

Customary Norms, Women's Participation, and Sustainability of Non-Timber Forest Products in a Local Community Forest Concession (CFCL) Bisemulu in Kailo, Democratic Republic of Congo

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ABSTRACT

The sustainable management of Non-Timber Forest Products (NTFPs) is a major challenge for rural livelihoods and the conservation of forest ecosystems in Central Africa. This study analyzes the relationships between customary norms, female participation, training, and NTFP sustainability within the Local Community Forest Concession (CFCL) of Bisemulu, in the Democratic Republic of Congo. A cross-sectional survey was conducted among 403 local households. The data were analyzed using descriptive statistics and Chi-square association tests, supplemented by Cramer's V. The results show low recognition of customary rules (23.1%), a high perception of NTFP decline (66.8%), predominantly low or moderate female participation (91.3%), and very limited adoption of sustainable practices (3.7%). The analyses reveal significant associations between customary norms and perceptions of decline, between female participation and sustainable practices, and above all between training and sustainable adoption. The study concludes that the sustainability of NTFPs depends less on the formal existence of rules than on their effective institutionalization, the genuine inclusion of women, and the strengthening of local technical capacities. The association between training and sustainable adoption is very strong ($\chi^2 = 212.6$; $p < 0.001$; $V = 0.73$).

Keywords: NTFPs, customary norms, gender, forest governance, CFCL, DRC

INTRODUCTION

Non-timber forest products (NTFPs) play a fundamental role in rural economies in Central Africa, providing food, medicinal, cultural, and economic benefits to millions of households (Sunderland et al., 2014; FAO, 2020). In the Democratic Republic of Congo (DRC), where more than 60% of the population depends directly on forest resources, NTFPs are an essential component of subsistence strategies, particularly in remote forest areas (Ingram et al., 2020).

However, the growing and often unregulated exploitation of NTFPs raises serious concerns about their ecological and socio-economic sustainability. Several studies highlight that the weakening of customary systems, demographic pressure, and the marginalization of certain social groups, particularly women, contribute to the progressive degradation of these resources (Lescuyer et al., 2012; Megevand et al., 2022).

In response to these challenges, community forestry has been promoted as a local governance tool aimed at reconciling conservation and development. Nevertheless, results remain mixed, particularly in the DRC, where CFCLs struggle to achieve their sustainability objectives due to a lack of effective rules, technical capacity, and social inclusion (Bayol et al., 2020; Ribot & Larson, 2020).

It is in this context that the present study aims to analyze the interactions between customary norms, female participation, training, and the perceived sustainability of NTFPs in the Bisemulu CFCL.

Research Question

To what extent do customary norms and women's participation influence the sustainable management of NTFPs in the Bisemulu CFCL?

Secondary Questions

1. What are the key customary norms that influence NTFP management in the Bisemulu CFCL?
2. How do women participate in the collection, processing, and decision-making regarding NTFPs?
3. To what extent do the integration of customary norms and women's participation contribute to the sustainability of NTFP management ?

Research Hypotheses

Central hypothesis:

The sustainability of NTFPs is constrained by the weak formalization of customary norms, the marginalization of women in decision-making, and a lack of training.

Secondary hypotheses:

1. Local customary norms, such as rotation of harvesting areas and community regulation of harvesting, have a positive influence on the sustainability of NTFPs when they are respected.
2. Women, although they make up the majority of NTFP collectors and processors, are marginalized in decision-making bodies, which reduces the effectiveness of sustainable management strategies.
3. The integration of customary knowledge and the active participation of women in forest governance strengthen the ecological and socio-economic sustainability of NTFPs.

Study Objectives

Main objective

Describe customary norms governing access to and use of NTFPs and women's participation in the Bisemulu CFCL

Specific objectives

- Analyze the nature and extent of women's participation in NTFP management.
- Assess the impact of customary norms and women's participation on the sustainability of NTFP management.
- Formulate recommendations for better integration of these factors.

Justification

This study is important for scientific research because it fills a gap in the integration of socio-cultural dimensions into forest management. It is also relevant for policymakers, providing empirical data for inclusive policies, and for local communities, strengthening their governance and resilience.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

NTFPs and Livelihood Sustainability in Central Africa

Non-timber forest products (NTFPs) occupy a strategic place in African rural economies. Historically, their contribution to food security and forest household incomes has been demonstrated by Shackleton and Shackleton (2004) and the FAO (2010). However, contemporary dynamics reveal a profound transformation in exploitation systems.

