

# Developing Regenerative Supply Chains for Shea and Baobab Products in Times of Climate Change and Terrorism

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## Abstract

In this paper, we explore if rural communities can exploit sustainably to collect and produce non-timber forest products (NTFPs), and if gaining access to global markets and transnational supply chains can mitigate the effects of climate change and improve the lives of people living in rural communities in Northern Ghana and Burkina Faso that are severely affected by climate change and, in the case of Burkina Faso, terrorism. We find that actors in Burkina Faso and Ghana and the MNCs in their networks have so fundamentally different understandings of sustainability and approaches to doing business that they follow different rhythms.

## Keywords

Climate Change, Non-timber Forest Products, Poverty-Environment Trap, Regenerative Supply Chains, Sustainable Development, Terrorism

## Introduction

In this paper, we explore if and how forest resources can be exploited by rural communities in Burkina Faso and Northern Ghana to collect and produce non-timber forest products (NTFPs) in a sustainable manner, or if it risks keeping them trapped in poverty. Specifically, we investigate the challenges that actors in these communities face as they attempt to earn money from collecting and producing NTFPs from shea and baobab trees for sale locally and on international markets dominated by large multi-national corporations (MNCs) that face different demands and circumstances.

NTFPs refer to all biological products other than wood and wildlife, derived from forests, woodlands or trees outside forests (FAO, 1999; MECV, 2010; Nedeljković, 2019). Examples include leaves, flowers, fruits, bark, roots, non-lignified stems, sap, gums, resins and their by-products. NTFPs are an important source of income to households in rural areas of developing countries like Ghana (Adongo, Osei, & Wongnaa, 2018) and Burkina Faso (Ouedraogo, Maiga, & Esbjerg, 2025).

Although the importance of NTFPs for people living in rural communities in developing countries is widely acknowledged, the literature disagrees about whether the exploitation of NTFPs keeps people trapped in poverty or can help reduce income

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inequality. Because rural areas are often very poor and rely on natural resources there is a risk of falling into a poverty-environment trap (Barbier, 2010; P. Dasgupta, 1995), where exploitation of natural resources like shea or baobab leads to a degradation of these resources and increased poverty.

Poverty-environment trap theory considers poverty and environmental degradation as two interlinked phenomena that mutually reinforce each other (Barbier, 2010; P. Dasgupta, 1995). The theory highlights a potentially vicious cycle in which poor communities exploit their environment for survival, which in turn leads to environmental degradation and perpetuates poverty (S. Dasgupta, Deichmann, Meisner, & Wheeler, 2005). According to poverty-environment trap theory, the lack of income-generating opportunities and limited access to key markets—such as land, labor and credit—push poor households to rely heavily on available natural resources (such as forests, soils, water and minerals) to meet their immediate needs (Barbier, 2010; Ikefuji & Horii, 2007). This excessive use of natural capital leads to resource degradation. Households are then forced to spend more time and effort to collect the same quantities of products or turn to lower-quality resources. If natural resources become depleted, their productivity declines, resulting in reduced income and worsening poverty (Barbier, 2010; Wang, Cui, & Huang, 2023). This limits their ability to invest in sustainable forest management practices or diversify their income sources.

If NTFP resources become scarce due to overharvesting or climate change, the productivity of forest ecosystems declines. Since exploitation of indigenous trees is a national priority in Burkina Faso (MECV, 2010) and Ghana (Ahenkan & Boon, 2010; Issaka, 2018) it is therefore important that the exploitation of NTFPs does not make matters worse, as the absence of viable economic alternatives during certain times of the year can lead to overexploitation of forest resources because many households rely heavily on NTFPs for their livelihoods.

In our paper, we study domestic and transnational supply chains and networks for NTFPs derived from shea and baobab trees, both of which are indigenous to Ghana and Burkina Faso. Whereas the exploitation of the shea tree is relatively mature, with shea butter an important export used in cosmetics and food products, the baobab is not so widely exploited commercially. Getting access to international markets is a way to get better prices for raw materials and processed products but, as we will show, comes with added costs and obligations. Supply chains for both shea and baobab involve a variety of different actors, including individual harvesters and collectors, women groups, collectives, village merchants, local processors, wholesalers, retailers, exporters and foreign customers. We study the demands challenges local actors face as they attempt to make a living out of collecting, producing and marketing NTFPs on domestic and international markets dominated by large multi-national corporations (MNCs), who face different demands and circumstances.

