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Contribution of Forest Resources to Household Socio-Economic Resilience in the Sudano-Sahelian Zone of Burkina Faso: Evidence from the Razoutenga Community Forest

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Abstract

The Razoutenga forest in Burkina Faso serves as a vital ecological and socio-economic asset for the surrounding rural communities. It is located in the Sahel region, specifically in the sub-Saharan sector of Burkina Faso. It falls within the municipality of Zitenga, which is in the Oubritenga region. This study investigates the extent to which forest resources contribute to the resilience of households living in proximity to the forest. This is why a survey based on semi-structured interviews conducted with 56 heads of household, representing more than 62% of the households in the village, was carried out, employing a mixed quantitative and qualitative approach to ensure the robustness of the data and its extrapolation to the entire population. The results highlight a local governance framework based on customary norms, in which access to forest resources is regulated by the authority of the village chief. This community control system, although informal, plays a central role in the sustainable management of timber resources in the Razoutenga forest. Additionally, the forest supports food security by providing wild fruits, edible plants, and game, especially during periods of agricultural shortfall. Its medicinal plants also bolster community health, offering accessible and culturally relevant healthcare alternatives. Furthermore, the forest acts as a buffer against climatic and economic shocks, re-

ducing vulnerability by offering fallback options when conventional livelihoods are disrupted. The study underscores the importance of sustainable and participatory forest management practices. It advocates for inclusive governance models that involve local stakeholders in decision-making processes to ensure the long-term preservation of the forest's ecological functions. Such approaches not only safeguard biodiversity but also reinforce the socio-economic stability of rural populations. Ultimately, the Razoutenga forest emerges not merely as a natural resource but as a cornerstone of rural resilience, deserving of integrated conservation and development strategies that align environmental sustainability with human well-being.

Keywords

Non-Timber Forest Products, Community-Based Forest Management, Livelihood Diversification, Sahelian Ecosystems, Rural Adaptation Strategies, Socio-Economic Resilience, Razoutenga, Burkina Faso

1. Introduction

In Sahelian countries such as Burkina Faso, natural resources play a fundamental role in the daily lives of rural populations. Forests, in particular, serve as reservoirs of goods and services that are indispensable for the survival and development of local communities (Thiombiano et al., 2006; Elisabeth, 2008). They provide firewood, food products, medicinal plants, and building materials, while also contributing to the regulation of hydrological and climatic cycles. In rural areas, where monetary incomes are often low and infrastructure remains limited, forest resources constitute a vital lever of resilience against economic, social, and environmental challenges (Ouoba et al., 2006; Elisabeth, 2008). Within this context, forests function as natural buffers, enabling populations to diversify their sources of income, secure food supplies, access healthcare, and reinforce their autonomy (Zerbo et al., 2007). The concept of resilience is, moreover, experiencing increasing dissemination within multiple scientific disciplines. However, its application in socio-economics remains lacking a systematic conceptual framework. In this field, socio-economic resilience can be understood, in a first sense, as the capacity of an individual or a group to absorb and overcome the negative effects of risks and shocks likely to alter their living conditions (Berrou & Gondard-Delcroix, 2011). It is the capacity of an individual, group, community, or system to resist and adapt to disturbances without collapsing, and to adjust to long-term challenges such as climate change, economic crises, disasters, and pandemics. However, the resilience function of forests is often underestimated in public policies, and these ecosystems are frequently subjected to unsustainable exploitation, thereby threatening both their sustainability and the services they provide (Ouoba et al., 2006; Généré, 2024; Rostand et al., 2025). The Razoutenga Forest, located in the Oubri region of Burkina Faso, represents a typical Sudano-Sahelian ecosystem,

characterized by shrub and tree vegetation adapted to semi-arid climatic conditions. It serves as a site of collection and exploitation for several surrounding villages. Local populations engage in activities such as deadwood collection, wild fruit harvesting, medicinal plant extraction, and the use of diverse plant species to support agricultural and livestock practices.