Recent studies conducted in the Congo Basin indicate that the growing commercialization of NTFPs is leading to increased pressure on certain species (Bayol et al., 2020). According to Megevand, Mosnier, and Hourticq (2022), the absence of specific NTFP

management plans in community forest concessions in the Democratic Republic of Congo (DRC) limits their ecological sustainability.

Tiani, Yembe-Yembe, and Mala (2023) show that in several contexts in Central Africa, NTFPs are exploited under hybrid institutional regimes, combining customary rules and administrative norms, without clear ecological monitoring mechanisms. This situation encourages uncontrolled extractive practices.

More recently, Nguiffo et al. (2024) emphasize that the sustainability of NTFPs depends less on biological availability than on the quality of local institutional arrangements. Thus, contemporary literature converges toward a socio-institutional approach to NTFP sustainability.

Customary Norms and Community Governance of Natural Resources

Ostrom's theory of the commons (1990) remains the analytical foundation for community-based natural resource management. It establishes that sustainability depends on the existence of clearly defined rules, adapted to the local context, accompanied by monitoring mechanisms and graduated sanctions.

However, recent African research qualifies this perspective. Ribot and Larson (2020) demonstrate that forestry decentralization in sub-Saharan Africa produces mixed results when local norms are not formalized or when they remain dominated by local elites.

Mwangi, Meinzen-Dick, and Sun (2021) show that effective community governance requires clarification of access rights, transparency in decision-making, and inclusion of vulnerable groups. In the Congolese context, Megevand et al. (2022) indicate that legal recognition of community forest concessions has not always been accompanied by effective strengthening of local regulatory capacities.

Tiani et al. (2023) observe that in several community forests in Cameroon and the DRC, customary rules remain mainly oral and little known, which limits their effectiveness in a context of growing commercial pressure.

Thus, recent work confirms that the formalization and dissemination of customary norms are essential conditions for preventing the overexploitation of NTFPs.

Gender and Inclusion in Forest Governance

Gender is now a central theme in the literature on community forestry. Agarwal (2001) demonstrated that the effective participation of women in local institutions improves environmental performance through better monitoring and more prudent resource management.

Research over the past decade reinforces this finding. Mwangi et al. (2021) establish that the inclusion of women in decision-making in forestry committees increases institutional accountability and reduces conflicts related to access to resources.

Tiani et al. (2023) show that community forest concessions in Central Africa that actively involve women in governance have better indicators of compliance with local rules. Similarly, Bayol et al. (2020) observe that the marginalization of women weakens community mechanisms for controlling extractive activities.

In the DRC, Rainforest Foundation UK (2019) reports that women represent around 60% of those involved in the collection and processing of NTFPs, but remain under-represented in decision-making bodies. Despite the integration of gender as a "cross-cutting issue" in the National Community Forestry Strategy (MEDD, 2018), binding mechanisms remain limited.

More recent analyses by Djoudi and Locatelli (2022) emphasize that the lack of formal recognition of female leadership in community structures can undermine conservation and sustainable management efforts.

Thus, contemporary literature confirms that female participation is not only a matter of social equity, but also a structural factor influencing the sustainability of forest resources.

Conceptual Framework of the Study

Recent literature allows us to articulate a socio-ecological model integrating local governance and social inclusion.

From a legal perspective, the Congolese Forest Code (Law No. 011/2002) recognizes customary rights of use while introducing the concepts of forest inventory and management as conditions for sustainable management.

From a theoretical perspective, the combined work of Ostrom (1990), Ribot and Larson (2020), and Mwangi et al. (2021) suggests that the sustainability of NTFPs depends on three interdependent conditions:

1. The existence and formalization of clear customary norms;
2. The effective inclusion of women in local governance;
3. The adoption of sustainable harvesting practices supported by technical capacities.

With this in mind, this study adopts a sequential model according to which:

Customary norms

→ Female participation

→ Adoption of sustainable practices

→ Perceived sustainability of NTFPs

Technical training is included as an additional explanatory variable that directly influences the adoption of sustainable practices.

