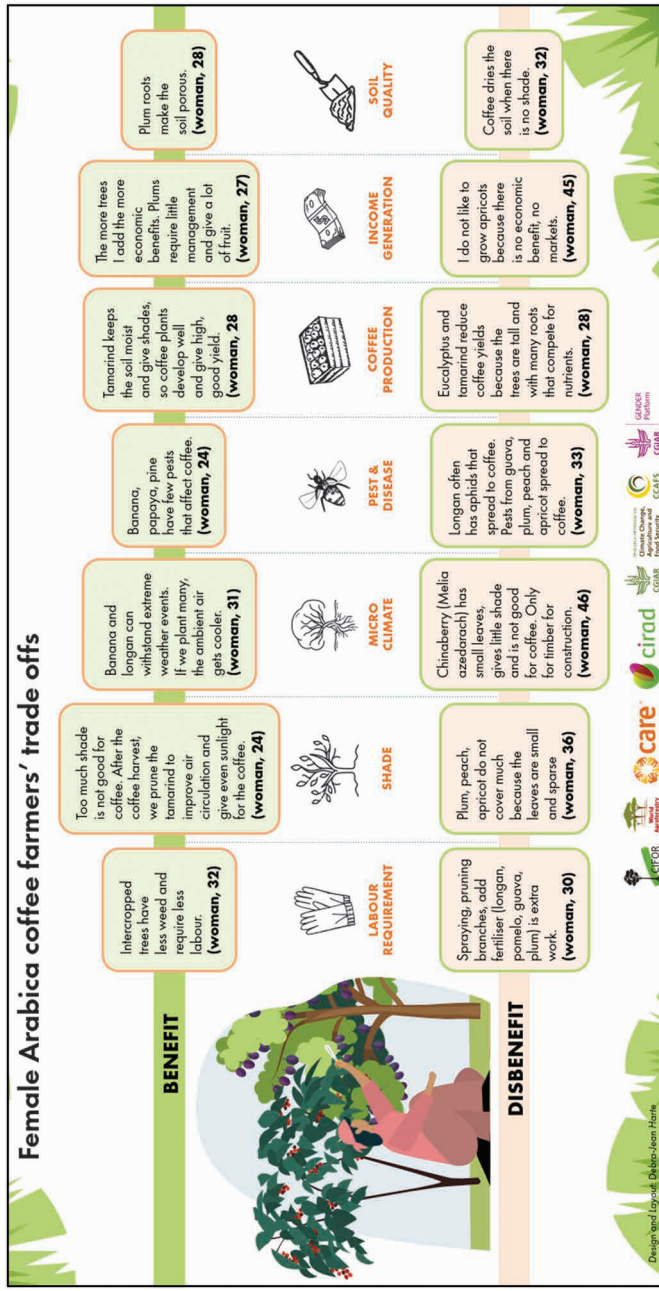

Figure 3 Criteria shaping women's preferences for tree species for inclusion in coffee agroforestry systems. Source: Adapted from: Simelton et al. (2021a) (Design and layout: Debra-Jean Harte).

Table 3 Gender-specific preferences for tree species (excluding *Arabica* coffee) to incorporate in coffee agroforests and reasons for these preferences

	Preferred benefit cited	
Species	Men (n = 53)	Women (n = 53)
Honey locust *(Fructus gleditschiae (Gleditsia))*	Income generation ***Overall preference***	Soil quality Coffee production Pest and disease resistance
Candle bush (*Senna alata*)	Soil quality	Shade Labour requirements
Tamarind (*Leucaena leucocephala*)	Soil quality Coffee production	Soil quality Coffee production
Tenasserim pine (*Pinus latteri)*	–	Shade
Longan (*Dimocarpus longan*)	–	Shade
Eucalyptus (*Eucalyptus* spp.)	–	Labour requirement
Chinese black olive (*Canarium nigrum*)	–	Pest and disease resistance
Jackfruit (*Artocarpus heterophyllus*)	–	Soil quality
Plum (*Prunus salicina*)	–	Multiple benefits ***Overall preference***

Source: Adapted from: Table 1 and Figure 1 in Simelton et al. (2021a).

suitable shade for coffee (such as locust and candle bush) and for themselves. Moreover, their heavy farming and domestic responsibilities, including their caretaking (of children, elders) roles, leave them little time to follow courses or attend meetings, which often restricts their participation in value-addition activities of the family enterprise. This contributes to women's preferences for fruit trees, from which they can sell fruits directly.

