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Cocoa Farmers' Perspectives

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CHAPTER 4

Social Challenges and Opportunities in Agroforestry: Cocoa Farmers' Perspectives

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Abstract Agroforestry practices in cocoa cultivation have historical roots going back to the Mayan sacred groves in Mesoamerica. Today, agroforestry cocoa, i.e., the integration of shade trees, plants and crops in cocoa systems, is promoted as a climate smart practice by public and private institutions. Shaded cocoa can sustain or even increase cocoa yields and the agroforestry systems may provide additional output for household consumption and sale as well as improve the microclimate and soil conditions on the farm. Despite these promising features, cocoa agroforestry systems are far from the norm in producing countries like Ghana. Based on discussions with groups of farmers across the Ghanaian cocoa belt, this chapter shows that while farmers are well aware of the positive aspects of

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shaded cocoa systems, traditional cocoa practices, village chiefs' command of local land uses, land and tree tenure systems, alternative land uses and inability to access inputs and extension services limit the adoption and constrain the management of shade trees. As still more policies are developed to improve the Ghanaian cocoa sector, policymakers must consider these often overlooked social and institutional factors that prevent cocoa farmers from engaging in longer-term agroforestry practices and thereby benefiting from the opportunities they present.

Keywords Land and tree tenure rights · Multi-institutional complex · Non-timber forest products · Smallholder perspectives · Mining activities · Socio-cultural and gender dimensions

4.1 Introduction

Cocoa agroforestry systems are described as climate smart practices because of their potential ability to mitigate and adapt to climate change, while ensuring diverse farm outputs (Vaast et al., 2015). However, the cultivation of cocoa in intercropping or shaded systems is not a new practice developed in the face of climate change. Quite the contrary, cocoa has been cultivated under shade trees since the domestication of the *Theobroma cacao* tree in pre-Hispanic South and Central America (Gómez-Pompa et al., 1990). As a highly valuable crop used for religious

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ceremonies, as food and as currency, the Mayan cultivated cocoa trees in sacred groves, either in agroforestry systems or in sinkholes, where steep slopes and high soil humidity provided an adequate yet geographically very limited microclimate (ibid.). Cocoa continues to this day to be part of religious practices and has ceremonial value for modern-day Maya groups. The shaded cocoa habitats have even been described as limiting deforestation and forest degradation due to the sacred character of the cocoa trees (Kufer et al., 2006; Steinberg, 2002). Cocoa cultivation in shaded systems, often intercropped with other food crops, has persisted in various forms as a central practice in traditional cocoa farming from Latin America to West Africa and Indonesia (Oladokun, 1990; Rice & Greenberg, 2000; Schulz et al., 1994). Today, shaded cocoa cultivation may take many forms, ranging from cultivation in the limited shade provided by a single tree species, often timber trees, to rustic shade systems, where cocoa is found under remnant forest trees, to a more actively managed fully fledged cocoa agroforestry system with several strata, each consisting of multiple trees with diverse purposes (see typology in Orozco-Aguilar et al., 2021). However, intensive cocoa farming with high performing cocoa varieties in lightly shaded or full-sun conditions is currently the rule rather than the exception. As a result, cocoa is more often mentioned as a deforestation driver and less as a harbourer of biological diversity (Franzen & Borgerhoff Mulder, 2007; Ordway et al., 2017; Ruf & Schroth, 2004), especially in Côte d'Ivoire and Ghana (Kalischek et al., 2022).

Cocoa agroforestry has been highlighted for its ability to increase the total economic output from cocoa and shade trees, take advantage of cost complementarities between cocoa and other products on the same plot, and reduce input dependencies in low-input systems managed by smallholder farmers with limited access to fertilizers and pesticides (Herzog, 1994; Ofori-Bah & Asafu-Adjaye, 2011). For example, shade trees may provide nutrients and humidity to the soil through branch pruning and litter decomposition, and provide farmers with tree products, such as edible plant parts, firewood, timber, fibers and fodder, both for subsistence use and for sale (Bos et al., 2007; Graefe et al., 2017; Kaba et al., 2020). Products from shade trees may thus have a role as an income gap filler, while timber trees may function as a safety net during times of low income. Yet, while cocoa plantations are often established under shade through intercropping to shield the young plants, mature plantations in West Africa often become monocrop systems to avoid cocoa trees competing with shade trees for water, nutrients, space and light. However, while competition between shade trees and cocoa has been documented, e.g., for soil water in situations with prolonged droughts (Abdulai et al., 2018), limited effects or even a positive effect on cocoa yields have been found in systems with low to moderate levels of shade (Abou Rajab et al., 2016; Asare et al., 2019; Nunoo & Owusu, 2017). The positive role of shade trees on economic output is further augmented when the prolongation of the main productive phase of cocoa trees, due to the presence of shade, is considered (Asare et al., 2019). While full-sun cocoa systems have become widespread in the search for higher yields, research is increasingly finding that cocoa agroforestry systems, when appropriately implemented and managed, may outperform full-sun systems on economic as well as environmental parameters (see also Chapters 3 and 5 in this volume).