## Literature review

Sustainability has long been a watchword in the supply chain and network literature, with companies striving to reduce the negative consequences of their operations while turning a profit. However, several researchers have questioned the assumptions underlining supply chain management, which has focused on maximizing profits and optimise operational efficiency (Gualandris et al., 2024; Wieland, 2021).

In this section we will outline how research on supply chains has evolved from focusing on sustainable to circular and regenerative supply chains. Space constraints prevent us from providing a thorough review of the literature.

## Sustainable supply chains

Sustainability is often conceptualized as encompassing economic, environmental, social dimensions, sometimes referred to as the triple bottom line (Elkington, 1998). Most approaches to sustainability take an instrumental approach, reducing environmental and social sustainability to means to achieve economic prosperity (Hahn & Figge, 2011). Simultaneously achieving business goals and reducing the environmental impact requires balancing of priorities, which can be difficult for managers (Wu & Pagell, 2011). In long and fragmented supply chains it is difficult to balance the three dimensions of sustainability, and especially social sustainability has been neglected in both practice and research (Bubicz, Dias Barbosa-Póvoa, & Carvalho, 2021; Govindan, Shaw, & Majumdar, 2021; Kauppi & Hannibal, 2017).

Research has found that assessment initiatives can exert coercive, normative and mimetic pressure on companies to adopt standards both directly and indirectly through, e.g. by influencing retailers, media and consumers (Kauppi & Hannibal, 2017). This is important because private standards and regulations play a central role in transnational supply chains for NTFPs, not least when exporting to Europe. Products must then live up to European safety standards and are sometimes required to also meet organic standards or be fairtrade certified.

A lot of work on sustainability in relation to supply chains focuses on environmental sustainability. We think that it is important to focus more on social and economic sustainability for local actors, particular as regards value chains involving subsistence producers in Sub-Saharan Africa, who are often by necessity concerned about the immediate wellbeing and survival of themselves and their families.

## Circular value chains

Supply chains and value chains have traditionally been linear. Raw materials are harvested/extracted and processed into materials and parts that are assembled into finished products that are sold, used and ultimately discarded with little regard for how to avoid valuable materials ending up in landfills or being incinerated.

As an alternative to linear economic system, circular economy (CE) has been proposed. According to the Ellen Macarthur Foundation, the circular economy builds on three principles: eliminate waste and pollution; circulate products and materials; and regenerate nature<sup>1</sup>. Material use is reduced through narrowing, slowing and closing resource loops (Aarikka-Stenroos, Chiaroni, Kaipainen, & Urbinati, 2022).

Circular supply chains go beyond traditional linear supplier-manufacturer-customer networks to incorporate actors such as collection and sorting contractors, re-processor or re-manufacturers (Calzolari, Bimpizas-Pinis, Genovese, & Brint, 2023; Calzolari, Genovese, & Brint, 2021).

Supply chains can be seen as both a driver and barrier to creating a circular economy (Tura et al., 2019). Other areas of drivers and barriers are environmental, economic, social, political and institutions, technological and informational and organisational factors (Tura et al., 2019).

It is important to consider the policy landscape, as regulation can differ markedly between countries (Svensson-Hoglund et al., 2021). Adoption of CE practices is driven by institutional pressures, with coercive regulatory and market pressures being found

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<sup>1</sup> See <https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview>.

to be particularly important (Calzolari et al., 2023). Research indicates that smart manufacturing and data processing technologies can improve supply chain integration and contributed to CE (Di Maria, De Marchi, & Galeazzo, 2022)

However, CE is not without critics, who amongst other things argue that it neglects basic principles of thermodynamics, limitations in material properties and fails to include the Global South (Corvellec, Stowell, & Johansson, 2022).

### Regenerative supply chains

Sustainability has been conceptualized in terms of a business case for sustainability (Bansai & Song, 2017), which has focused attention on a single company (Hahn & Figge, 2011; Hahn & Tampe, 2021). This ‘weak sustainability’ has been dismissed as inadequate, as it accepts a trade-off between nature and profitability. Although there has been a focus on minimizing harm from supply chains, it has been accepted that there will be *some* harm.

As the scale and impact of environmental degradation, loss of biodiversity, global warming and growing economic inequity have become ever clearer, there have been calls for ‘strong sustainability’ and for companies to make a positive contribution towards a better world (Oliveira Neto, Pinto, Amorim, Giannetti, & Almeida, 2018). Towards this end, the term ‘regenerative supply chains’ has recently been garnering interest (Gualandris et al., 2024; Howard, Hopkinson, & Miemczyk, 2019)

To be regenerative, supply chains must create and maintain positive reinforcing cycles of wellbeing between humans and wider nature (Buckton et al., 2023).