By exploring gender-specific tree species preferences, the project helped to reveal, document, and discuss these normative gender roles with study participants (quadrant 4 in Fig. 1). Findings have also informed subsequent projects targeting ethnic minority women in developing marketing and economic skills for coffee and agroforestry business (Simelton et al., 2021b). Results have additionally been shared with investors, government, and extension officers, who usually decide what tree seedlings to select for agroforestry projects (see Nguyen et al 2020).

Reinforcing results from the first case study in a different regional context, the second example – the '**Agroecological Regenerative Cocoa**' (ARC) project – focuses on another tree crop: cocoa. Cocoa is the second most important agricultural product in Peru after coffee, and the Peruvian cocoa sector employs more than 100000 families, generating 13 million wages annually (Soto et al., 2022). Cocoa forms part of the ancestral Amazon culture, knowledge, and heritage of Indigenous peoples. Yet the expansion of cocoa plots is one of the main threats to forest ecosystems in the region. Cocoa agroforestry (versus

monoculture) is considered a way to strike a balance between profitability and forest conservation.

The ARC project (2020–2025) aims to contribute to the establishment of productive and sustainable cocoa agroforestry landscapes to improve the quality of production, ecological resilience, socio-economic sustainability, and sustainable access to markets. Led by the Alliance of Bioversity International and CIAT in collaboration with KAOKA, Colpa de Loros cooperative, CECAO cooperative, Conservation International, and World Agroforestry, the project's gender equality objective focuses on the equal participation and leadership of women and men. Emphasis is on 'reaching' and 'benefiting' (Table 2) women by including them and ensuring their participation in the co-design and implementation of activities, and designing activities 'according to the context and the necessities of women and men' for the benefit of all.

The project recognizes that traditionally women in the Peruvian Amazon have played a crucial role in the preservation and sustainable use of tree species, non-timber forest products, and medicinal plants, drawing on their knowledge of ancestral practices and its intergenerational transmission. In Peru's Amazonian region of Ucayali, the project is working with the Colpa de Loros cooperative that includes 30% of women members. The project has taken an intersectional approach by including women of different age groups (a group of 40- to 60-year-olds and another of 60- to 80-year-olds) and ethnicities (Quechua from the Andean regions and mestizos from the coastal region).

In the project site, a situational analysis showed important gender gaps in household headship (Fig. 4), which is linked to decision-making authority. Although this is a common traditional household structure in the Peruvian

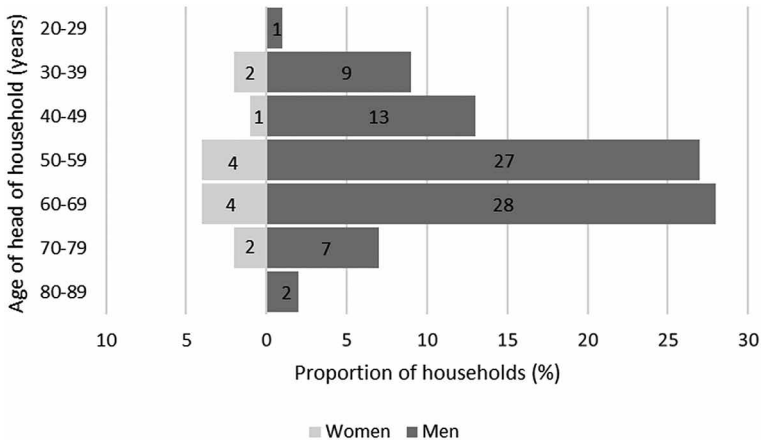

Figure 4 Household headship by gender and age in the ARC project site. Source: Adapted from: ARC (2021).

Amazon, the project emphasizes more egalitarian decision-making in relation to tree species selection in agroforestry plots to benefit not a specific gender group, but the entire community and the environment.

The situational analysis surfaced differences in women's and men's tree species preferences, which were based on different criteria. Men wanted to plant a greater number and proportion (85%) of timber trees, such as mahogany (*Swietenia macrophylla*) and caipirona (*Calycophyllum spruceanum*), because of their high market value. In contrast, although financial benefits were important for women, they wanted to plant a large proportion (50%) of fruit tree species, and of species providing medicinals, firewood, and other products related to household maintenance and well-being.

