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A cocoa agroforest in the JBL. Photo E. Kumeh

How agroecology can help build dynamic cocoa agroforests in Ghana

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“Policymakers, researchers, extension services, NGOs and the private sector must join forces to provide comprehensive support for agroecological cocoa farming.”

Introduction

In the heartland of Ghana, where lush landscapes once boasted vibrant and diverse forests and cocoa agroforests, a disheartening trend has taken hold. Once-thriving ecosystems teeming with life and cultural richness have gradually transformed into cocoa monocrops devoid of companion crops, biodiversity and the intrinsic nature that once defined cocoa farming in the region. The race for high cocoa yields underpinned this process and disrupted the intricate balance between nature and agriculture, giving rise to a cascade of social, ecological and economic challenges.

This article describes the transformative potential of agroecology as a beacon of hope for reestablishing balance in Ghana's cocoa-forest mosaic landscapes. Agroecology – rooted in the principles of ecological harmony and sustainable agriculture – offers a way to revive and restore biodiversity, empower farmers and ensure a resilient and thriving future for cocoa farms.



Full-sun cocoa in the JBL. Photo: E. Kumeh

This article draws on a case study of local innovation that was identified through in-depth ethnographic fieldwork in Ghana's Juabeso/Bia Landscape (JBL). It articulates a vision of how the adoption of agroecological principles can breathe life back into cocoa farming, enable food security, nurture vibrant ecosystems, preserve cultural heritage, and empower cocoa farmers.

Promising start, bleak outlook

Cocoa remains a cornerstone of Ghana's economy, with immense social, cultural and economic significance. Many cocoa farmers in the country clear forest to establish cocoa, while reserving established beneficial trees or tending their saplings for shade, food and cultural benefits. These farmers integrate cocoa seeds or seedlings with companion crops such as cocoyam, yam and plantain, ending the planting of most of these crops as the cocoa achieves canopy closure. Wild yam (*Dioscorea villosa*) was typically an exception; farmers continued to tend it even after the cocoa canopy closes since it is well adapted to growing in shade and contributes to household food security.

Many institutions, including the Ghana Cocoa Board (COCOBOD), NGOs and cocoa-buying companies, have over the years invested significant resources in the JBL to promote farmers' uptake of cocoa agroforestry. These actors supply cocoa farmers with hybrid cocoa seedlings, tree seedlings such as *Terminalia ivorensis/superba*,

Melia excelsa, *Entandrophragma angolense* and *Cedrela odorata*. In addition, COCOBOD supplies agrochemicals to the farmers. The institutions train farmers in various skills, such as agrochemical application and shade management, aimed at improving the effectiveness of the cocoa agroforests. Although these investments initially boosted cocoa production in the area for most of the 2000s, cocoa production in the JBL has declined significantly in recent years and farmers' uptake of cocoa agroforestry has been stymied.

Barriers to cocoa agroforestry

The decline of cocoa production in the JBL and the poor uptake of cocoa agroforestry lie mainly at the intersection of three key issues:

- full-sun cocoa;
- tenure insecurity; and
- food insecurity.

Full-sun cocoa

With the emergence of full-sun, monoculture cocoa, touted to improve cocoa bean productivity, practitioners and researchers persuaded cocoa farmers to do away with old-growth, large-canopy trees that formed the overstorey layer on their farms. This development occurred on the back of genetic improvements in cocoa and along with expanded fertilizers and pesticides supplied by the Ghanaian government to cocoa farmers. The main rationale was to bridge "the yield gap," as

cocoa farmers' outputs were believed to be subpar (Amponsah-Doku et al. 2022; Asante et al. 2022).

Drawing on outputs from full-sun cocoa on experimental stations and in other countries, COCOBOD and many other cocoa-sector stakeholders convinced cocoa farmers in the JBL that they could double their yields with full-sun cocoa. What many of these stakeholders failed to consider was that simulations on experimental stations, including water stress management, are often not replicable or feasible on farms. Meanwhile, cocoa monocultures have proved to be less resilient than cocoa agroforestry to climate variability and pests. As a result, COCOBOD and other actors that influenced farmers to adopt cocoa monoculture are now racing to influence them to revert to cocoa agroforestry. Thus, the shift in promoting cocoa agroforestry needs to be interpreted within the context of redressing an ill-advised policy in the country rather than as an innovation.

Further, some proponents of cocoa agroforestry encourage approaches that are ill-suited to farmers' operational environment. For example, the Cocoa Research Institute of Ghana recommends planting 18 shade trees per hectare of cocoa farm; this, however, is argued to often be inadequate for achieving shade levels that provide optimal economic and environmental benefits, due to differences in the crown size of various tree species (Blaser et al. 2018; Niether et al. 2020; Richard and Ræbild 2016). Additionally, whereas one strand of the

literature argues that the benefits of cocoa agroforestry add up over time at all levels, others assert that cocoa agroforestry is inimical to farmers' economic interests at the farm level but beneficial at the landscape level. Cocoa farmers in the JBL end up trapped in the politics of knowledge and incongruence in policy and practices.