“Building regenerative supply chains entails aligning organisational knowledge, decision-making, and activities by diverse supply chain members with the structures and dynamics of social-ecological systems in diverse geographies (including “Global North” and “Global South” contexts), at multiple levels (local and global) and across time horizons (short term and long term)” (Gualandris et al., 2024: 54).

In this connection, it is also important to move beyond looking at issues of sustainability from the perspective of individual firms and think about the wider networks and social-ecological systems (SES) they are part of (Howard-Grenville & Lahneman, 2021). It is important to study how diverse sets of actors can adaptively co-manage in complex SES.

Regenerative sustainability seeks to “restore and regenerate the global social-ecological systems” (du Plessis, 2012: 19). According to Hahn and Tampe (2021), there are two principles of regenerative business. First, to derive objectives of business activities “from the perspective of the SES in which business activity is embedded” (Hahn & Tampe, 2021: 460). Second, to have an adaptive management approach that is place-sensitive and temporally oriented (Hahn & Tampe, 2021).

It has been suggested that a regenerative lens can help shape ambition and drive actors to want to imagine alternative futures, maintain transformational intent and to reflect on the progress made towards a regenerative supply chain (Buckton et al., 2023). To help firms manage the transition from sustainable to regenerative supply chains, it has been suggested that indicators are needed (Howard et al., 2019).

Gualandris et al. (2024) suggest that being regenerative demands a more nuanced, gradual, agile management approach to supply chain management. Specifically, they propose three organising principles for regenerative supply chains have been

proposed: *proportionality* between the scale and scope of production and consumption and what social-ecological systems can tolerate; *reciprocity* between supply chain actors and social-ecological systems across geographies, levels and time horizons; and *poly-rhythmicity* due to the multiple, simultaneous rhythms of various living systems (Gualandris et al., 2024).

Actors in regenerative supply chains need an ecological worldview recognizing that they are part of a complex web of existence and an awareness that their actions impact other actors and wider social-ecological systems (Buckton et al., 2023). Similarly, Hahn and Tampe (2021) propose taking a systems approach to recognize “the inherently dynamic and non-linear interdependences” between the different elements of social-ecological systems (p. 457).

## Theoretical background

Theoretically, we are inspired by the emergent literature on collective market shaping (Baker & Nenonen, 2020; Esbjerg, Laursen, & Olsen, 2024; Pontikes & Rindova, 2020). Intersecting markets and the fact that different actors in value chains face different institutional demands mean that it can be difficult to align interests and operations across value chains (Esbjerg et al., 2024). This is only likely to be exacerbated when spanning greater geographic, cultural and institutional differences.

As supply chains bridge local communities, organisations and companies with multinational companies serving distant markets, we also look at the importance of place, and are inspired by discussions of building and dwelling modes of engaging with your environment (Andersen & Esbjerg, 2020; Chia & Holt, 2006; Chia & Rasche, 2010; Ingold, 2000, 2011). The essence of the building mode is that ‘worlds are made before they are lived in’ (Ingold, 2000: 179). From the dwelling perspective ‘the environment is, in the first place, a world we live in, and not a world we look at’ (Ingold, 2011: 95). Social reality does not come to us ‘ready-made’. On the contrary, the primary condition of human existence is that reality is ambiguous and fluxing. The difference between these two approaches to engaging with the world can be particularly evident when managers and companies from the Global North interact with actors in the Global South but do not have a sufficient understanding of the local context (Andersen & Esbjerg, 2020).

Individuals and groups inhabit their environment and through practices of habitation it becomes part of them as well (Gibson, 1979; Ingold, 2011). It is therefore important to take into account the lived experience of all the actors involved in the collection, processing and marketing of NTFPs – from collectors of shea kernels or baobab fruits over community organisers and local processor to exporters and European customers.

People stabilize their understanding of their environment along a ‘path of observation’ or movement (Gibson, 1979: 197). Stability and social order in the mind of the individual is thus fundamentally (and paradoxically as well) about movement. As wayfarers, we experience a progressional ordering of reality along a path of travel, with objects falling into and out of sight, as new vistas open up and others are closed off (Ingold, 2007). What we are, or what we can be, is something that we continually shape through our actions (Ingold, 2011).

Managing place-based tensions is important (Slawinski, Winsor, Mazutis, Schouten, & Smith, 2021). Often multinational companies are separate from the local communities and environments that they interact with and from which they procure materials and products for further processing; they are not embedded in the

communities within which they operate and move on if it does not make economic sense to stay (Thomas & Cross, 2007).