This forest, like others in comparable regions, plays a crucial role in household livelihood strategies. During periods of hardship or crisis, it serves as an alternative source of income and food (Vennetier, 2014). Women, in particular, rely on forest products to meet their basic needs, while traditional healers draw upon its resources for their pharmacopoeia. Farmers also utilize specific plant species to fertilize soils or provide fodder for livestock (Ouoba et al., 2006; Zerbo et al., 2007; Le Bouler, 2023). The Razoutenga Forest is therefore not merely an ecological space; it also constitutes an economic, social, and cultural asset. Despite the centrality of forest resources in rural household strategies, their contribution to local resilience remains insufficiently documented in a systematic manner. Existing research has largely emphasized ecological dimensions or the impacts of deforestation, without fully examining the diverse uses and socio-economic benefits that local populations derive from the forest (Zerbo et al., 2007). Furthermore, increasing pressure on natural resources—driven by population growth, poverty, and climate change—has heightened the vulnerability of forest ecosystems and the communities that depend upon them (Tivadar et al., 2025). In the case of the Razoutenga Forest, it is essential to examine how households utilize available resources, identify the products most commonly used, and assess how these practices contribute to strengthening resilience. Equally important is the need to recognize the threats to the sustainability of these practices and to propose pathways for participatory and equitable forest management. This research is justified by the imperative to valorize local knowledge and traditional practices related to forest resource use within a sustainable development framework. By highlighting the interconnections between forest resources and rural resilience, it addresses a scientific gap and provides insights for natural resource management policies. Moreover, it contributes to enhancing the capacity of local communities to safeguard their environment while improving their living conditions.

The study adopts an interdisciplinary approach, integrating perspectives from the social sciences, ecology, rural economics, and ethnobotany. It employs a mixed methodology that combines field surveys, semi-structured interviews, participatory observations, and statistical analyses. Furthermore, it draws upon the knowledge of local stakeholders to develop a nuanced understanding of the socio-ecological dynamics at play.

2. Methods and Materials

2.1. Study Area

Razoutenga forest is located in the Sahel region, specifically in the sub-Saharan sector of Burkina Faso. It falls within the municipality of Zitenga, which is in the

Oubritenga region. This study adopts an analytical approach to evaluate the contribution of forest resources to the socio-economic resilience of rural households living near the Razoutenga forest in Burkina Faso. It is based on the hypothesis that forest products—both timber and non-timber—serve as essential levers for diversifying livelihoods, securing income, and adapting to environmental and economic shocks. The methodological framework combines field surveys, semi-structured interviews, and analysis of local socio-economic data to characterize forest usage and its impact on household resilience. However, the study acknowledges certain limitations, including the seasonal variability of resources, the complexity of interactions between resilience factors, and constraints related to forest access and community-based management. These challenges highlight the need for an integrated and context-sensitive approach to understanding the role of forest ecosystems in sustainable rural development. Razoutenga is a village located within the municipality of Zitenga, which serves as the study area for this research. The village lies approximately 7 kilometers west of Zitenga's municipal center, near the administrative boundary with the municipality of Ourgou-Manega. It is bordered to the east and north by Lallé, to the west by Bouktenga, and to the south by Sanmassi. Situated close to the territorial limit separating Zitenga from Ourgou-Manega, Razoutenga occupies a strategic position within this rural landscape. Its geographical boundaries—Lallé to the east and north, Bouktenga to the west, and Sanmassi to the south—define the spatial context of the study (**Figure 1**).