Tenure insecurity

Until 1962, cocoa farmers effectively held ownership rights to the trees on their farms, with traditional authorities sanctioning associated claims. This changed considerably when the Nkrumah administration passed the *Concessions Act, 1962* (ACT 124, Section 14.4), vesting the rights over naturally regenerated trees to the state. This act is largely recognized as the result of the president's aim to curb the power of traditional authorities as punishment for supporting the colonial administration, and to consolidate government control over rural areas. The change empowered the state to issue timber rights to private companies for logging on cocoa farms, creating multiple conflicts.

In the JBL, timber companies continue to fell trees on cocoa farms without the consent of farmers and without paying compensation for the damages inflicted on such farmers. This has discouraged many farmers from maintaining old-growth trees such as mahogany, *Melia excelsa*, *Terminalia* spp. and *Ceiba pentandra* on their farms. Some farmers proactively debark trees, apply



Farmer on a food crop farm that encroaches on the Krokosua Hills Forest Reserve, JBL. Photo: E. Kumeh

Box 1. Grassroots voices on cocoa agroforestry

Grassroots voices are essential in conveying farmers' perceptions and sense of justice about cocoa agroforestry. Focus group discussions on cocoa agroforestry with farmers across the JBL were often tense, charged and heated.

For example, in discussing support systems for agroforestry in Kunkumso, JBL, a farmer who had been engaged in cocoa production for over 25 years observed that: "COCOBOD and stakeholders miseducate us — cocoa farmers. One moment, they tell us to cut the trees on our farms; another time, 'plant trees,' they tell us. I personally don't understand or listen to them anymore because their knowledge is just theoretical. We are farmers, constantly on the farm. We know what works and doesn't work."

Other cocoa farmers such as this one were concerned about the complexities of tree registration: "What annoys me most is NGOs are frequently telling us to

go and register our trees at the district office. So, if I don't have transport fare to go there, I cannot register my trees. What is that?" "I am challenging you to come with us and look at how timber contractors have destroyed our cocoa with their logging activities. Contractors, district officials and you researchers don't hold us in any regard at all; you don't value us. You're always telling us to plant trees in our cocoa. Come with me, let's go and see for yourself. I will never plant any tree seedlings," lamented another cocoa farmer, whose trees had been destroyed by a logger without his consent or any form of compensation.

A recurring theme in farmers' narratives is an apparent stifling of their agency. With stakeholders having largely failed to address cocoa farmers' concerns and grievances pertaining to trees on farms, farmers' resisting cocoa agroforestry, in multiple ways, is likely to continue in the JBL.

agrochemicals or set fire to destroy trees and eliminate the risk that timber contractors will damage their farms. Other farmers prefer to preserve less economically viable species and slender crown trees such as *Newbouldia laevis*, while still others desist from planting shade trees altogether due to the complexities in establishing ownership rights over them (see Box 1).

Food insecurity

Permanent food production is critically marginalized in debates about cocoa agroforestry in Ghana (Kumeh et al. 2022). Those debates that do take place are pixelated, asymmetrical and biased towards tree planting on cocoa farms. Policymakers and practitioners discuss food production only during the establishment phase of cocoa, either in new areas or through the rehabilitation of old or diseased farms. The latter problem has been particularly topical in the JBL, which is losing its lead position in national cocoa exports due to surging climate shocks, and a high incidence of Cocoa Swollen Shoot Virus Disease (CSSVD) and Black Pod disease.

Indeed, COCOBOD is implementing a multimillion-dollar cocoa programme to rehabilitate old and diseased farms in the JBL and elsewhere. Cocoa rehabilitation does not consider long-term food production, even though cocoa farmers cannot eat cocoa. Under the programme, COCOBOD pays farmers a fixed rate: GHS

1,000 (USD 86) per ha of cut cocoa farm. It also supplies them with inputs — hybrid seedlings, tree seedlings and plantain suckers — and technical advice to establish their cocoa. The plantain is meant to shade the cocoa seedlings and provide food during the initial phase of farm establishment. Thus, the programme largely entices farmers to lock up their lands under full-sun cocoa, leaving them exposed to food insecurity once their cocoa establishes itself. Often farmers have to wait for "gaps" in their cocoa to produce food crops. Some studies have found that food insecurity is on the ascendency in cocoa-growing communities, even among farmers certified by the Rainforest Alliance, because income from cocoa alone is insufficient to meet their food needs. In the JBL, cocoa farmers are forced to encroach into forest reserves to produce food, leading to deforestation conflicts with forestry authorities (see Kumeh et al. 2022).