Finally, we view supply chains as social-ecological systems of becoming that are cannot be seen in isolation from their environment (Wieland, 2021).

## Methodology

This paper draws on qualitative research conducted from 2023 early 2025, with most data generated in 2024. We have taken an iterative grounded approach to our research (Orton, 1997), combining insights from the literature on sustainable supply chain management with inductive insights from interviews with key informants in the value chains for shea and baobab NTFPs (Burawoy, 1991; Gioia, Corley, & Hamilton, 2013; Magnani & Gioia, 2023). We chose this iterative approach because there are relatively few studies of supply chain management involving actors in Sub-Saharan Africa.

We studied value chains for both shea and baobab because value chains for shea are well-established while exports of baobab to Europe and other developed markets are limited. There are numerous uses for both shea and baobab in food and cosmetics.

We chose to focus on European customers because exports to Europe have to live up to stringent European regulation, which makes exporting to Europe especially demanding and challenging (Bradford, 2020).

## Research setting

In Burkina Faso and Northern Ghana, non-timber forest products such as baobab and shea are essential to rural livelihoods, especially for women. These natural resources provide income, contribute to food security, and help preserve traditional knowledge. Women are at the heart of these value chains, taking on the collection, processing, and marketing of products, often through cooperative structures that combine economic activities with strong social solidarity.

In Burkina Faso, the broader context has become increasingly fragile due to worsening security conditions. Since 2016, the spread of terrorism has profoundly affected rural life. Many forest areas where baobab and shea are traditionally harvested have become inaccessible or too dangerous to reach. As a result, production activities have been displaced toward safer zones, which are often already saturated or lacking in natural resources. This situation has contributed to the scarcity of raw materials, increased their purchase costs, and made transportation of both raw and processed products more difficult and riskier. At the same time, structural constraints such as deforestation, declining tree productivity, and the growing impacts of climate change are further weakening the availability of these forest products in Burkina Faso. Rainfall variability and changing harvest calendars are creating uncertainty for producers and threatening the long-term viability of these value chains.

In the context of Ghana, the scarcity of raw materials for NTFPs production is largely blamed on diminishing presence of shea and baobab, which is caused by an interaction between anthropogenic activities such as recurrent bushfires, mechanized farming, illegal logging and climate related factors like reduced pollination due to persistent drought or low rainfall and heightened prevalence of pests and diseases (in the case of shea trees) (Pienaaah, Baruah, & Luginaah, 2024). More recently, illegal mining is becoming a threat to the survival of forest resources. The forest ecosystem including reserved areas, farmlands and parklands that harbour these plant resources are being encroached by illegal miners causing a devastating threat to the environment and the

tree resources. The activities of illegal mining further exacerbate plight of collectors and producers of NTFPs from baobab and shea.

Despite these challenges, local actors are developing strategies to adapt. Some cooperatives have planted new trees such as baobab and shea to restore availability in the medium term. Others have relocated their processing sites closer to collection points in secure areas. Awareness campaigns on biodiversity protection and investments in processing equipment have also contributed to building resilience.

## Data

Around 25 qualitative interviews were conducted with various actors in Burkina Faso and Ghana, as well as a small number of interviews with firms located in Europe.

Using purposive sampling, we sought to interview key informants from different types of actors in value chains that worked with collecting, processing and marketing NTFPs from shea and baobab trees, including women's groups (collecting and processing shea and baobab is gendered work), cooperatives, processors and exporters in Burkina Faso and Ghana, as well as customers in Western Europe.

Interviews were semi-structured. We used an interview guide covering a number of key issues: the informant and their organisation/company, how they saw the market for the NTFPs that they worked with, how the market for the NTFPs in question had changed in recent years, how they understood and worked with sustainability, important business partners and their day-to-day interactions with them, certification and the challenges and opportunities they saw for exporting or importing NTFPs. Interviews were recorded and transcribed verbatim. When necessary, transcripts were translated to English.

Interviews were supplemented with documentary materials, primarily corporate websites describing the different businesses and organisations worked with sustainability issues in their supply chains.

## Analysis and interpretation

We followed an inductive approach to analysing our interviews, where we initially developed first-order codes close to the language used by informants before trying to identify second-order themes and aggregate dimensions in the interviews (Gioia et al., 2013; Magnani & Gioia, 2023). Analysis is still ongoing, and the findings we present in the next section are therefore tentative. In the analysis, we are amongst other things looking at the challenges that actors face in relation to supply chains and sustainability issues, as well as the exchange practices they engage in.