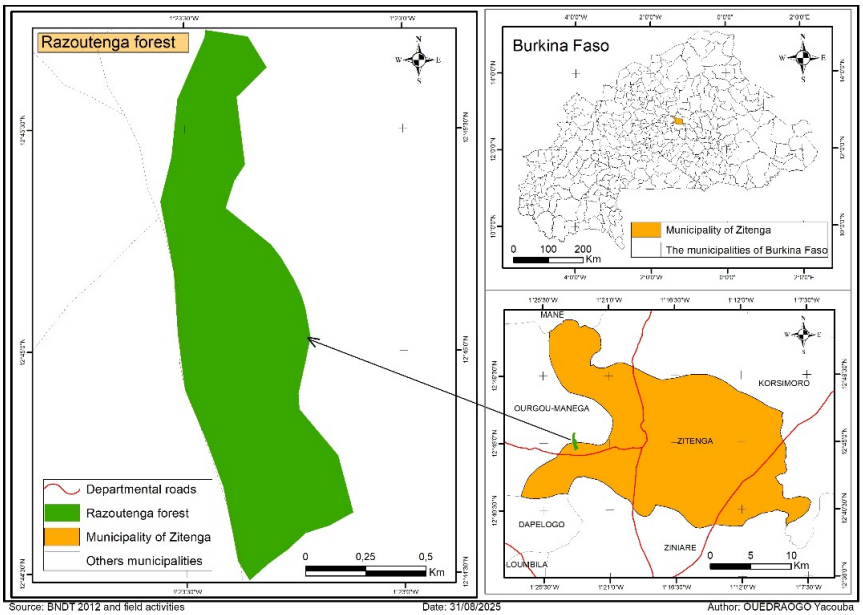


Figure 1. Geographical location of the forest.

The study area is subject to a Sudano-Sahelian climate, characterized by the alternation of two distinct seasons: a rainy season, lasting from June to October for about four to five months, and a longer dry season, spanning seven to eight months. Annual rainfall ranges between 400 and 800 millimeters, while the average temperature

is around 28˚C. March and April are typically the hottest months, with maximum temperatures reaching up to 40˚C (Thiombiano et al., 2010; Ouédraogo, 2021). This rainfall pattern is now characterized by irregular precipitation, recurrent droughts, and an intensification of sporadic rainfall events (Thiombiano et al., 2006; Zin & Schmidt-Traub, 2011).

Faced with the disappearance of plant species in Razoutenga, a local notable named Aimé BIRBA launched a nursery on his plot in 1996. Initially overlooked, the initiative gained recognition in 2011 when the trees began to bear fruit. This turning point mobilized the community around the preservation of plant resources. Under the leadership of the village chief, a 100-hectare community forest was established with support from the Great Green Wall project and the Regional Directorate of Environment. This development marks a shift from individual commitment to a collective approach to safeguarding the local ecosystem.

It is worth noting that the study area lies within the northern Sudanian zone. It is primarily composed of savanna-type vegetation formations, dominated by woody species such as *Afzelia africana*, *Anogeissus leiocarpus*, *Balanites aegyptiaca*, *Burkea africana*, *Crossopteryx febrifuga*, *Daniella oliveri*, *Isoberlinia doka*, *Khaya senegalensis*, *Kigelia africana*, *Lannea acida*, *Mitragyna inermis*, *Pterocarpus santalinoides*, *Terminalia avicennioides*, and *Vitellaria paradoxa*. The herbaceous layers, for their part, are primarily composed of grasses, with a strong presence of *Loudetia togoensis*, *Vetiveria nigritana*, and *Echinochloa pyramidalis* (Gansaonré et al., 2020; Traoré, 2021).

2.2. Collection of Socio-Economic Data

The study was conducted in the village of Razoutenga, which comprises an estimated 89 households according to the 2019 General Population and Housing Census. Since the survey specifically targeted households in this locality, a simple random sampling method was adopted to ensure the results were reliably representative. In total, 56 household heads were interviewed, representing over 62% of all households in the village. This coverage rate, well above the one-tenth threshold typically required for field studies, strengthens the robustness of the data collected and allows for more accurate extrapolation of the findings to the entire village population. Data collection was based on semi-structured interviews conducted with the selected household heads. These interviews provided both qualitative and quantitative information on the key themes addressed in the study.