This conceptual framework is part of an integrated approach to the governance of common resources, combining institutional, social, and technical dimensions.

Contribution of the Study

Despite the abundance of recent work on community forestry in Central Africa (Bayol et al., 2020; Megevand et al., 2022; Tiani et al., 2023), few empirical studies have simultaneously examined the interaction between customary norms, female participation, and sustainable practices in community forest concessions in the DRC.

This research helps fill this gap by offering a quantitative analysis based on a sample of 403 households within the Bisemulu CFCL, simultaneously integrating local governance, gender inclusion, and NTFP sustainability.

Conceptual framework

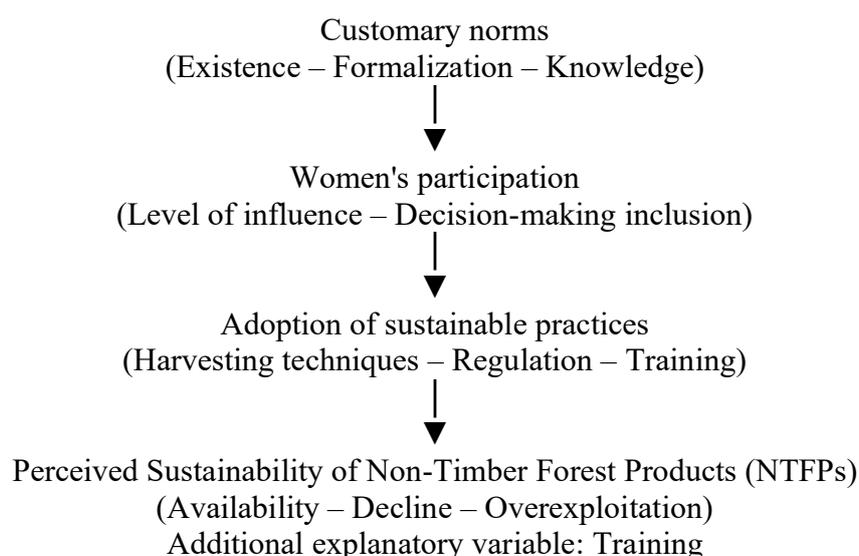


Figure 1: Integrated conceptual framework for sustainable NTFP management at the Bisemulu CFCL

MATERIALS AND METHODS

Study Area

The research was conducted in households within the Bise mulu Local Community Forest Concession (LCFC), Ambwe sector, Kailo territory, located in Maniema province, in eastern Democratic Republic of Congo. This area is characterized by a strong dependence of households on forest resources, particularly non-timber forest products (NTFPs), harvested for food, medicinal, and commercial purposes.

This concession was officially granted to the local community of Bakuko by Provincial Decree No. 01/062/CAB/GP-MMA/2018 of December 6, 2018. Its establishment resulted from a participatory process supported by GIZ and the CAFI program, within the framework of the Maniema Integrated REDD+ Program (PIREDD-Maniema), which aims to promote sustainable forest resource management through community forestry (GIZ & CAFI, 2022).

Physical Boundaries of the Concession

The Bise mulu CFCL is bounded:

- To the north by the Katchumbe, Mobeche, Kiodje, and Bieme rivers;
- To the east by the Me ya group (Pangi territory) and the Pange River;
- To the south by the Elila River;
- To the west by the Congo River.