By applying a gender-sensitive methodology for tree species selection, the project was able to respond to the preferences of women and men, to provide benefits of importance to both. Planting multiple tree species supported diverse income streams to alleviate financial constraints between cocoa harvesting seasons, and greater dietary diversity, including the production of nutritious seeds, nuts, and fruits. As in the Vietnam case, assuming that all species are ecologically compatible, cocoa agroforestry systems informed by women's and men's priorities would thus promote greater agrobiodiversity while promoting greater equity in agroforestry. In both cases, prior information, group consultations, and debriefing sessions were important for supporting women's full participation in research and other project activities.

3.2 Strengthening women's access to and control over agroforestry resources (quadrant 2)

The project **'Nutrition-sensitive forest restoration to enhance the capacity of rural communities in Burkina Faso to adapt to change'** (2016–2019) aimed to increase the utilization and restoration or planting by smallholder farmers of tree diversity with optimal characteristics for local use, adaptation to climate change, and nutrition. Coordinated by Bioversity International, the project was implemented in the Sahelian and Sudanian regions of Burkina Faso, in collaboration with the Burkinabè NGO *Association tiipaalga*, the Burkina Faso National Tree Seed Centre (CNSF), the Institute of Research in Applied Sciences and Technologies (IRSAT) in Ouagadougou, and the University of Natural Resources and Life Sciences, Vienna (BOKU). In the provinces of Oubritenga and Kourwéogo, on the Central Plateau of Burkina Faso, one component of the project described in Tiendrébéogo et al. (2020) focused specifically on the constraints women face in implementing land restoration activities, and the potential that gender-responsive restoration holds for improving women's lives and livelihoods. In that region, most of the farm and forest land has been degraded by overexploitation, and prevalent shallow and relatively infertile

soils are vulnerable to erosion and runoff. The Mossé, who are the dominant ethnic group in these areas, are patrilineal and practice agropastoralism.

Mixed methods, including interviews with women and men farmers and key informants, focus group discussions with women and men and members of women's self-help groups, and direct observation, were used to gather information on experiences with restoration, types of restorative practices, and factors supporting or hindering women's and men's adoption of such practices. Participants were purposively sampled to represent a diversity of backgrounds and experiences. Data were additionally gathered on social networks through which innovative practices are shared and adapted, taking into account the economic and social heterogeneity of different actors involved.

Research showed that farmers in the study sites are involved in different restoration activities on their agroforestry plots, such as creating *zaï* pits, half-moon catchments, stone bunds, composting, mulching, charcoal making, farmer-managed natural regeneration (FMNR), grass strips, fencing, and firebreaks. The characteristics of these techniques influence requirements for their adoption, such as access to and control over specific types of assets (quadrant 2 in Fig. 1). For instance, agroforestry practices including FMNR and fencing as practised in the study sites (exclosures of 3 hectares) require large areas of land and secure land tenure, which women lack in the area. Composting requires access to organic waste, and the creation of stone bunds demands access to stones and means of transporting them to desired field areas, all of which are also difficult for women. Some techniques, such as fencing and charcoal making, require financial capital to purchase materials. Those requirements pose different constraints to adoption for men and women of different socio-economic and generational groups.

As noted above and shown in this research, women face multiple constraints to implementing restoration practices, as socio-cultural norms (quadrant 4) and gendered power relations shape their access to assets (quadrant 2), labour, and benefits from restoration, as well as their recognition as legitimate stakeholders who should have influence and decision-making power in restoration processes (quadrant 1). Gender, however, is not the only factor that determines who will implement and potentially benefit from restoration practices. Whether a woman is married, where her husband resides, the size of the plots she can access, and even whether the woman has adult male children all influence the probability of a woman implementing restoration practices and gaining some of the benefits. Notable differences exist among groups of women, such as married women living with their husbands, widows, and wives of migrant husbands (Table 4).

Widows who live with the families of their deceased spouse do not systematically benefit from their late husband's fields. They cultivate land that his family has given them and often find themselves with only small, degraded plots. This group has the most difficulty adopting restoration techniques. They

Table 4 Adoption of selected restoration practices among different groups of women and men

	Male heads of household (*kãsmdambã*)	Male youth (*yapɑ̃*)	Female farm heads (*pagb sẽn koodb ye*)	Widows (*pʋg kõapã*)	Wives of migrant husbands (*yap-pagbã*)
FMNR	X		X	X	
Zaï pits	X		X		X
Half-moons	X				
Stone bunds	X		X		
Grass strips	X		X		

Source: Tiendrébéogo et al. (2020).

are excluded from practising fencing techniques because they do not have enough land (quadrant 2). Those who are not part of farmer organizations targeted by NGOs also lack the knowledge to practise FMNR. Other widows have left the household of their deceased spouse and manage their own lands. They have more autonomy over decisions related to the adoption of restoration techniques, but are typically asset-limited and farm relatively small plots of land.