With the advent of human-induced climate change, agroforestry is increasingly being highlighted as a climate smart practice, especially in perennial cropping systems such as cocoa cultivation. Climate smart practices entail adaptation to long-term climate change and erratic weather events, climate mitigation by reducing the emissions of greenhouse gasses and possibly sequestering gasses from the atmosphere, and sustainably increasing the productivity of the agricultural system (FAO, 2009). In West Africa, where the main share of the global cocoa production takes place, the effects of climate change are exerting pressure on cocoa farmers to change crops or adopt climate smart practices to adapt to higher temperatures and change in precipitation patterns. In their recommendation across different agro-ecological zones in Ghana, Bunn et al. (2019) emphasize the use of shade trees to adapt to climate change.

Cocoa agroforestry systems are being promoted in voluntary certification schemes as well as in corporate programs for responsible cocoa production and sourcing in which almost all major cocoa buying companies are engaged (Carodenuto & Buluran, 2021; Thorlakson, 2018). These corporate initiatives will very likely gain further traction as new public regulations and directives for the main market for cocoa and chocolate, the EU, are expected to push the agenda for deforestation-free cocoa without climate emissions. An EU deforestation regulation and the Corporate Sustainability Due Diligence Directive (CSDDD) will hinder any trade to the EU of cocoa unless the trading company can document that the cocoa is not associated with deforestation, is legally produced and does not have any adverse climate impacts. While neither has been implemented yet, cocoa buying companies are setting up programs for deforestation-free cocoa that also promote dissemination of shade tree seedlings (Nasser et al., 2020).

Having in mind the agri-ecological benefits of shaded cocoa production, the long-term benefits of cocoa agroforestry to the farming household, as well as its promotion as a climate smart practice and part of a sustainable business model, it seems surprising that agroforestry is not the dominant way of producing cocoa. Kaba et al. (2020) relate the low adoption of agroforestry to a mismatch in farmers' and researchers' understanding and perception of shade tree integration in cocoa farming. Farmers generally possess knowledge of the positive and adverse effects and outcomes of intercropping trees and cocoa, as shown in several studies (e.g., Awuah & Kyereh, 2019; Graefe et al., 2017; Smith Dumont et al., 2014). There are seemingly other factors at play that keep farmers from returning to the old ways of the Mayan shaded cocoa groves and that influence farmers' decision and ability to plant and care for trees in their cocoa plantation. Based on discussions with cocoa farming communities in Ghana and interviews with key informants in the Ghanaian cocoa sector, this chapter explores and discusses the social challenges as well as opportunities linked to agroforestry from the perspective of the cocoa farmers. The following section provides further background on farmers' valuation of trees in cocoa cultivation and the obstacles that may limit farmers' ability and willingness to plant trees, mainly based on studies from Western Africa. This section is followed by a discussion of the experiences of Ghanaian cocoa farmers, who are struggling along several fronts concerning the integration of trees in cocoa farming. Finally, possible pathways for facilitating the integration of shade trees in cocoa farms are presented.

4.2 Background

Cocoa cultivation in West Africa goes back to the 1880s and has long been one of the main income-generating activities that support the livelihoods of millions of farmers in Côte d'Ivoire and Ghana. In 2019, according to UN trade data,[1] cocoa provided around USD 2.7 bn. in export earnings to Ghana through exports of cocoa beans and other cocoa

[1] https://comtrade.un.org/data, Trade codes HS 1801–1806.

products. The parastatal Ghana Cocoa Board (COCOBOD) obtained revenues of around USD 1.3 bn., which among other things covered large-scale service provision programs to farmers. Roughly, USD 900 million was paid to farmers, while the remaining earnings were captured by traders and grinders with domestic operations in Ghana. These figures only tell part of the story of the importance of cocoa to rural communities in Ghana. Other types of economic and social values exist in relation to the cocoa cultivation systems and the intercropping of trees.

4.2.1 *Farmers' Cocoa Agroforestry Economy*

There are far more studies of the economic value of the cocoa crop than of the value of shade trees in cocoa agroforestry systems. Nevertheless, several studies have highlighted the potentially extensive values of shade tree products and ecosystem services that farmers may obtain when managing cocoa farms for more than just cocoa. In cocoa agroforestry systems in Southern Cameroon, Gockowski et al. (2010) recorded 286 different plant species that farmers used for food, medicine, timber, packaging materials and other non-timber forest products. The non-cocoa products generated 217 USD/ha in one area, compared to 425 USD/ha from cocoa, and across all regions, trees and plants generated 25% of total farm income, mainly driven by sales of palm oil, timber and fruits. While Gockowski et al. focused on marketed products, Cerda et al. (2014) also included the value of the households' own consumption of non-cocoa products in their research on cocoa farmers in Central America. The authors found that the economic benefits to the households of bananas, fruit trees and timber in the cocoa plots equaled or exceeded the family income from cocoa sales. Obeng et al. (2020) went a step further and used contingent valuation methods to assess Ghanaian farmers' willingness to pay for tree integration on their cocoa farm in order to obtain non-marketed ecosystem services, such as erosion control, temperature regulation and water resources protection. They estimated the value of bundled ecosystem services to be USD 164 per ha per year, corresponding to 8.2% of the farmers' cocoa income.