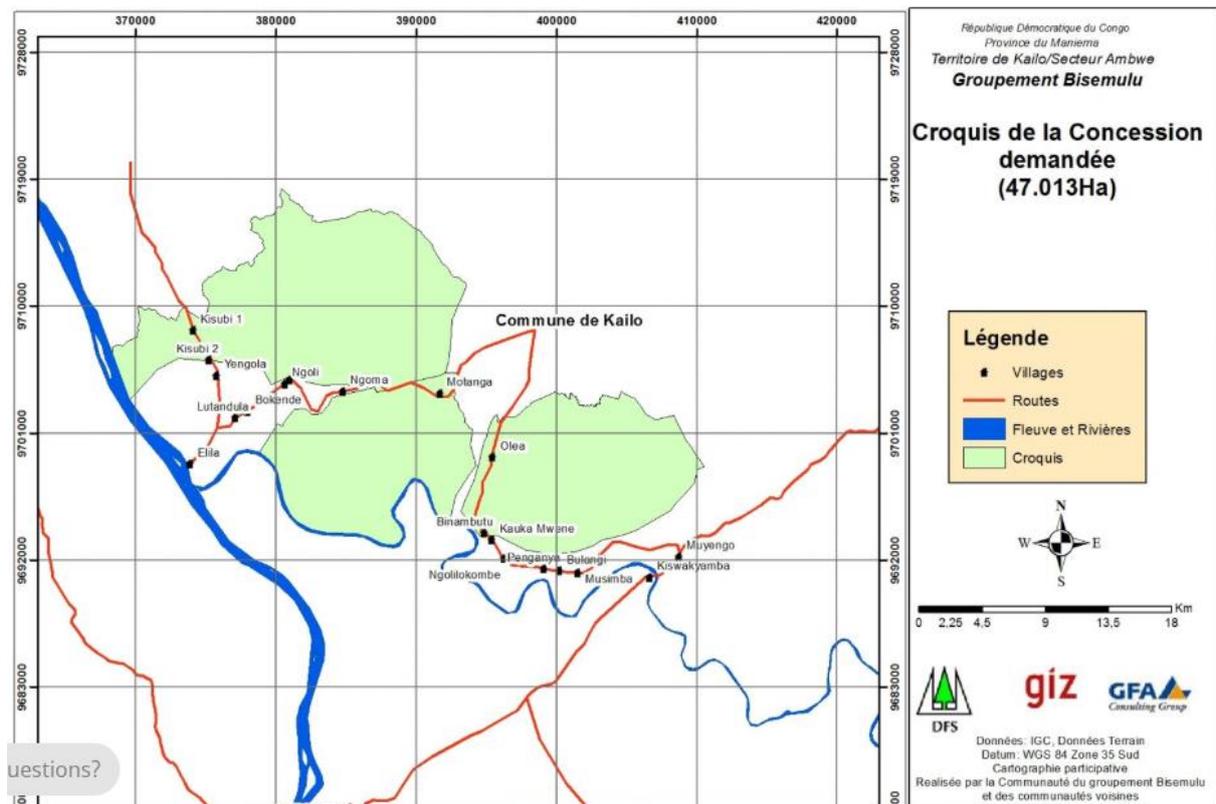


Figure 2: Tenure of the BISEMULU concession (GIZ, 2018)

Materials and Methods

Study Type and Approach

The study adopts a cross-sectional analytical design, combining a quantitative approach with a qualitative interpretation of the results, in accordance with the methodological standards of natural resource governance studies (Creswell, 2014).

Population and Sampling

The survey included 403 households living near the Bisemulu CFCL (Community Forest Local Development) site, selected using purposive sampling to represent the socio-economic and spatial diversity of the communities concerned.

Data Collection

Data were collected using a structured questionnaire administered to heads of households, supplemented by semi-structured interviews with key community stakeholders. Key variables included the existence of customary norms, women's participation, NTFP harvesting practices, training, and perceptions of sustainability.

Data Analysis

Data were analyzed using descriptive statistics (frequencies, percentages) and chi-square tests of independence. The strength of associations was assessed using Cramer's V, with a significance level set at 5% ($\alpha = 0.05$).

RESULTS

This chapter presents the main results of the survey conducted among 403 households in the CFCL of Bisemulu (Maniema, DR Congo). The data highlight the importance of customary norms, women's participation, and the adoption of sustainable practices in the management of Non-Timber Forest Products (NTFPs). The results are organized into descriptive tables, followed by analyses and interpretations.

Existence of Customary Rules**Table 1: Existence of customary rules in the Bisemulu CFCL**

Existence of customary rules	Frequency	Percentage
Yes	93	23.1%
No	310	76.9%
Total	403	100%

Less than a quarter of households acknowledge the existence of customary rules governing the exploitation of NTFPs in the Bisemulu CFCL. This low proportion reflects poorly structured local governance, based mainly on oral norms and traditional taboos. The lack of written formalization and clear control mechanisms undermines the effectiveness of these rules and limits their ability to sustainably regulate access to forest resources.