Wives of emigrant husbands were mostly 30–40 years old in the study, and cultivated fields that their husband had inherited. These fields are larger and more fertile than those of widows, and their situation allowed them to acquire a certain autonomy in managing agricultural work in their husband's absence. This group of women practices *zaï* pits and has some rights to use compost if living in the compound of their husband's parents. Yet, because they lack of membership in farmer organizations, do not have access to their husband's labour, and have limited land, they do not practice FMNR, fencing, or implement stone bunds or half-moons.

To address these constraints, women's self-help groups, with some support from NGOs such as *Association tiipaalga*, are working to secure communal access to land for widows and young women whose husbands have migrated. *Association tiipaalga* has acted as an intermediary between landowners and women's groups to help the latter acquire rights to land to be able to 'benefit' from agroforestry. Once acquired, women fence off this land to promote natural regeneration and plant income-generating tree and crop species. Working as a group, women can thereby improve their collective land rights as well as their access to other resources and farming implements while strengthening their social capital and collective action.

NGOs such as *Association tiipaalga* also train women on different land restoration techniques, which participants have applied to their household fields and personal plots to increase their yields. In the study villages, restoration activities have resulted in women's employment and income through the sale of non-timber forest products. Micro-credit provided to women's groups by

Association tiipaalga and other NGOs have further enabled members to carry out other income-generating activities and to use their income to pursue micro-entrepreneurial opportunities.

3.3 Challenging gender norms that exclude women in agroforestry (quadrant 4)

The '**Regreening Africa**' project (2021–2023) aimed to reverse land degradation to improve livelihoods, food and nutrition security, and climate resilience by scaling evergreen agricultural practices among smallholder farming households. The project was coordinated by World Agroforestry and implemented in eight sub-Saharan African countries, including Ghana. Ghana's Bawku West district is a degraded area, with a largely agrarian population that is heavily dependent on tree resources to fill annual food gaps. Tree product-based livelihoods are especially vital for women, who have discretionary access to land in a patrilineal landscape where women's rights are embedded within men's rights. Cultural norms exclude women from land use and management decisions, including those related to restoration and to the benefits of restorative practices.

In this district, World Vision Ghana and Catholic Relief Services took an intentionally transformative approach focused on redressing restrictive gender norms as a precursor to achieving effective restoration with more balanced outcomes for men and women. Over 22 months, the project adapted and implemented several methodologies described as 'gender transformative approaches' (GTAs) (Mayoux, 2014; Mohanraj and Hillenbrand, 2015; CARE, 2019; Wong et al., 2019). These methodologies seek to unpack the underlying causes of gender inequality, such as discriminatory gender norms (quadrant 4 in Fig. 1) that underpin unequal access to productive resources (quadrant 2), participation in decision-making (quadrant 1), labour burdens (quadrant 4), and a lack of recognition of women's roles and contributions (quadrant 1). Taking a GTA, the project encouraged critical self-reflection and awareness of the influence of gender relations, gender roles, and stereotypes on women's access to resources and information (quadrants 1, 2, and 4).

A gender analysis preceded the design of GTA modules. The analysis highlighted imbalances around land access and control, work burdens, as well as women's exclusion from land decisions (Adeyiga et al., in prep.; Adeyiga, 2021; Bourne, 2022). This baseline directly fed into the design of GTA modules, outlined below; effectively setting the priorities for the first phase of the initiative.

The methodology combined work at a landscape scale with work at the community and household scales. The Regreening Africa project involved 30 villages in Bawku West, all of which received technical capacity strengthening in evergreen practices, including composting, FMNR, and tree nurturing. Of

these communities, 15 were randomly selected, after which 10 households per community were randomly selected to participate in the GTA initiative. Two members of each household took part in activities: usually the man household head and their partner (one spouse), or in the few women-headed households, the woman head with an adult man from her household. Gender training was facilitated by local experienced man–woman pairs, and community champions were selected and received additional training to support and encourage other participating households.

GTA modules focussed on equipping men and women with the capacities and opportunity to critically reflect on and navigate their sensitive and tightly held beliefs around gender in relation to assets, labour, finances, and decision-making. The training consisted of adapted reversed role play and visioning exercises to bring the gender norms that provide constraints or opportunities for women and men as individuals, and for their households and communities, to the fore (quadrant 1). Participants discussed what social changes they desired, prioritized behaviours to change, and committed to sharing decisions (quadrant 1), asset control, workloads, and expenditures (quadrant 2) to achieve more equitable households.