## Findings

In both Burkina Faso and Ghana, collecting and processing NTFPs is gendered work mainly done by women.<sup>2</sup> These women are often organised in collectives referred to as women groups or cooperatives, some of which band together in larger associations to improve the lives of their members:

“The idea came from an observation we made about the difficult living conditions faced by women. So we asked ourselves why not set up an association. So we set up the association, and FAFPA (Fonds d'Appui à la Formation Professionnelle et à

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<sup>2</sup> There are also a few male members in some of the associations and cooperatives we have interviewed. For instance, Cooperative W in Burkina Faso has 107 members, 6 men and 101 women.

l'Apprentissage) supported us with training in processing shea kernels. We also received other training, particularly in entrepreneurship and marketing” (Group P, Burkina Faso).

“We are a cooperative of 45 women. All the women members of the cooperative were already processing almonds into shea butter on an individual basis. But we realized that each of us couldn't earn a decent living from individual production. That's why we decided to pool our strengths and join forces. We're all determined, and we get on very well in this cooperative” (Cooperative Y, Burkina Faso).

The collectives mainly process the raw materials they collect and harvest, but some also buy raw materials from other women and communities. The different groups typically sell some of their production directly to local consumers, e.g. through stores or market stalls, and some to local wholesalers and processors, who then process and distribute NTFPs domestically and export raw materials or processed products to international market. Some women groups and associations also sell directly to international customers.

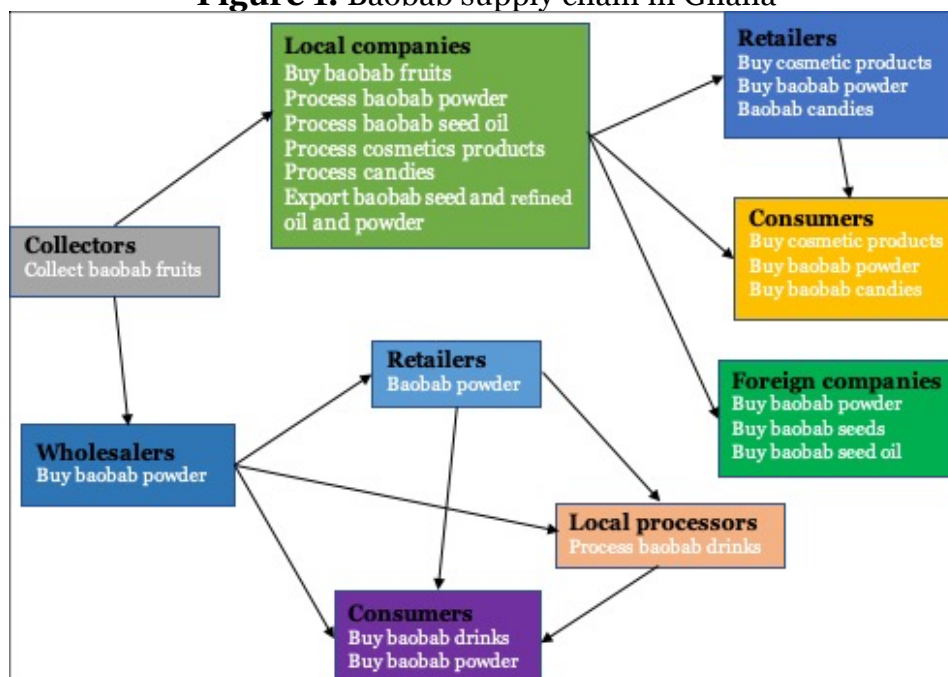
Local companies in Burkina Faso and Ghana that target international markets often buy NTFPs from several women groups and associations. To take one example:

“We mainly buy organic and conventional shea nuts from registered women groups, community members, aggregators and market centres, and processed into unrefined shea butter at different centres. We also buy baobab oil from X and Y. The company produce cosmetic products such as body creams, lotion, hair creams, black and shea soap using shea butter as the main ingredient at the main processing centre. We sell our cosmetic products to walk inns, retail shops within Ghana. We sell the unrefined shea butter to cosmetic companies in Ghana, Netherlands, Germany, USA, Canada, Saudi Arabia China and Japan. Perfume for our cosmetic products is sourced from the USA and Europe. Packaging materials (cardboard) is sourced local while containers are sourced from China for packaging” (Company S, Ghana)

Many different actors are thus involved in supply chains for baobab and shea NTFPs, which are often quite complicated. To illustrate this, Figure 1 provides an overview of the baobab supply chain in Ghana.

