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The Tiogo Classified Forest Put to the Test of Time: Community Perception of Forest Resource Dynamics

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Abstract

This study analyzes the perceptions of local communities regarding the dynamics of plant and animal species in the Tiogo Classified Forest (TCF). Based on field surveys and direct observations, the research reveals a significant decline in forest cover, perceived by 83.49% of respondents as advanced degradation. Paradoxically, some plant species are reported to be expanding particularly *Guiera senegalensis*, *Lannea microcarpa*, and *Acacia macrostachya* suggesting an adaptive response to environmental and anthropogenic pressures. From a faunal perspective, species perceived as increasing include the hare, partridge, and monkey, while large mammals such as the lion, buffalo, and elephant are widely reported as disappearing. The degradation of the TCF is attributed primarily to human activities, including bushfires, gold panning, agricultural clearing, uncontrolled fires, and demographic pressure. Natural factors are rarely mentioned. Furthermore, the perceived utility of species influences local assessments of their abundance, potentially biasing the evaluation of their actual status. These findings highlight the urgency of implementing conservation and sustainable management strategies that integrate local knowledge with scientific approaches to preserve biodiversity and enhance the ecological resilience of the TCF.

Keywords: Environmental Dynamics; Community Perceptions; Tiogo Classified Forest; Forest Governance; Burkina Faso

Introduction

In Africa, classified forests play a fundamental role as reservoirs of biodiversity and providers of essential ecosystem services for rural populations. However, they are increasingly threatened by both natural and human-induced pressures. According to Konate et al. (2024, p.43), vegetation cover degradation represents a major environmental challenge for countries such as Burkina Faso. Statistical data show a significant decline in national forest cover, dropping from 6,716,500 hectares in 2010 to 6,216,400 hectares in 2020—a 7.44% decrease over a decade (FAO 2020, p.136). This alarming trend highlights the urgent need to strengthen conservation strategies and the sustainable management of forest resources to mitigate the effects of deforestation. Ecosystem degradation undermines the availability of essential natural resources, increasing the vulnerability of local communities and limiting their capacity to adapt to environmental and socio-economic disruptions. In this context, the preservation of ecosystem services represents a major challenge for fostering prosperous and resilient rural populations, especially in an era marked by climate change and insecurity. The Tiogo Classified Forest (TCF), located in the Centre-West region of Burkina Faso, is managed by forestry services in collaboration with local communities, particularly through Forest Management Groups (Groupements de Gestion Forestière - GGF). It plays a crucial role for

these communities by providing no fewer than 34 ecosystem services, including the supply of fuelwood and both timber and non-timber forest products (NTFPs) (Nitiema B. et al., 2024, p.909). Despite its ecological and socio-economic importance, the TCF is facing increasing degradation and alarming deforestation. These negative trends are largely explained by weak governance, characterized by insufficient regulation and limited control over access to natural resources. This governance failure has encouraged the unregulated occupation of forest land by farmers, herders, and especially gold miners, thereby intensifying pressure on the ecosystems (Sawadogo B. et al., 2022, p.249). In this context, the following question arises: How does the local community perceive the dynamics of forest resource degradation in the TCF? The objective of this research is to analyze local perceptions of forest resource degradation dynamics among the communities surrounding the Tiogo Classified Forest. This approach seeks to better understand the interactions between social representations, resource exploitation practices, and environmental governance challenges.