These cases indicate that the adoption of cocoa agroforestry in the JBL depends on the interaction of social, cultural and policy issues, and not just economic returns. Together, these factors not only militate against the adoption of cocoa agroforestry, but are increasingly driving a trend where cocoa farmers — in some cases, entire communities — shift from cocoa agroforestry completely, trading their cocoa farms for illegal surface gold mining (Eberhard et al. 2022; Snapir et al. 2017). The consequences are staggering. Once-vibrant cocoa-



Cocoa farms being converted to surface gold mining in the JBL. Photo: E. Kumeh

forest landscapes, alive with the symphony of countless species, are being reduced to barren expanses. This loss of biodiversity not only disrupts the delicate ecological balance but also threatens the long-term viability of cocoa production. In this challenging landscape, agroecology emerges as a solution that promises to restore the balance between productivity and sustainability in cocoa farming.

Agroecology as a path to dynamic cocoa agroforests

Agroecology encompasses an assemblage of farming practices that engender crop diversity, rotations, biomass and residue management, and biological pest control. Although it recognizes and aims to improve yields, its broader aim is to increase overall system resilience, and to provide diverse social, economic and environmental benefits over the long term.

At its core, agroforestry is an agroecology practice. The challenge, however, is that agroforestry in the JBL is practised in a way that neglects many of the agroecological principles that underlie it. Such principles include: i) reducing nutrient losses while improving nutrient cycling; ii) cultivation and use of locally adapted food crops while building on local knowledge and culture; iii) diversified production with the utmost respect for the inherent capability of soils over time; and iv) optimizing

beneficial biological interactions to increase the efficiency and resilience of farming systems.

An overlooked, underexplored and unpolished gem

Deep in the land of a community in Ghana, where several hectares of cocoa farms have been devastated by illegal mining, Farmer X (he is not named here to protect his identity) was found to have implemented dynamic cocoa agroforestry that respects many agroecology principles.

While the lush overstorey canopy of diverse trees on his cocoa farm is noticeable from a distance, it is what he does beneath the understorey that is fascinating. Each year, he uses the off-season period to dig pits, about 50–70 cm wide and deep, on his cocoa farm, planting wild/bush yam in them. Bush yam, he notes, is notoriously difficult to dig up as the tubers can be very irregular. Having dug the pits, he fills them with cocoa litter from his farm and with dried cocoa placenta that is extracted and aggregated while drying his cocoa beans. He plants yam setts in the cocoa litter-placenta mixture, dressing it with some soil to provide additional support. Farmer X pointed out that this technology makes harvesting the matured yam tubers fairly easy, significantly reducing the losses from digging up the yam in a conventional planting approach (see photos next page), while meeting a significant part of his household food needs.



Left: Wild yam harvested from an ordinary cocoa farm, December 2019. Right: Wild yam harvested from Farmer X's farm, January 2020.
Photos: E. Kume

The relative success of this farmer also indicates the potential of agroecology to improve biodiversity and ecosystem services in cocoa. By using cocoa litter and placenta to amend soils, cocoa farmers could reduce the risk of fire on their farms, and improve nutrient cycling, biodiversity and soil carbon sequestration. The rejuvenation of soil health and the reduction of chemical inputs can lead to enhanced resilience, minimizing the risks posed by pests and diseases. This newfound ecological balance may bring not only intrinsic value but also tangible benefits to farmers' livelihoods.

Building the foundations for a giant leap

While Farmer X's success provides inspiration and motivation, other challenges may hinder the scaling of agroecology principles in cocoa agroforestry in Ghana. In addition to the barriers such as tree ownership and inconsistent or inappropriate technical support discussed earlier, actors need to find ways around issues such as limited empirical information on options to optimize food production in mature cocoa agroforests, poor investment in wild yam germplasm development, and policy and institutional shortfalls that impede bottom-up learning from farmers. Also, the growing threat of illegal mining on cocoa farms in the JBL cannot be discounted.

To overcome these challenges, a collaborative effort is paramount. Policymakers, researchers, extension services, NGOs and the private sector must join forces to provide comprehensive support for agroecological cocoa farming. Investment in farmer programmes, particularly at the community level, can enhance knowledge co-creation, yielding pragmatic solutions. The development of robust market systems, with fair pricing and certification schemes, can incentivize and reward farmers for their sustainable practices.

The role of government in this transition is pivotal. Policymakers must recognize and prioritize the integration of agroecological principles into cocoa sector development policies and strategies. This requires aligning incentives, regulations and support mechanisms to create an enabling context for agroecology to flourish. A starting point would be to give back control over trees on farms to farmers while exploring ways to overcome the governance challenges that led to the abuse and misuse of pesticides in cocoa agroforests. These efforts require a long-term vision that transcends political cycles and ensures sustained commitment to agroecological principles.

Conclusions

This article provides a critical reflection on how the co-optation of cocoa agroforestry — and neglect of the agroecological principles that underlie it as a practice — led to cocoa monocropping. It demonstrates how state failure to guarantee farmers' rights to trees and secure permanent food production in cocoa agroforests undermines the spirit of functional agroforestry and frustrates farmers' efforts. This not only limits their uptake of dynamic agroforestry but creates negative spillover effects such as encroachment into forest reserves to secure food and the transition to illegal mining on cocoa farms.

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