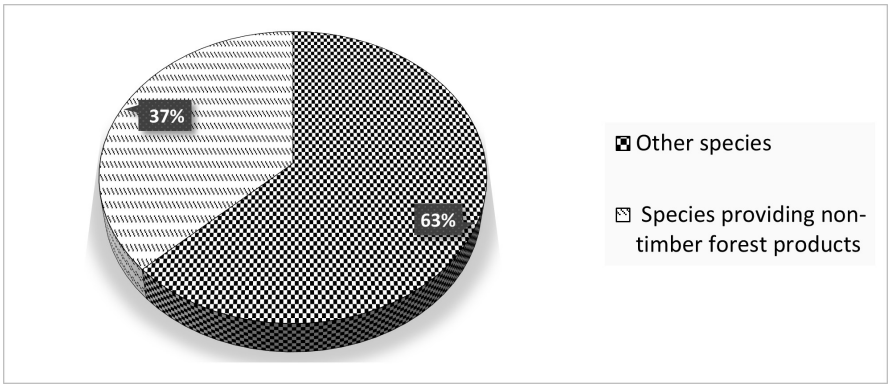
3. Results and Discussion

3.1. Food Valorization of Non-Timber Forest Products in Razoutenga

The woody plant species that serve as the primary source of non-timber forest products for food use in the village are mainly trees and shrubs. According to data from the floristic inventory and field surveys, 37% of the recorded woody species are identified as providers of edible non-timber forest products, particularly fruits

and leaves (Figure 2). The main species involved include *Diospyros mespiliformis*, *Lannea microcarpa*, *Parkia biglobosa*, *Acacia macrostachya*, *Balanites aegyptiaca*, *Tamarindus indica*, *and Adansonia digitata*.

These species play a fundamental nutritional role in local diets. The edible parts, such as fruits, pods, nuts, and leaves, are incorporated into village culinary practices, contributing to meal diversification and improving seasonal nutritional balance. They provide macronutrients (lipids, proteins) as well as essential micronutrients (vitamins, minerals), complementing staple cereals. According to the study by Kabore (2017), four species of non-timber forest products were identified. These include *Vitellaria Paradoxa*, *Adansonia digitata*, *Balanites aegyptiaca*, and *Azadirachta indica*, along with honey. The results clearly demonstrate that Burkina Faso possesses significant potential in non-timber forest products (NTFPs), which play important socio-economic roles. For example, oil extracted from the kernels of *Vitellaria paradoxa* (shea tree) is a major source of lipids in rural diets. Similarly, the pods of *Parkia biglobosa* are processed into "soumbala," a fermented condiment rich in protein and widely consumed in the region. These forest food resources become especially important during the lean season—a critical period during which more than 80% of surveyed households reported relying heavily on them for subsistence. These findings are consistent with those of Thiombiano (2025), who demonstrated that the non-timber forest product sector represents an effective strategy for poverty alleviation. This analysis takes into account the prevailing insecurity and climatic uncertainties that continue to undermine agricultural production in Burkina Faso.



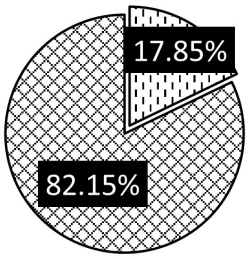
Sources: Forest inventory and field survey, November 2023.

Figure 2. Proportion of plant species inventoried.

3.2. Contribution of Forest Plant Species to Animal Feed in the Pastoral Context of Razoutenga

Pastoralism in the village of Razoutenga remains poorly structured, due to the absence of areas specifically designated for grazing, as confirmed by field surveys. Nevertheless, the results reveal a targeted use of forest plant resources, particularly Sclerocarya birrea and Pterocarpus lucens, used by more than 17% of livestock-

keeping households (Figure 3).



Source: Field survey, November 2023.

Figure 3. Use of forest resources for fodder.

The use of leaves and fruits from certain woody species during the rainy season—when animals are generally confined—reflects local mastery of ecological dynamics. This strategy aims to optimize animal fattening during intensive livestock phases. According to the floristic inventory, fodder-oriented woody species represent 23% of the recorded taxa.

Although access to the forest for grazing is not formally restricted—a fact confirmed by over 80.31% of household heads—constraints related to distance and the community's commitment to preserving forest flora encourage populations to favor local alternatives. The use of reserve plots and fallow lands for grazing illustrates a relevant agroecological adaptation, reconciling the demands of animal production with the conservation of forest ecosystems.

These observations reflect rational and sustainable management of natural resources and highlight the importance of developing integrated territorial policies. Such policies should promote synergy between local pastoral practices and environmental conservation goals, within a framework of socio-ecological resilience.