In the study by Obeng et al. (2020), farmers' willingness to pay for tree integration was significantly influenced by their positive attitude toward forests in general. Farmers emphasized the existence value of tropical forest more so than its current use value as their motivation for off-farm forest protection. However, more tangible values were prioritized for on-farm tree integration. The shading of cocoa trees, access to timber and (nature) medicine and environmental benefits such as providing a habitat for pollinators were among the main reasons behind farmers' valuation of tree integration (ibid.).

The benefits of shade tree products may come at the cost of reduced cocoa yields, though the results from studies of combinations of cocoa and different shade trees vary. Koko et al. (2013) find that intercropping of fruit trees in Côte d'Ivoire reduced yields per cocoa tree and per ha. They also cite a number of earlier studies from Latin America that showed similar results and argue that excessive light inception reduces flowering and thus yields. Results from more recent studies paint a different picture. Abou Rajab et al. (2016) find no negative effect on cocoa yields between monocultures and multi-shade systems in Indonesia, while Asare et al. (2019) document a doubling of cocoa yields in Ghana when changing from no shade to 30% canopy cover. Equally important, Nunoo and Owusu (2017) find that shade increases the length of the mature cocoa producing phase based on data from Ghana, thus prolonging the economically productive phase of the rotation length. Despite lower yields under shade, Koko et al. (2013) obtain much higher yields in their trial experiment in their shaded plots than the average productivity in West Africa. This points to another important factor: access to inputs, farmer skills and management priorities highly affect cocoa yields, with or without shade trees. Whereas the cocoa plots in Koko et al. (2013) received optimal levels of inputs to maximize yields, we found that many small-scale farmers do not have access to or cannot afford fertilizers and agrochemical inputs. They therefore tend to aim for lower but stable outputs based on more "nature-based solutions"—to borrow a term from climate smart agricultural programs—which include shade trees for weed suppression, soil fertilization and moisture, and food.

Important factors when cocoa farmers make overall farm management choices include trade-offs between different crops, access to inputs required for different systems, and the value of ecosystem services from shade trees. From this perspective, the intercropping of shade trees in cocoa plots represents an opportunity for added value, especially when farmers do not have adequate access to inputs or for other reasons manage their cocoa plot extensively. This is exemplified in the study by Bentley et al. (2004), who found that more diverse agroforestry was practiced mainly by farmers with low-input management regimes in Ecuador. The economy of cocoa agroforestry may thus be particularly advantageous for smallholders.

4.2.2 The Socio-cultural Context of Cocoa Agroforestry Systems

At the place of origin of the cocoa tree in South America and Mesoamerica, many farmers attach ceremonial and social values to their cocoa plots. From Mexico and Guatemala to the Ecuadorian Amazon region, cocoa trees and associated forest trees are regarded not only as a productive system, but also as a social-ecological system with deep-rooted cultural values (Coq-Huelva et al., 2017; Kufer et al., 2006). This is a result of cocoa cultivation having evolved along with other societal developments over several thousand years in South America (Zarrillo et al., 2018). In contrast, the cocoa tree was introduced as a cash crop in Ghana in relatively recent times, just 150 years ago. The ritual and ceremonial values attached to cocoa at its natural origin did not accompany the beans on the Portuguese ships that first brought the crop to West Africa (Ryan, 2011). However, the economic value and importance of the crop in Ghana, which has surpassed the crop's economic importance on the American continent, have influenced Ghanaian culture beyond the economic aspects.

"Ghana is cocoa, cocoa is Ghana" is a common saying in the world's second largest cocoa producing country, not only because of the thousands of cocoa farming households and the nearly one million people working in the cocoa plantations. For better or worse—"worse" referring to a colonial history and coercive use of labor, including child labor, that still taint the cocoa sector today—cocoa has shaped Ghanaian society since its introduction. Tetteh Quarshie, the blacksmith most often accredited with the first introduction of cocoa to Ghana, is regarded as a national hero and is a figure that continues to be present in the cocoa sector and in society; several streets, a highway and a hospital bear his name, as does one of the traditional cocoa varieties.

Less obvious is the connection of agroforestry practices in cocoa farming to local cultures and cultural values. Mr. Quarshie established the first cocoa farm in Ghana, intercropping a variety of food crops. This practice continues today, as many farmers rely on food crop production in and around their cocoa farms, for sale and consumption. Intercropping helps to shield the young cocoa plants and to gap-fill farm outputs in the first years of the plantation, but is then often abandoned for a sole focus on cocoa yields. Cocoa has been one of the main drivers of deforestation in Ghana, and still is today (Acheampong et al., 2019), but some farmers do retain forest trees as they move into new areas or plant trees for a variety of reasons. The choice of trees is mainly related to the use and economic value of the trees (Anglaaere et al., 2011), but what is useful and of economic value depends at least partly on the socio-economic context and the local knowledge of trees (see Appendix in Chapter 3 in this volume). Lack of education providing awareness of tree benefits has been identified as a key factor explaining why Ghanaian farmers remove shade trees (Kaba et al., 2020). Specific knowledge of shade tree—cocoa compatibility in Southern Ghana and needs for income diversification in the Northern cocoa areas of Ghana have been found to be important for shade tree selection (Graefe et al., 2017). Gender aspects also play a role, as women more often select shade trees for household consumption purposes than men, but at the same time, they may be constrained in terms of shade tree management due to intra-household power dynamics, lack of land possession and access to hired labor, as found by Jamal et al. (2021).