Baobab collectors (households) collect dry baobab fruits during the dry season (peck period) and either sell to individual merchants (dealers, traders and wholesalers) or to local processing companies/cooperatives. Due to competition for raw material (baobab fruit), some companies and individuals pre-finance the collection processes through household collectors or various women groups. The local and cooperative processing companies buy entire baobab fruits from collectors, and process them into seed oil, refined powder, candies (from powder) and crude oil (from seeds) for cosmetic product. Some of these companies sell their products to local customers, retailers and other local companies, particularly the candies, refined powders, baobab oil and cosmetic products, while others export their products abroad especially, the refined powder, oil and the raw seeds. Retailers in big cities buy products from these processing companies and repackage them in small containers and other forms and sell to their customers. It is important to note that some of these companies have the capacity to produce oil and refined powder because they have the cold-press machine which the individuals and other local companies do not have. Also, the exporting companies have all the necessary certification documentation that allows them to export their products abroad.

**Figure 1.** Baobab supply chain in Ghana



### Approaches to doing business

In our study, we find that actors in Burkina Faso and Ghana and the MNCs in their networks have so fundamentally different understandings of sustainability and approaches to doing business that they follow different rhythms. On the one hand, we have actors in rural communities that collect and produce NTFPs like shea butter and baobab powder for personal use and for selling to domestic and international customers. In doing so, they follow the natural rhythms of their social-ecological systems. Their livelihoods are threatened by climate change and terrorism, which means that it is difficult and sometimes dangerous for them to collect NTFPs. Because of the precariousness of their existence, many of the Burkinabe and Ghanaian actors must think about their immediate future.

On the other hand, we have MNCs that buy NTFPs from developing countries, process them and sell them to customers in the global north, where there is an increasing awareness of sustainability issues, and where many companies are required to do extensive ESG reporting. These MNCs and their customers focus on steady supply, product consistency, efficiency and supply chain resilience:

“Big customers demand certification. They want standard certifications so they can source from multiple suppliers” (MNC A).

Certification ensures that products meet standardized requirements. However, customers in Europe are reluctant to commit to buying from specific countries or communities, as illustrated by this quote:

“It's difficult to get a customer to commit. If you're a buyer and need a "Colonofaso" certified supply, you can't just switch suppliers. If I raise the price the next day, but you've already bought 30 million shampoo bottles and built your brand around it, you're locked in with us” (MNC A).

Thus, MNCs do not want to use the origin of shea butter or baobab powder in their marketing communication even though they, along with many of their customers, want to do good by doing business with suppliers in developing countries.

## Sustainability and security concerns

Sustainability is treated instrumentally by European firms, who want to reduce the carbon footprint of their products and, perhaps, put a sustainability label on their products to differentiate them. Focus is mainly on environmental sustainability, less on the economic or social sustainability of the communities they source from.

For the local communities and actors in Burkina Faso and Ghana, sustainability is an existential issue. Local actors fret about the availability of raw materials due to declining number of trees and lower yields because of climate change, and whether they can make a living, and thereby support their families and communities.

“For us, sustainability refers to high-quality products. It also means having sufficient resources to carry out our business in a sustainable manner. To ensure the sustainability of our activities, we rigorously manage our financial resources in such a way as to free up resources for investment. To improve the sustainability of our association and the whole chain, we are constantly looking for financial, technical and commercial partners to support the processing and marketing of our products. We also raise public awareness of the therapeutic virtues of our products” (Association W, Burkina Faso).

The focus of local actors in Burkina Faso and Ghana is often on economic sustainability in the short to medium term (“Will I be able to provide for my family and be in business next year?”), not on environmental sustainability in the long run.

For Burkina Faso, terrorism and the general security situation raises the stakes even more for local collectors and producers of NTFPs, who often cannot go to the forests to collect raw materials like shea nuts or baobab fruits, or only at considerable risk.

“The return of peace to the country will be decisive in this change. In fact, in a peaceful situation (without terrorism), there are short routes that traders in raw materials can take, but in a situation of insecurity, these short routes are not practicable, so journeys become longer and more costly, with the corollary that raw materials are more expensive. In addition, the return to peace could facilitate the arrival of new partners to support us with more suitable equipment and external sales opportunities” (Association W, Burkina Faso).

Several of the local actors we interviewed have an explicit focus on reducing poverty and community development:

“Our organization is a social enterprise that seeks to bring rural people out of poverty by creating market for local products such as NTFPs while also aiming at making profit for the company” (Producer S, Ghana).

“Our organization is a community development and environmental sustainability NGO, we provide financial teaching where we form VSLA, support members to pay school fees, tree planting and incorporate business model such as NTFP value chain development as part of our activities to sustain our businesses and improve lives of our members” (Community Development NGO, Ghana).