3.3. Domestic Use of Deadwood under Village Control

Field survey data reveal that 100% of respondents report access to the Razoutenga forest for deadwood collection is permitted, subject to approval by the village chief, in accordance with prevailing customary rules. Additionally, 78.5% of surveyed households indicate that firewood and timber are primarily sourced from agroforestry zones and family-owned reserve plots, exclusively for domestic use.

As a result, forest wood exploitation is strictly regulated and limited to non-commercial consumption. The sale of wood—whether deadwood or charcoal—is formally prohibited, regardless of the harvesting location. This management approach is acknowledged by all respondents. Such restrictions imply that woody forest resources are not integrated into local economic circuits, and no household derives direct financial benefit from their exploitation.

This regulatory framework aims to preserve the forest's ecological integrity

while ensuring sustainable community-based management of natural resources. Survey results highlight a local governance system rooted in customary norms, where access to forest resources is regulated by the authority of the village chief. This informal community control system plays a central role in the sustainable management of Razoutenga's woody resources. The requirement for prior authorization to collect deadwood, along with the restriction of its use to domestic purposes, reflects a collective commitment to preserving the ecological integrity of the forest cover.

This management model is somewhat parallel to that of wetland areas in Benin. According to Daïnou et al. (2008), local populations depend on surrounding wetland vegetation formations, as individual plantations are rare and marked only by the scattered presence of fruit trees. Coastal coconut groves and most teak plantations are the result of public sector initiatives. Depending on the availability of resources and the level of community awareness, various scenarios are observed, ranging from anarchic harvesting to near-total conservation of existing resources. The availability of forest resources is therefore a consequence of state intervention in Benin, whereas in Burkina Faso, particularly in Razoutenga, it is the work of local populations. The failure to integrate forest timber into local economic circuits, particularly through the ban on its commercialization, raises significant challenges in terms of economic resilience. Indeed, in many rural African contexts, timber forest products represent an essential source of income, particularly during lean periods or food crises. However, in the case of Razoutenga, this resource is deliberately excluded from market dynamics, which limits its potential to directly contribute to household financial security. Razoutenga's community control system is similar to that of a family forest management group advocated by Badré (2023). However, this restriction can be interpreted as a proactive conservation strategy aimed at preventing the degradation of forest ecosystems through commercial overexploitation. It aligns with a community-based approach to managing common goods, where the preservation of natural resources takes precedence over their immediate economic valorization. Although financially restrictive, this model may promote long-term ecological resilience by maintaining the forest's ecosystem functions. Thus, the Razoutenga forest emerges as a space for social and environmental regulation, where resource use is collectively negotiated and oriented toward sustainability. This outcome invites reflection on the trade-offs between conservation and development, and on the conditions under which natural resources can be mobilized to strengthen socio-economic resilience without compromising their long-term viability.

3.4. Contribution of Plant Species to Traditional Pharmacopoeia

Medicinal plant species constitute a major phytotherapeutic group, displaying significant functional diversity in healthcare practices within the Razoutenga community. The use of medicinal plants is widespread among households, which employ them to treat various ailments. This widespread reliance on traditional med-

icine is largely due to the absence of primary healthcare infrastructure—such as Basic Health Centers—and the relatively high cost of allopathic medicines.

These findings are consistent with those of Elisabeth (2008), who noted that the village's health situation is marked by limited access to healthcare facilities, insufficient medical coverage, and underdeveloped social services. Residents face challenges in obtaining quality care due to a lack of qualified personnel, medical equipment, and appropriate structures. Social services remain rudimentary, only partially meeting the needs of the population.

In this context, the village's customary chief, who also serves as a traditional medicine practitioner, established a cooperative named Wend-La-Tiipa. This community-based structure aims to facilitate access to primary care by prescribing specific plant organs (leaves, bark, roots) sourced from local flora. The cooperative plays a vital socio-health and economic role: it enables the local population to receive low-cost treatments while attracting patients from neighboring villages, thereby contributing to a trans-community healthcare dynamic.