In a very different part of the world, East Papua New Guinea, where cocoa is also a relatively recent crop, the socio-cultural context plays a different role in cocoa cultivation. Low-input cocoa systems with diverse intercropping are favored by the local traditional "way of life" and moral values and are seen as providing status and identity (Curry et al., 2015). While the social obligations to share surplus generate community-wide benefits, they also create a socio-cultural context that limits farmers' ability to invest in and build on savings from cocoa cultivation. The same social constraints are not found in Ghana, where it seems the main cultural value of agroforestry systems is related to economic outputs and the viability of the productive agro-ecological system, even though the socio-cultural context influences the importance given to different types of shade trees, such as multipurpose trees for materials, medicines and other sources of environmental income.

4.2.3 The Multi-institutional Complex of Shade Tree Systems

The care for trees and the right to enjoy the benefits of harvesting the trees is no simple matter in Ghana, legally speaking. National land tenure policies, tree use permits, traditional land rights vested in the chief, and a mix of matrilineal and patrilineal inheritance systems that tend to weaken individual land rights (Quisumbing et al., 2001), further complicated by a long history of domestic migration, come together in a hot pot of rights, obligations and opportunities that influence cocoa farmers' willingness and ability to invest in and manage shade trees.

According to Mayers and Ashie Kotey (1996), land tenure is influenced by tradition, politics and postcolonial policies. Traditional landholding authorities, most often the chief, may be a paramount, divisional or sub-stool or a combination of these, depending on the mode of acquisition of the land and history of the people. Chiefs may hold absolute title to land on behalf of the people, who in turn have usufruct rights and can appropriate a portion of the land for permanent development (Mayers & Ashie Kotey, 1996). Such land, for most practical purposes, belongs to the community member with usufruct rights whose interests should be secure, inheritable and generally alienable (Spichiger & Stacey, 2014). Migrants acquire land by outright purchase, or more commonly by leasing under customary law. Traditional authorities may also grant tenancies on *abunu* terms for cash crops, where e.g., cocoa land is shared between landowner and tenant once the cocoa crop is mature, or on *abusa* terms for food crops where the food production, not the land, is shared. Many poorer migrant farmers are in *abusa* arrangements, which are generally insecure and therefore create little incentive to plant and nurture trees (Mayers & Ashie Kotey, 1996).

While the farmers' right to maintain trees on cocoa farms and to have their farms protected from timber concessionaires has been in place since 1979, only from 1995 was it possible for farmers to receive compensation for crop damages incurred when timber was harvested on their fields. All revenues from the timber, however, were to be divided between public authorities and the traditional authorities (Amanor, 1996). The legal basis for farmers to refuse the felling of timber on their farmland or negotiate a price for each tree to be felled by a concessionaire was finally established with the Timber Resources Management (Amendment) Regulations in 2003. However, the full power of landholders to plant, maintain, harvest and sell timber from their own land is still a wishful scenario for most cocoa farmers. Today, rights to timber on farmland may still be afforded to concessionaires despite farmers' rights to refuse, and farmers have to navigate a bureaucratic registration system to register trees and gain user rights to individual trees on their farm (Gaither et al., 2019; Hirons et al., 2018). For these reasons, farmers with timber trees on their farmland will often gain greater benefits from engaging with the informal wood sector, rather than trying to stay within the formal legal system (Hirons et al., 2018).

Within this complex institutional framework for land and tree rights corporate sustainability programs run by international cocoa buyers and chocolate companies are disseminating shade tree seedlings to farmers across Ghana. Tree seedlings are part of a bundle of services farmers receive, either at no cost or paid back via a share of the harvest, as part of the cocoa-industry's efforts to build capacity in the Ghanaian cocoa farming communities vis-a-vis yield improvement, climate resilience, sustainability, regenerative practices or other objectives often found in industry financed, farmer facing programs (Boadi et al., 2022; Carodenuto & Buluran, 2021; Nasser et al., 2020). In this context, women are also marginalized in terms of access to shade trees and training, because programs most often interact with male landowners and focus on technical solutions (e.g., number of tree seedlings distributed) rather than gender differentiated solutions (e.g., female farmers' selection of tree species) (Friedman et al., 2018). It is within this multi-institutional context that farmers must navigate when they consider the short and long-term costs and benefits of planting, maintaining and harvesting different types of shade trees for different kinds of purposes, besides "simply" shading the cocoa trees.