In a similar way, some MNCs try to support local development, but also think about the economic viability – that they are commercially driven and just done for CSR concerns:

“You see this a lot with NGO projects. When they are not commercially driven, they just stop at some point, and there isn’t that same urgency— we need to make this work, or we won’t have a business in three years” (MNC A, Europe).

MNC A works directly with 240,000 women and have the names and phone numbers of them all. The women sign contracts with their fingerprints as it is increasingly important for them to know whom they buy from:

“In recent years, we have become increasingly aware of who we buy from. Due diligence, CSR, and ensuring that we are not supporting anything linked to terrorism, child labor, or other such issues. We are now checking all suppliers” (MNC A, Europe).

In both Burkina Faso and Ghana, actors struggle to collect sufficient raw materials. The number of shea and baobab trees has been declining due to climate change, which also impacts fruiting from remaining trees. Due to demand for baobab leaves, these are sometimes over-harvested, which again affects yields of baobab fruits and seeds. The lack of raw materials threatens the economic sustainability of businesses, undermining an important income stream for vulnerable communities. There is thus a clear danger that communities fall into the environment-poverty trap.

“For us, sustainability means all the strategies aimed at making forest resources available in the long term. At our level, we are trying to take the issue of sustainability into account by raising awareness among collectors of the disadvantages of poor fruit harvesting practices (picking unripe fruit, for example). We try to take into account the sustainability of our company and the entire supply chain through the production and sale of shea tree nurseries, the training of harvesters on best picking practices which guarantee a good regeneration and good fruiting of the trees. We are committed to regenerative practices through the production and sale of tree nurseries, through raising awareness among rural populations of the disadvantages of excessive tree cutting and through the training of harvesters on good picking practices. Our customers have no particular requirements in terms of sustainability. They just want to have quality products” (Association Z, Burkina Faso).

### Accessing international markets

To do business with customers in Europe, which is often considered attractive due to higher prices, producers in Burkina Faso and Ghana need to meet European food safety requirements and often also requires obtaining organic and fairtrade certifications. Getting certified is seen as costly and cumbersome. The following is just one of many statements to this effect:

“The organic certification process is difficult, time-consuming and costly” (Cooperative Y, Burkina Faso).

Certification schemes generally favour the concerns of the multinational corporations (MNCs) over those of the local communities and firms, and can involve requirements that are difficult to meet:

“Certification is a process of recognition of product quality by competent structures such as ABNORM. However, it is long and expensive. This is the reason why we have not been able to obtain certification until now despite our good will. Indeed, one of the requirements of organic certification is to have your own field of shea trees to ensure that the shea trees are not in contact with chemicals such as fertilizers. Unfortunately, we do not have land to plant shea trees” (Association Z, Burkina Faso).

Burkinabe and Ghanaian actors are often willing to adapt to demands of European customers, e.g., to obtain organic and/or fairtrade certificates. However, European actors are not really willing to adapt their business practices and are also hesitant to

commit to long-term partnerships as they want flexibility and lack competence trust in Burkinabe and Ghanaian suppliers.

“The organic certification process is difficult, time-consuming and costly. For example, it requires that the shea trees do not come into contact with chemicals. This is difficult because we use chemical fertilizers, herbicides and insecticides in our fields” (Cooperative Y, Burkina Faso).

Security issues in Burkina Faso hampers travel, and therefore also negatively impacts exports:

“In recent years, we've seen a drop in demand, partly because we've lost certain sales opportunities abroad. In the past, for example, we took part in trade fairs abroad, notably in France and Norway, but in recent years we've been unable to secure similar sales opportunities. Added to this is the scarcity of shea kernels due to terrorism and the low fruiting rate of shea trees. These factors have seriously threatened our shea product processing activities in recent years” (Association Z, Burkina Faso).

### Exchange practices

Business relationships are transactional due to lack of trust between value chain actors, at least initially and especially between local actors and MNCs:

“I once did payments in a village that had never dealt with white people before. The trust issue was real—could they rely on us? They recognized a local unit of measurement and saw that the price was fair. After fulfilling their initial commitment, they brought out extra sacks they had held back, only selling them once they trusted us. [...] We have a different business mentality. After 10-12 years in the region, always showing up and always paying market price, people now see us as a reliable income source. Villages now recommend us to each other. The first years were slow, but now it's exponential” (MNC A, Europe).