Following a participatory outcome mapping methodology (Mohanraj and Hillenbrand, 2015), men and women participants developed indicators to capture the changes that they were committed to making over the research period (Table 5). These were categorized as immediate changes, which were expected to happen quickly, and long-term changes requiring sustained engagement and action.

These indicators were used for monitoring every fifth month on three occasions. At each monitoring meeting, men and women discussed what was changing in their lives and what was not changing, such as women's access to land. Strategies were proposed to encourage men to share homesteads (home gardens or cultivated land near the dwelling) with women. Community champions played a key role in supporting households along this journey, visiting each household at least once a month to discuss the household's particular situation and changes.

In the initial two years of project implementation, the GTA resulted in important changes in gender norms. The most significant outcome was women's increased agency (quadrant 1, Fig. 1) to make changes in homesteads. Prior to the GTA initiative, women had been unable to make decisions in this area and spent long hours daily gathering resources far away from this central area. At the end of 2 years, 80% (n = 120) of the women who took part in the GTA initiative were able to access up to 0.5 acres near their homes to cultivate crops of their choice (quadrant 2). There were also significant shifts in household labour, with men challenging existing norms (quadrant 4) by contributing more often to collecting water and fuelwood, bathing children, and taking them to school.

Table 5 Indicators developed by participant women and men to monitor changes in equality and household resilience

	Women	Men
Expect to see	Men and sons help with washing clothes	Men provide money for buying condiments
	Men and sons help with fetching water	Men give women money for the grinding mill
	Men bathe children	Men pay for health insurance and medications for women and children
	Men take young children to school	Men pay school fees for children
	Women receive money from men for trading	Men weed women's farms after men's farm (family farm)
Like to see	Women gain complete control over their own livestock income	Women take care of livestock
	Women's farm is given priority and ploughed after the family farm, before ploughing for other men	Men support and encourage women to attain leadership positions
	Men help with taking sick children and older people to the hospital	Men actively participate in bringing up the girl child
	Men reduce alcohol intake	Men receive support from women to buy farm inputs for men's farm (family farms)
	Women discuss family planning with husband without judgement	Men are concerned about women's general health: e.g. accompany women to the hospital and support them on antenatal visits
Love to see	Women participate in key household decisions (e.g. income expenditure)	Men include women in key decisions: e.g. income expenditure
	Women access fertile family land for farming	Wives are accepting of additional wife
	Spouses jointly control family farm produce: e.g. what to sell, when to sell, how much to sell, and how to use cash from crop sales	Men allocate fertile land to women for farming
	Women freely express grievances to their husband without ridicule, shame, or fear	Men apologize to their spouse when wrong
	Women have control over their own body in decisions of sex	The family is more peaceful and united

Participating households reported that the gender training had improved household relations, and that even though women could not participate in land decisions openly, they felt consulted in most decisions by their spouses.

Due to the positive feedback from participating households, word quickly spread within the communities about the GTA and several people asked the project team to include them in future training. With internal funding, World Vision Ghana scaled out gender training to an additional 25 households in each research community. The project also designed an interactive radio programme in the local language (Kusaal) that reached an estimated 16 000 listeners in five districts across the Upper East region. In this programme, gender specialists discussed ways to address unequal gender norms to improve household relations and wellbeing. By popular request, the programme extended its run and involved significant listener participation through phone-ins. Based on listener responses, there was an appetite for more GTAs.

GTA modules went beyond 'reaching' men and women. The reflection activities enhanced men's and women's critical consciousness and women's capacities to negotiate and navigate the complex interactions and normative prescriptions that exclude them from decisions (i.e. 'empower'). By explicitly engaging men in challenging discriminatory norms, these activities also sought to 'transform' the structures that perpetuate inequality.

4 Conclusion

The case studies demonstrate progressively more ambitious ways in which agroforestry projects have integrated gender considerations to reach and benefit differentiated groups of women and men, and support their empowerment as well as changes towards greater gender equality. In the first (Vietnam and Peru) cases, projects 'reached' women by engaging them in meetings, research, and listening to their priorities; and used this information to develop tree species portfolios that would 'benefit' women as well as men. The cases surfaced inequalities in women's and men's access to resources (quadrant 2 in Fig. 1), and sharing results back with farmers served as a launchpad for discussions that raised their awareness of gender relations (quadrant 1 in Fig. 1). In both cases, considering gender at the planning stage, when tree species are selected, was important for ensuring that the chosen species fulfil the breadth of social, economic, and environmental functions that both women and men farmers seek. Local perspectives, and rural women's influence in the selection of trees, showed promise for enhancing synergies among livelihoods, nutrition, biodiversity, and other socio-economic and environmental goals.