4.3 Talking About Shade Tree Management with Ghanaian Cocoa Farmers

In order to improve our understanding of Ghanaian cocoa farmers' perceptions of shade trees and their associated values in cocoa agroforestry systems, along with the socio-cultural context defining the challenges and opportunities related to cocoa agroforestry, we organized a number of focus group discussions with cocoa farmers across the cocoa zones in Ghana. In total, 20 focus group discussions were carried out with female farmers, male farmers and in mixed groups over a period spanning 2018 and 2019, covering 12 villages in the districts of Asutifi South, Offinso North, Amansie West, Atwima Nwabiagya, Sefwi Wiawso and Wassa Amenfi. The participants were selected from a pool of over 400 farmers, who had participated in a farmer survey on cocoa production practices and shade tree management (see Chapter 5 in this volume for details and map of study areas). They represented both migrant farmers and farmers native to the cocoa communities, as well as farmers with private landholdings and farmers in shared land arrangements. The expected differences in use of different shade tree species, given possible differences in knowledge about trees and access, were not clear in the quantitative survey data. While native farmers as a group had more species represented, they also accounted for most of the cocoa plots registered in the survey, and many species were only found on single cocoa plots. Both groups of farmers favored a handful of timber and fruit tree species. Several species of trees with medicinal uses were also mentioned, but were found on fewer plots.

Sitting outdoors in shaded environments under community trees, we began our discussions by listening to farmers' history of their community or their stories of migration to existing cocoa areas often several generations ago. Then we centered on the use of shade trees in cocoa cultivation, the benefits and disadvantages of specific shade trees or, more generally, of shade in cocoa farming, and the challenges and opportunities experienced by farmers who either wanted to manage or already managed tree-cocoa intercropping systems. Furthermore, in each group discussion, the issues of climate change and possible coping strategies, land tenure and the future of cocoa farming were addressed, as these issues are often studied in the context of agroforestry. While the topics were predefined, the discussions were allowed to make detours to related topics, often as a result of disagreements among participants, such as farmers' perceptions of the practice of small-scale gold mining, also referred to as *galamsey*, and sand mining. The farmers saw mining activities as either new avenues for income and livelihood improvements, or as detrimental to future economic activities and agricultural-based living, but all agreed that mining conflicts with cocoa and tree management.

Over the course of the 20 group discussions, we heard the views of 70 male and 53 female cocoa farmers. Their views were supplemented with four in-depth interviews with cocoa buying agents and lead farmers in some of the communities. The qualitative data was transcribed and analyzed for commonalities across discussions and locations that would improve our understanding of the challenges and opportunities of shaded cocoa as experienced by the farmers.

4.4 Recent Perspectives from Ghanaian Cocoa Farmers

The following represents the voices, perceptions and experiences that were common to most, if not all, groups of farmers participating in the focus group discussions, complemented by references to previous studies in the Ghanaian cocoa belt.

4.4.1 Common Practices, Changing Practices

> Since we took over from our grandparents, we have maintained their farming practices. We cut down all the trees, after which we burn the weeds on the land. (Discussion participant, Esaase Community)

Whether farmers were native or had migrated to their current community, the majority of farmers described using the traditional slash-and-burn approach to establish their cocoa plots and intercrops mainly to shade the young cocoa plants; practices that the farmers have learned from observing and participating in the cocoa activities of parents, other family members and community members. Even recent plot establishment had required clearing and burning forest areas or fallows. However, during all discussions, participants acknowledged the protective effect of shade trees and described how they bring about a better and cooler climate and more humidity and help cocoa to survive during warm periods. Most farmers indeed described having smaller shaded areas or a few shade trees dispersed on their cocoa plots. Farmers without shade on their own farms, described visits to neighboring farmers, whose shaded cocoa trees were performing better during warm periods, while their own had "their tops burned off" as one farmer described it. Even farmers with negative perceptions of shade effect on cocoa yield and presence of pests recognized the positive role of shade trees on the microclimate. This recognition was seemingly related to farmers' account of recent experiences of changes in rainfall patterns, longer droughts, higher temperatures and intense sunshine. Many farmers agreed that at least some level of shade was necessary throughout the cocoa trees' lifetime, and some described how they had recently introduced the first or additional shade trees in mature cocoa plots, on a needs basis, referring to the specific service of shading—though often combined with reference to timber.

There was, however, also consensus on keeping shade trees limited in number, so as not to decrease the cocoa yields.

Farmers' choice of shade tree species and their management were mainly informed by agricultural advisory and tree planting schemes, but also based on the farmers' own experiences. Avocado, orange and mango were the most common fruit trees due to their economic benefits, while a number of valuable timber trees were favored, partly for economic reasons and partly due to "tall and broad trees" being good characteristics of shade trees according to advice from extension officers. Contrary to this, there was less consensus when it came to selecting tree species believed to have medicinal properties, which is related to differences in the specific knowledge of individual farmers. Similarly, information on trees with detrimental effects on cocoa farming was to a larger extent based on farmers' own experiences with how certain trees limit the growth of the cocoa trees or attract pests, even trees recommended by extension officers.