Perception of the Decline in NTFPs**Table 2: Households' perception of the decline in NTFPs**

Perceived decline	Frequency	Percentage
Low	155	33.2%
High	248	66.8%
Total	403	100%

The majority of households (66.8%) perceive a significant decrease in non-timber forest products (NTFPs) in the Bisemulu Community Forest. This perception reflects increasing pressure on forest resources, primarily due to overexploitation. It confirms the existence of an imbalance between harvesting levels and the natural regeneration capacity of exploited species, justifying the need for more effective community-based regulatory mechanisms.

Women's Participation

Table 3: Level of Women's Participation in NTFP Management

Level of participation	Frequency	Percentage
Low	211	52,4%
Medium	157	38,9%
High	35	8,7%
Total	403	100%

Women's participation in NTFP management remains mostly low or moderate (91.3% combined). Although women play a central role in the collection, processing, and marketing of NTFPs, their low representation in decision-making bodies limits their ability to influence management rules and the adoption of sustainable practices.

Adoption of Sustainable Practices

Table 4: Adoption of sustainable practices by households

Adoption of sustainable practices	Frequency	Percentage
Yes	15	3.7%
No	388	96.3%
Total	403	100%

The adoption of explicitly sustainable practices remains marginal in the Bisemulu CFCL, with only 3.7% of households involved. This low proportion reflects a significant lack of training, awareness-raising, and technical support, confirming that the sustainability of NTFP harvesting remains largely theoretical and not very operational in practice.

Customary Norms × Perception of NTFP Decline

Table 5: Association between the existence of customary rules and perception of decline (n = 403)

Existence of customary rules	Slight decline	Strong decline	Total
Yes	58	35	93
No	97	213	310
Total	155	248	403

Note: Test χ^2 : $\chi^2 = 18,4$; $p = 0,002$; $V = 0,21$

Analysis and Interpretation

This table highlights a statistically significant association between the existence of customary rules and the perception of NTFP decline. The perception of a sharp decline is significantly stronger when customary rules are absent. This moderate strength of the relationship confirms that local governance plays an important role in resource sustainability, although the lack of formalization and enforcement mechanisms limits the effectiveness of existing rules.

Training × Adoption of Sustainable Practices**Table 6: Effect of training on the adoption of sustainable practices (n = 403)**

Training received	Sustainable practices	Unsustainable practices	Total
Yes	7	3	10
No	8	385	393
Total	15	388	403

Note: Test χ^2 : $\chi^2 = 212,6$; $p < 0,001$; $V = 0,73$

Analysis and interpretation

This table reveals a very strong association between training and the adoption of sustainable practices. Households that have received training adopt proportionally many more sustainable practices than those that have not received any guidance. This result shows that technical capacity building is the most decisive lever for the sustainability of NTFP exploitation, surpassing the effect of customary norms alone.

DISCUSSION

The results of this study highlight a structural fragility in the sustainability of Non-Timber Forest Products (NTFPs) in the Bisemulu Local Community Forest Concession (LCFC), resulting from the interaction between institutional, social, and technical factors. This integrated approach allows us to move beyond a purely ecological interpretation of NTFP overexploitation, showing that the pressure on resources is primarily the product of local governance failures and limited human capacity.

Customary Norms and NTFP Sustainability: Between Social Legitimacy and Institutional Weakness

The observed association between the existence of customary norms and the perception of NTFP decline partially confirms the postulates of the commons theory developed by Ostrom (1990). According to this theory, local communities can sustainably manage common resources when they have clear, legitimate, and respected rules. However, the results from Bisemulu show that the mere existence of customary norms, essentially oral and unformalized, is not enough to guarantee the ecological sustainability of NTFPs.

This observation aligns with the critical analyses of Ribot and Larson (2020), who emphasize that forest decentralization in sub-Saharan Africa has limited effects when local rules are neither institutionalized nor accompanied by effective control mechanisms. In the Congo Basin, Bayol et al. (2020) and Megevand et al. (2022) also demonstrate that community forestry remains vulnerable to market dynamics when customary norms are not integrated into clear legal and technical frameworks.

In Bisemulu, the predominance of traditional taboos and prohibitions, while socially legitimate, appears insufficient to regulate increasingly commercially oriented harvesting practices. This situation illustrates what Tiani et al. (2023) describe as “incomplete hybrid governance,” in which customary rules coexist with weak administrative frameworks, lacking functional coordination or systematic ecological monitoring. Thus, the sustainability of NTFPs depends less on the symbolic existence of rules than on their ability to be applied, monitored, and adapted to a context of increasing economic pressure.