In the Burkinabè case, social inequalities based on gender, family structure, and other intersecting factors of social differentiation influenced the ability of farmers to adopt land restoration techniques. Although there were differences across groups of women, rural women on the whole faced several constraints in carrying out land restoration activities. These constraints include a lack of perceived legitimacy as stakeholders in restoration initiatives (quadrant 1) and

discriminatory norms (quadrant 4) that limit their access to and control over land, labour, and other productive resources (quadrant 2). Through a group-based approach, the project intentionally addressed some of these constraints to allow women to benefit from agroforestry, strengthen their social capital, and enhance their land rights and livelihood opportunities – all of which further sustain women's interest and investments in restoration.

Finally, the Ghana case showed that it is possible to challenge discriminatory norms (quadrant 4) in the context of an agroforestry project. Supporting women's and men's equitable inputs into land use and management decisions requires 'transforming' deep-rooted gender inequalities in households and communities. Applying a GTA supported several changes in gender dynamics, such as improving intra-household relations and women's confidence to negotiate for their strategic interests, over a relatively short period of time.

Research is only beginning to examine how gender equality can support other desirable agroforestry outcomes, and how to achieve synergies among these multiple goals (Elias et al., 2021). Further long-term research should explore how changes in gender equality, such as those described above, can be sustained over time and scaled beyond the household and community levels. Finally, research is needed on how simultaneously pursuing changes across the four quadrants described above in the context of agroforestry projects can accelerate progress towards gender equality and other agroforestry outcomes, to benefit people and the planet.

5 Where to look for further information

The following publications provide a good overview of the subject:

- CGIAR FTA (2020). *Gender Equality and Social Inclusion: A Revised Agenda and Action Plan for the CGIAR Research Program on Forests, Trees and Agroforestry 2020–2021*. Bogor: CGIAR Research Program on Forests, Trees and Agroforestry (FTA).
- Colfer, C. J. P., Catacutan, D., Naz, F. and Pottinger, A. J. (Eds) (2015). Gender in agroforestry: special issue. *International Forestry Review* 17(Suppl 4). https://www.ingentaconnect.com/content/cfa/ifr/2015/00000017/a00404s4.
- Elias, M., Paez Valencia, A. M., Ihalainen, M. and Monterroso, I. (2021). *Advancing Gender Equality and Social Inclusion*. FTA Highlights of a Decade 2011–2021 series. Highlight No.15. Bogor: The CGIAR Research Program on Forests, Trees and Agroforestry (FTA).
- Fortmann, L. and Rocheleau, D. (1985). Women and agroforestry: four myths and three case studies. *Agroforestry Systems* 2(4), 253–272. https://doi.org/10.1007/BF00147037.

- Ingram, V., Haverhals, M., Petersen, S., Elias, M., Sijapati Basnett, B. and Phosiso, S. (2016). Gender and forest, tree and agroforestry value chains: evidence from literature. In: Colfer C. J. P., Sijapati Basnett, B. and Elias, M. (Eds) *Gender and Forests: Climate Change, Tenure, Value Chains and Emerging Issues*. New York: Routledge, pp. 221–242.
- Kiptot, E., Franzel, S. and Degrande, A. (2014). Gender, agroforestry and food security in Africa. *Current Opinion in Environmental Sustainability* 6, 104–109.
- Kiptot, E. (2015). Gender roles, responsibilities, and spaces: implications for agroforestry research and development in Africa. *Forest Policy and Economics* 17(4), 11–21.
- Mathez-Stiefel, S-L, Ayquipa-Valenzuela, J., Corrales-Quispe, R., Rosales-Richard, L. and Valdivia-Díaz, M. (2016). Identifying gender-sensitive agroforestry options: methodological considerations from the field. *Mountain Research and Development* 36(4), 417–430.

Key research in this area can be found at the following organizations:

- AFR100 (https://afr100.org/).
- Alliance of Bioversity International and CIAT (https://alliancebioversityciat.org/).
- CIFOR-ICRAF (https://www.cifor-icraf.org/).
- IUCN (https://www.iucn.org/).
- World Resources Institute (https://www.wri.org/).

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