Research is emerging on the impact of different shade tree species and shade tree species diversity in cocoa agroforestry systems (Asare et al., 2019; Asitoakor et al., 2022; Graefe et al., 2017; Kaba et al., 2020. See also Chapters 3 and 5 in this volume). We found that some extension services that support better shade tree selection and shade tree seedlings are being offered to a limited group of farmers. Indeed, we found that these farmers were most able to implement cocoa agroforestry systems successfully. Yet, even though NGOs, cocoa-industry initiatives and the state all provide extension services, most farmers only receive limited training and are only given seedlings from a very small selection of shade tree species. The farmers' discussions did indicate smaller changes in their perceptions and management of shade trees, but changing policies and the lack of consistency of the agri-advisory services offered to farmers have created some distrust among farmers of advice from institutions offering such services, including advice on shade tree integration. Farmers thus reported conflicting recommendations from extension services and described how they were first recommended to eradicate shade trees as they were not good for cocoa, but later on, the same extension services came back to recommend tree integration. There is a need for consistency in terms of agri-advisory regarding tree integration in cocoa farms, but also better communication concerning desirable/undesirable shade trees, the contextual nature of what constitutes an optimal number of shade trees to manage on cocoa farms and the importance of shade tree species diversity.

4.4.2 Environmental Income and Shade Tree Products

> These trees have been helping me a lot. Quite recently, I went to harvest some of these trees when I was in financial hardship. It is good and beneficial to nurture such trees in the farm. (Focus group participant, Nerebehi, Ghana, talking about timber trees in cocoa)

Cocoa farmers with a more diverse shade tree composition and intercropping were able to reap monetary benefits additional to the sale of cocoa (Chapter 5 in this volume). The farmers' discussions revealed three broad categories of benefits derived from shade trees and agroforestry: (i) tree products, such as fruit, timber and fuel wood, (ii) benefits to the cocoa system itself, such as improved water retention and protection from high temperatures and direct sunlight and (iii) harvesting of mushrooms and snails from the shaded environment on and adjacent to the cocoa farms. The latter used to be important for many farmers, both for sale and consumption, but most farmers were now only reminiscing about the time when there was an abundance of mushrooms and snails on or near their farms. Very few farmers reported currently collecting mushrooms and snails blaming general deforestation, use of pesticides in cocoa and other agriculture, and bushfires to be the culprits of the disappearance of this environmental income, confirming a trend documented in 2008 by Ahenkan and Boon (2011). Farmers acknowledged how planting of shade trees within the limits of their own farms was not sufficient to provide the habitat for snails and mushrooms, as not only a shaded environment is needed but also decaying wood and thick undergrowth on larger areas. Some farmers jested of having to buy cultivated mushrooms and snails, others talked of missing a piece in their diversified livelihoods.

As a result of changing landscapes, trees on the farm have become the source of environmental income. The multiple tree products mentioned by farmers included firewood, various fruits, leafy vegetables and food ingredients, tree parts or sap with medicinal properties, along with various construction materials that are mainly used on their own farms. The access to tree seedlings was a recurrent subject, as some trees—those most favored by farmers due to multiple products afforded by a single tree—were difficult to regenerate naturally and farmers therefore were dependent on buying seedlings. When selecting shade tree species, farmers considered not just the potential added benefits, but also the problems that could arise when including specific species in agroforestry, including competition for water and nutrients and an increase in pests and diseases (see also Chapter 3). Avocado, a good source of fruits for sale and consumption, was known to attract mistletoe that would also negatively affect certain varieties of cocoa, while oil palms were favored by some as a food ingredient, but reportedly harbored squirrels and "destroyed cocoa trees." Furthermore, some trees with medicinal value were not thought to be compatible with cocoa farming. Farmers must therefore carefully select trees for different purposes.

Shade trees of timber species, cared for with the intention of harvesting poles and beams for constructing and roofing houses, were among the most contentious issues discussed by the farmers. Timber trees may support families during hardship if sold on the market, as exemplified in the quote above, but farmers were well aware of the complex set of rules that surrounds timber trees and restricts the use and sale of timber, even of trees planted and cared for on private farmland. Some farmers even resorted to removing valuable trees before maturity to avoid trouble and, in no small part, out of spite of the Forestry authorities. Doing that, they also forgo what may be a substantial value from the cocoa systems, as documented by Nunoo and Owusu (2017) and Obiri et al. (2007) among Ghanaian cocoa farmers.

4.4.3 Gold and Sand Mining—Competing and Destructive Land Uses

> They are profiting from the mining operations, but we are dying. What are we going to do as the government has given the mining companies the permit to mine in the mountains which is the source of all our waterbodies, and as the activities of these mining companies is resulting in the breaking apart of the mountain and the cutting down of the trees? (Focus group participant, Jeninso, Ghana)

The quote introducing this section represents the situation in five of the 12 communities, where the focus groups discussions took place. Along with sand winning, *galamsey* activities, or small-scale mining,[2] were seen by especially the older cocoa farmers to be among the largest threats

[2] Galamsey is derived from the phrase "gather them and sell," and is used to describe illegal, small-scale mining activities, mainly for gold.

to not only cocoa farming but also agricultural activities in general. Farmers described the activities mainly as illegal activities, often accepted or even facilitated by the local chief, and carried out on a small scale by people not from the local community or on larger tracts of land by mining companies. Farmers described *galamsey* and sand winning activities as leading to destroyed roads and footpaths, complicating access to farms, increasing the occurrence of forest fires, impacting water bodies, uprooting cocoa trees and removing soil cover, thereby leaving farmland unproductive. The loss of land had incentivized some farmers to look for forested areas to establish new cocoa farms, indicating a push factor from mining activities leading to cocoa-related deforestation. The farmers also associated the mining activities with a lack of labor for agricultural activities, as day wages cannot compete with the possible earnings of mining activities. Older farmers told of conflicting views; they discouraged their children from pursuing *galamsey* activities, but also acknowledged the hardship and risky livelihood related to cocoa farming in a context of other and faster economic opportunities. This argument was also voiced by younger farmers participating in the discussions. Nonetheless, they did not consider engaging in mining activities.