Women's Participation: Social Inclusion Still Lacking Decision-Making Power

The limited influence of women's participation on the adoption of sustainable practices, while statistically significant, highlights a gap between women's actual contribution to NTFP value chains and their decision-making power in community governance. This situation is well documented in the literature on community forestry and gender.

Agarwal (2001, 2009) showed that women's participation improves environmental performance only when it is substantial, that is, when they take part in strategic decisions and control mechanisms. Bisemulu's findings confirm that women's participation remains largely consultative, thus limiting its impact on regulating harvesting practices.

Recent work by Mwangi et al. (2021) and Tiani et al. (2023) indicates that the effective inclusion of women in forest governance structures in Central Africa strengthens compliance with rules and community monitoring. Conversely, Bayol et al. (2020) and Rainforest Foundation UK (2019) emphasize that the marginalization of women weakens social control mechanisms and fosters opportunistic extractive practices.

In the Congolese context, despite the formal recognition of gender as a cross-cutting principle in the National Community Forestry Strategy (MEDD, 2018), the absence of binding mechanisms limiting women's access to decision-making positions undermines the effectiveness of this approach. The analyses of Djoudi and Locatelli (2022) reinforce this interpretation by showing that the exclusion of women from leadership can reduce the socio-ecological resilience of community forestry systems. Thus, in Bisemulu, women's participation appears as an untapped potential rather than a fully operational lever for sustainability.

Training and Technical Capacities: The Central Lever for Sustainability

The crucial role of training in the adoption of sustainable practices is one of the major findings of this study. The high strength of the observed association indicates that building household technical capacity is a decisive factor in the sustainability of NTFPs, surpassing the isolated effect of customary norms or social participation.

This finding is fully consistent with the work of the FAO (2020), which emphasizes that the sustainable management of NTFPs requires specific skills in harvesting, processing, storage, and species regeneration techniques. Ingram et al. (2020) also show that a lack of training limits producers' ability to integrate sustainable practices into increasingly commodified value chains.

In Central Africa, Tiani et al. (2023) and Nguiffo et al. (2024) emphasize that the sustainability of NTFPs depends more on human capital than on the biological availability of resources. Without technical support, even well-designed rules and inclusive governance struggle to translate into effective practices on the ground. The results of Bisemulu confirm this perspective, showing that training is the main driver of change in exploitation behaviors.

Theoretical and Operational Implications

Overall, this study confirms and nuances Ostrom's (1990) model in the context of African community forestry. It shows that the sustainability of NTFPs depends on a dynamic combination of local rules, social inclusion, and technical capacities. The absence of any one of these pillars weakens the entire system.

These results suggest that public policies and interventions by technical partners must go beyond a normative approach focused on the legal recognition of CFCLs. They must incorporate strategies for formalizing customary rules, strengthening female leadership, and investing heavily in technical training in order to transform community governance of NTFPs into a real lever for sustainable development.

CONCLUSION

This study has highlighted the institutional, social, and technical factors that influence the sustainability of Non-Timber Forest Product (NTFP) harvesting in the Bitemulu Local Community Forest Concession (LCFC) in the Democratic Republic of Congo. Using a cross-sectional analytical approach based on empirical data collected from 403 households, it provides valuable insights into the current limitations of community-based NTFP governance in a context of high population dependence on forest resources.

The results show that NTFP sustainability remains severely compromised by the weak formalization of customary norms, which are predominantly oral and not very binding, as well as by the insufficient inclusion of women in local management structures. While the existence of customary rules is associated with a better perception of sustainability, their impact remains limited when they are neither institutionalized nor supported by effective monitoring and control mechanisms. Similarly, women's participation, although socially central to the collection and processing of NTFPs, does not yet translate into a sufficient influence on the adoption of sustainable practices, due to their marginalization in decision-making processes.

The major contribution of this study, however, lies in highlighting the crucial role of strengthening technical capacities. The very strong association observed between training and the adoption of sustainable practices confirms that the sustainability of non-timber forest products (NTFPs) depends less on the formal existence of rules than on the capacity of local actors to understand, apply, and translate them into concrete practices. Without appropriate training, even socially legitimate norms and inclusive governance remain insufficient to reverse the trends of overexploitation.