Lack of trust is also an issue between local actors:

“We tried to work with some raw material suppliers but were disappointed because they liked to cheat by mixing raw materials with other substances in order to increase quantities. As an illustration, a supplier from Léo delivered us baobab pulp mixed with “gari”. Our business relationships with suppliers are marked by a lack of trust, because suppliers are always trying to cheat; they focus only on profit and do not seek to maintain good social relationships. We are obliged to remain vigilant in terms of the quality of raw materials during each purchase. On the other hand, we maintain good relationships with our customers. They trust us a lot and we trust them too. We pay the suppliers of raw materials in cash by hand to hand or by mobile money. We usually exchange by phone with our customers” (Association W, Burkina Faso).

Both local and international firms offer different types of support to collectors in the form of financial assistance. For instance, MNC A provide local communities and women groups with pre-financing.

NFTP supply chains connect local communities and companies with multinational companies serving distant markets. These actors have different concerns and perspectives, and it is therefore difficult to develop regenerative supply chains. To develop regenerative supply chains for NTFPs, it is necessary that supply chain members in Burkina Faso, Ghana and Europe consider the multiple rhythms they and their counterparts face in their respective social-ecological systems.

## Discussion

The findings of our study shed light on the complex and often asymmetrical dynamics that characterize the value chains of non-timber forest products (NTFPs) in Burkina Faso and Ghana. The collection and processing of products such as shea and baobab are predominantly carried out by women, who are organized into cooperatives and associations. These collective structures not only enable women to improve their incomes but also strengthen their resilience to external shocks, including climate variability and security threats.

Despite their central role in local production systems, these women face numerous barriers to entering international markets. Obtaining the necessary certifications for export to Europe, such as organic or fair-trade labels, is widely regarded as costly, time-consuming, and often inaccessible. In addition, the security situation, especially in Burkina Faso, limits access to forest resources and constrains commercial outreach efforts.

At the same time, multinational corporations (MNCs) sourcing NTFPs from the region operate according to global market logics. These companies seek stable, standardized, and traceable supplies, in part to comply with increasingly stringent environmental, social, and governance (ESG) requirements. However, their vision of sustainability is often narrowly focused on environmental concerns, with limited consideration for the economic or social sustainability of local producers. For actors in Burkina Faso and Ghana, sustainability is above all an existential matter, tied to the availability of raw materials, the ability to support one's family, and the continuity of business operations.

Our results also reveal a disconnect in temporal orientations. Rural communities must respond to short-term pressures, such as basic livelihood needs and declining resource availability, while MNCs tend to project into the long term, embedding ESG considerations into their business models. This divergence generates tensions and fosters commercial relationships that are initially transactional and shaped by a lack of trust.

Nevertheless, some examples show that mutual trust can emerge over time, provided relationships are built on transparency, reliability, and genuine commitment to local development. Support measures such as pre-financing, technical training, and awareness-raising around sustainable harvesting practices have proven to be useful entry points for more equitable collaboration.

The growing scarcity of NTFPs, caused by climate change and overharvesting, also threatens the long-term viability of these value chains. In response, local initiatives promoting reforestation, sustainable resource management, and nursery development offer promising strategies. However, their effectiveness remains limited without stronger support from downstream actors, particularly European firms, in the form of financial backing and technical assistance.

Building genuinely regenerative NTFP value chains thus requires greater recognition of the distinct social, ecological, and economic rhythms experienced by actors across different contexts. This, in turn, calls for a shift beyond instrumental approaches to sustainability, toward partnerships based on mutual understanding, reciprocal commitments, and fair value distribution.

Several factors explain this environmental degradation by poor rural households. Poverty often prevents them from adopting technologies or sustainable practices such

as agroforestry, forest regeneration, or the cultivation of NTFPs. In addition, the lack of capital, limited access to credit, and insufficient technical training also hinder their ability to process or market NTFPs in a profitable way. These constraints trap them in a cycle of low income and environmental decline (Barbier & Hochard, 2016).

To break the link between NTFP exploitation and the poverty-environment trap, several strategies can be considered: (a) strengthening rural communities' capacities in sustainable forest management, resource regeneration, and agroforestry; (b) promoting value addition through processing, organic certification, and other quality-enhancing mechanisms; (c) improving rural households' access to national and international markets; (d) securing land tenure rights for local populations; (e) encouraging players along the value chain to upgrade and specialize in the processing of higher value-added products; and (f) strengthening the financial capacity of players by facilitating and/or setting up credit mechanisms that can help them acquire equipment for their processing activities.

If implemented in a coherent and participatory manner, these complementary strategies can help lift rural communities out of the vicious cycle of poverty and environmental degradation.

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