"If you find it, you own it" read the sign of a large mining company that flanked the entrance to a community where one of the focus group discussions took place. The advert seemed to have worked; along the local water bodies and in-between cocoa farms, pits and mounds of gravel from *galamsey* activities characterized the landscape. This was not a lone incident. Across Ghana, an estimated 300,000–500,000 small-scale, unlicensed miners are supporting an industry worth millions of dollars annually, often acquiring farmland from cash strained farmers (Siaw et al., 2023). Small-scale mining, when regulated, is seen as an economic activity that can help to alleviate poverty in rural areas of Ghana (Okuh & Hilson, 2011), but *galamsey* may also be seen as the antithesis to cocoa agroforestry farming. *Galamsey* favors short-term benefits at the cost of arable land, and cocoa farming is a long-term strategy for climate smart agriculture. For both, a facilitating regulatory and policy environment is needed to promote socio-economic development (Ofosu & Sarpong, 2022), but for cocoa agroforestry practices not to lose out to mining activities in overlapping areas, strong long-term incentives are needed from both public and private actors. These include secure land and tree rights as well as relevant pricing mechanisms for cocoa from shaded systems.

4.4.4 Rights or No Rights to Land and Trees

> There is a law, which forbids a farmer from harvesting the trees which he has planted on his farm and that have matured; there is a law which calls for the arrest of any farmer who commercializes tree harvesting. (Focus group participant, Mehame, Ghana)

Without being able to name the many policies and laws governing land tenure and tree rights, many farmers did clearly communicate the trouble of living with the uncertainty and complexity of rules and powers affecting access to land and trees. Some farmers, mainly natives to the communities, expressed having secure land rights and described how even if the local chief were to invite mining companies to mine their plots, or timber contractors to harvest the trees, the farmer would still be the one benefitting. Other farmers held deep, negative perceptions of the chiefs and shared experiences of chiefs who allocated the farmers' cocoa plots to sand winning and *galamsey*, or the timber trees to outside chainsaw operators without consulting them. Farmers described returning to their cocoa plots, only to find food crops and cocoa trees removed along with the topsoil, leading to the loss of livelihoods. In other narratives, the cocoa plots were allocated to urban extensions. Some farmers accepted this. Even after several generations of staying in the same community, farmers explained that they owe their land endowments to the village chief and therefore accept the chief's decision-making power over land allocations and use. Others were more frank in their assessment of the chiefs' "destroying our lands" for their own gain, but also described how little could be done about it and the fear of arrest if complaints were to be made.

Chiefs and elders of the communities were also mentioned as being involved in matters of timber trees on cocoa plots, but more often farmers referred to regulations implemented by officers from the Forestry Commission. A few farmers asserted full rights over trees grown and harvested on their farms, even when in sharecropping arrangements, and some described how tree materials could be used for their own houses, such as roofing, sometimes after consulting the chief and/or landowner. Many more were acutely aware of the limitations of harvesting trees, whether for sale or own use, and acknowledged the need to register individual trees and secure permits at the local Forestry Commission office in order to secure rights to the trees on their cocoa plots. The individual tree registration at the Forestry Commission, much akin to how the Land Commission should register land allocations in customary lands (Spichiger & Stacey, 2014), is the main approach adopted by public authorities to address tree tenure issues and create clarity of ownership and rights to usage. The farmers, however, often saw it as a way for public authorities to collect payment as a fee is paid for registering trees, and instead of a solution, farmers view tree registration as yet another source of tree rights disputes. Other farmers, especially those who had acquired their plots via the *abunu* sharecropping arrangement, referred to agreements that revert the land, and any timber/shade trees planted on it, to the landowner when the standing cocoa trees come to the end of the rotation cycle. Such agreements hindered not only shade tree integration, but also cocoa farm rehabilitation and renovation.

Some farmers had received tree seedlings from agricultural extension officers and, along with them, the rights to the tree. With the same aim, cocoa buying companies are disseminating tree seedlings to cocoa farmers to promote agroforestry practices in their supply chains, but even for large multinationals, the administrative burden of documenting and registering trees has led to projects giving up on tree registration, relying instead on traditional rules (O'Sullivan et al., 2018).

Insecure land and tree tenure regimes impede farmers' willingness to make long-term investments in their cocoa plots, including the planting and tending of timber trees in cocoa agroforestry systems. Indeed, for some farmers, the insecurity of tree ownership was seen as an incentive to remove shade trees.