The widespread use of medicinal plants by households reflects a community-based appropriation of phytotherapeutic knowledge. This practice is driven not only by structural constraints but also by cultural trust in indigenous knowledge systems. It reveals local resilience in the face of shortcomings in the formal healthcare system.

The creation of the Wend-La-Tiipa cooperative by the customary chief—himself a traditional healer—illustrates a form of social innovation. By institutionalizing access to traditional care, this initiative strengthens community cohesion and formalizes an alternative healthcare system. It enables the structuring of medicinal practices around a recognized entity, which may enhance treatment traceability, safety, and the regulation of traditional knowledge.

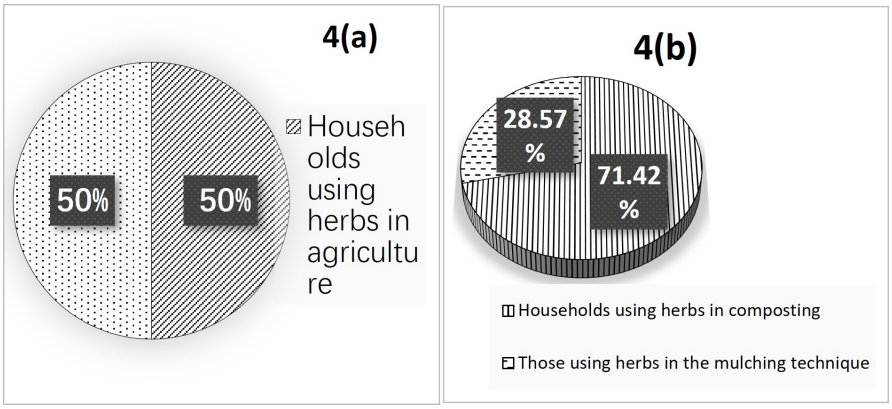
Studies conducted by Ouoba et al. (2006) and Zerbo et al. (2007) respectively catalogued 106 and 69 medicinal species in Niangoloko and the San region. These figures highlight the importance and role of forest resources in the pharmacopoeia of Burkina Faso.

3.5. Contribution of Forest Plant Species to Sustainable Agriculture in Razoutenga

Survey data analysis reveals that 50% of households in Razoutenga incorporate dry herbs from the forest into their agricultural practices, while the remaining 50% abstain, mainly due to material constraints (**Figure 4(a)**). Among users, 71% apply composting techniques and 28% use mulching (**Figure 4(b)**), illustrating a differentiated appropriation of agroecological methods.

The compost produced is used in the implementation of the "zaï" technique, which involves digging small pits in degraded soils, depositing compost into them, and then sowing crops. This method promotes water retention and soil regeneration. Mulching, on the other hand, involves spreading plant materials over arid areas of the field to improve fertility and reduce water evaporation. These practices reflect local ecological awareness and a strategy of adaptation to pedoclimatic

constraints. They contribute to the restoration of degraded lands, the improvement of soil fertility, and the optimization of agricultural yields. According to respondents, the use of herbs in these two techniques leads to an annual increase in agricultural income, with a marked preference for zaï, considered more effective under low rainfall conditions due to its ability to retain soil moisture. These findings are consistent with those of Sawadogo et al. (2008), who demonstrated that farming techniques such as zaï and compost application significantly improve crop yields in degraded areas.



Source: Field survey, November 2023.

Figure 4. Proportions of households using plant species in agriculture.

4. Conclusion

The Razoutenga forest emerges as a strategic pillar in the socio-economic resilience of rural households in Burkina Faso. Through its multiple functions, it serves as an essential resource for local communities, particularly during periods of vulnerability. The study highlights the importance of community-based management rooted in indigenous knowledge and customary norms, which promotes the sustainable and equitable use of forest resources.

However, in the face of growing demographic and environmental pressures, it becomes imperative to strengthen participatory governance mechanisms to safeguard the ecological and socio-economic functions of this ecosystem. Valuing local practices and integrating interdisciplinary approaches thus appear as key levers for enhancing the resilience of rural populations and fostering inclusive sustainable development.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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