From a theoretical standpoint, these results confirm and refine the theory of common goods in the African context, showing that effective community governance relies on a dynamic interplay between local rules, social inclusion, and human capital. Methodologically, the study demonstrates the relevance of an analytical approach incorporating association tests to objectively assess the links between governance, practices, and environmental sustainability. Operationally, this work highlights the need for community forestry policies and technical partner interventions to move beyond a normative approach focused on the legal recognition of local forest communities (LFCs) and toward integrated strategies that combine the formalization of customary norms, effective women's participation, and targeted investments in training.

Ultimately, this work underscores the strategic importance of LFCs not only as economic resources but also as indicators of the quality of local governance and the socio-ecological resilience of forest communities. It thus constitutes a relevant scientific and empirical contribution to current debates on natural resource sustainability, community forestry, and inclusive development policies in Central Africa.

LIMITATIONS OF THE STUDY

Despite the scientific and empirical interest of the results obtained, certain limitations must be acknowledged.

First, the cross-sectional design adopted does not allow for the establishment of strict causal relationships between customary norms, female participation, training, and the adoption of sustainable practices. A longitudinal approach would allow for a better analysis of temporal dynamics and behavioral changes (Mwangi et al., 2021).

Second, the study relies mainly on self-reported data and households' perceptions of the decline in NTFPs and the effectiveness of governance mechanisms. However, perceptual indicators can be influenced by memory bias or social desirability bias. Recent FAO reports (2022) recommend the integration of measured ecological indicators to enhance the objectivity of analyses.

Third, although the sampling aimed to be socio-spatially representative of the villages in the concession, the reasoned sampling method may limit the generalizability of the results to other community forest concessions in the DRC.

Fourth, the study does not include direct ecological measures (forest inventories, regeneration rates, harvesting intensity), while recent work highlights the importance of combining institutional and ecological data to assess the actual sustainability of NTFPs (Tiani et al., 2023; Nguiffo et al., 2024).

Finally, the “training” variable was not disaggregated according to the type, duration, or quality of training received, which is an important avenue for future research.

Despite these limitations, the results provide robust insights into the institutional and technical determinants of NTFP sustainability in the context of community forestry.

POLICY AND OPERATIONAL IMPLICATIONS

The results of this study have several major implications for community forestry policies and the sustainable management of NTFPs in the Democratic Republic of Congo.

Formalization and institutionalization of customary norms

The low level of formal recognition of customary rules observed in Bisemulu suggests that the mere existence of traditional norms does not guarantee their effectiveness. Public policies should promote the codification of customary rules in simple CFCL management plans in order to strengthen their legitimacy and applicability. Recent analyses of forest decentralization in sub-Saharan Africa show that hybrid systems perform better when customary institutions are formally integrated into national legal frameworks (Ribot & Larson, 2020; Megevand et al., 2022).

Strengthening women's decision-making power

The results confirm that women's participation remains largely consultative and non-decision-making. Community forestry policies should evolve towards binding mechanisms that guarantee minimum representation of women in CFCL decision-making bodies. Recent research shows that substantial participation by women improves compliance with local rules and community monitoring (Mwangi et al., 2021; Djoudi & Locatelli, 2022).

Priority investment in technical capacity building

The very strong association between training and the adoption of sustainable practices indicates that human capital is the main lever for transforming logging practices. REDD+, PIREDD, and other initiatives supported by technical partners should give greater priority to ongoing training in sustainable harvesting techniques, species regeneration, and value chain management. The FAO (2022) emphasizes that the transfer of technical skills is crucial for translating regulatory frameworks into concrete practices.

Integration of participatory ecological monitoring

Future policies should integrate participatory ecological monitoring mechanisms that combine local knowledge and periodic scientific inventories. Recent work in Central Africa shows that the link between community governance and ecological monitoring improves the adaptability of management systems (Tiani et al., 2023; Nguiffo et al., 2024).

Moving from legal recognition to operational effectiveness

The Bisemulu experience confirms that legal recognition of community forest concessions is not enough to guarantee the sustainability of NTFPs. A systemic approach combining institutional formalization, effective social inclusion, and investment in human capital is necessary to ensure truly sustainable forest governance (Bayol et al., 2020; Megevand et al., 2022).

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