4.4.5 Policy Implications—Private and Public

Secure long-term rights to land and trees are necessary for farmers to carry the long-term investment in cocoa agroforestry systems. While the egalitarian objectives of the formal state laws and traditional land authorities do exist on paper, the missing checks and balances that should exist between the different layers of customary land governance and administration units, and thus the missing accountability of chiefs, result in uncertainties and land conflicts (Spichiger & Stacey, 2014). This uncertainty is a source of insecurity among cocoa farmers, for their cocoa trees and for other trees as well. The power dynamics within the cocoa producing communities, where village chiefs have the right and the duty to (re)allocate land for different kinds of development and may even, at least de facto, give external parties short-term user rights to farmers' land, affect not only farmers' choices vis-à-vis agroforestry practices, but also buying companies' sustainability projects. Many if not all international cocoa traders are implementing projects in the cocoa producing areas in Ghana with the stated aim to increase cocoa production, improve farmer livelihoods and build climate resilience among producers—by handing out tree seedlings and training farmers in shade tree management (Carodenuto & Buluran, 2021; Thorlakson, 2018). As project participation may give preferential access to training, inputs and other kinds of support, the power dynamics within cocoa communities are instrumental in determining who will be able to engage in sustainability projects. This may lead to marginalized producers, e.g., descendants of migrants, being excluded from potential project benefits and pushed to even more disadvantaged situations. A similar scenario may play out for female farmers, who despite performing half of the work on cocoa farms are vastly underrepresented among the officially registered cocoa farmers due to registration being tied to land tenure systems that traditionally favor men (Barrientos & Bobie, 2016).

The need to remove risks and uncertainties from the shoulders of farmers is clear, not least for the facilitation of agroforestry promotion. Given the long tradition of traditional land authorities and the numerous actors involved in land governance, it will be no easy feat to enhance the transparency and accountability of these institutions, though this is called for to increase land security (Kasanga & Ashie Kotey, 2001). The overlapping and sometimes competing rights in administration systems for trees and land should be integrated so trees are tied to the farmland, affording all tree tenure rights to the landholder, when relevant, under the same conditions as those pertaining to food and cash crops. This would remove the administrative burden and costs of tree registration in both public and private programs.

Additionally, to increase adoption of shade trees, it is necessary to improve the current tree seedling distribution by COCOBOD's Seed Production Division, which is currently limited by farmers having to cover transportation costs. The program is essentially funded by the cocoa sector, including the farmers, through COCOBOD's price regulation and the proceeds of the cocoa export. It is by no means an easy task as the current mass spraying programs are already flawed, as reported by farmers. With tree seedling distribution becoming widespread also in corporate extension programs, there is an opportunity for public–private partnerships in a commercially pre-competitive setup including decentralized nurseries and strengthened distribution channels. Falling short of unifying tree and farmland tenure, the registration of newly planted trees should be an integrated part of tree seedling distribution programs, e.g., by digital receipts registered with farmers or farmer organizations upon delivery of the trees. This setup could piggyback on the registration of farmers' passbooks that have shown to work well for registering cocoa production in each cocoa district. Furthermore, it is important that a greater variety of tree seedlings is distributed through these programs. These programs should consider both farmers' preferred shade tree species and location-specific factors that influence the cocoa agroforestry system, such as the local climate and climate change predictions.

The management of shade trees may not be a panacea for decent cocoa-based livelihoods and a living income for farmers. However, when implemented on sound management practices and based on secure rights to land, cocoa and shade trees, agroforestry has the potential to generate diverse income streams for farming households, provide ecosystem services at the societal level, improve climate resiliency and supply cocoa raw materials to a global consumer base.

4.5 Conclusion

From pre-Hispanic Mayan cultivation of cocoa to present-day cocoa farms in Ghana, the farming of cocoa is more than the sole marketable value of the cocoa beans. While Ghanaian farmers do not attribute ceremonial values to their cocoa trees like the Mayans do, they do derive non-cocoa values from the cocoa plots, especially when managed as agroforestry systems. Ecosystem goods and services are provided by the shade trees and the shady environment to the farming households, such as food, fodder, medicine and materials. Trees are seen by farmers as increasingly important given their recent experiences of a warming climate, both for adapting to droughts and higher temperature and for mitigating further climate change. However, by focusing only on the apparent synergies between climate change resilience and farmer benefits from agroforestry, it is easy to overlook institutional factors that can prevent cocoa farmers from engaging in longer-term agroforestry practices and thereby benefiting from the opportunities they present. Especially, the institutional complex surrounding land and tree tenure creates high uncertainties for farmers regarding their ability to enjoy the benefits from their shaded cocoa plots. The costly registration of trees with Forestry authorities leads to limited user rights to trees on cocoa farmland, removing the economic incentives to care for trees. For some farmers, the risks of the loss of cocoa plots to mining activities, at the discretion of village chiefs, add additional insecurity to cocoa-based livelihoods and thus to longer-term investments in trees. While major land reforms may not be on the horizon, there is a need to unify tree and land rights systems to avoid overlapping and conflicting tenure regimes. This will ease current struggles among both private and public programs for tree seedling dissemination and the promotion of agroforestry.

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