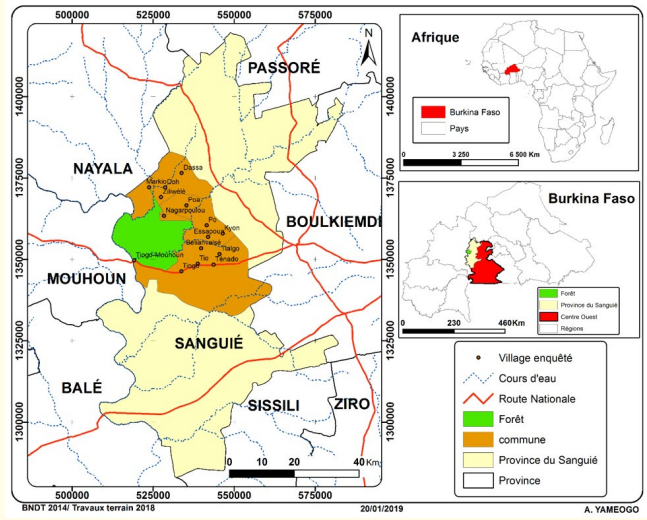
Materials and Methods

Overview of the Tiogo Classified Forest

The Tiogo Classified Forest (TCF) is located in the Centre-West region of Burkina Faso, specifically in the Sanguie Province. It spans the territories of three rural communes: Kyon, Tenado, and Dassa. The forest lies approximately 30 kilometers from the city of Koudougou, along the Koudougou-Dedougou road. Geographically, the TCF is situated between 2°39' and 2°52' west longitude, and 12°11' north latitude. It was classified by the colonial administration under Decree No. 114/SE dated January 17, 1940 (Yelkouni, 2004a, p.37). At the time of its classification, the forest covered an area of 37,600 hectares. Today, its area is estimated at 30,138 hectares. The forest is bordered by natural boundaries to the west, notably the Mouhoun River, and by artificial boundaries to the north, east, and south. It is bordered by fifteen villages: Tiogo, Tio, Tiogo-Mouhoun, Tialgo, Tenado, Kyon, Negarpoulou, Poa, Esapoum, Po, Dassa, Zilivèle, Do, Markyo, and Divele. According to the fifth general population census in 2019, the commune of Tenado had 60,190 inhabitants, while Kyon had 24,484, with a growth rate of 2.6% (INSD, 2022; Konate et al., 2024, p.44). According to Savadogo P. (2002, p.10), the Tiogo area is subject to a Sudanian climate, characterized by alternating wet and dry seasons with contrasting features. Agriculture is the dominant activity among the communities living near the TCF, playing a vital role in their subsistence and local economy. At the same time, extensive livestock farming is widely practiced, with a predominance of cattle, but also sheep, goats, pigs, and poultry. This activity is especially embedded in Fulani culture, where it forms a central part of their livelihood and socio-economic organization. The interdependence between these activities and the forest ecosystem highlights the need for sustainable management that balances resource use with environmental conservation. The sale of non-timber forest products (NTFPs) is also a major opportunity for the local populations of the TCF. This activity is mainly carried out by women (Sawadogo B., 2020, p.85). Bonkoungou J. et al. (2019) point out that the management of the classified forest tends to marginalize several socio-economic groups who are, nonetheless, innovation carriers, such as non-native populations and local prefectures. Paradoxically, this exclusion also affects municipal councils, despite the decentralization of powers from the central government, which designates communes as key actors in local development. This situation limits their ability to fully assume their role in forest governance and hinders the emergence of solutions adapted to the territory's environmental and socio-economic challenges.

Methodological Approach

The study is based on a hypothetico-deductive approach, which involves formulating hypotheses from existing knowledge and then testing them against empirical data collected in the field. In geographical research, this method remains essential for the rigorous analysis of spatial phenomena and territorial dynamics. As noted by Bailly et al. (1991), cited by Gumuchian and Marois (2000, p.61), the hypothetico-deductive approach is built on initial propositions that are provisional and subject to revision after verification. Its application in this study enabled a structured methodological framework for analysis, facilitating a better understanding of the issues related to the management of the classified forest and the interactions among the actors involved.



Map 1: Location of the Study Area.

Data Collection Techniques, Tools, and Processing

Surveys were conducted in the 15 villages surrounding the classified forest, namely: Balivarse, Tiogo, Tio, Tiogo Mouhoun, Kyon, Tenado, Dassa, Poa, Essapoun, Po, Divelè, Markyo, Tialgo, Nagarpoulou, and Ziliwèl. The selection of these villages was facilitated through collaboration with the Regional Directorate of Environment, Water and Forest Conservation (DREEVCC).

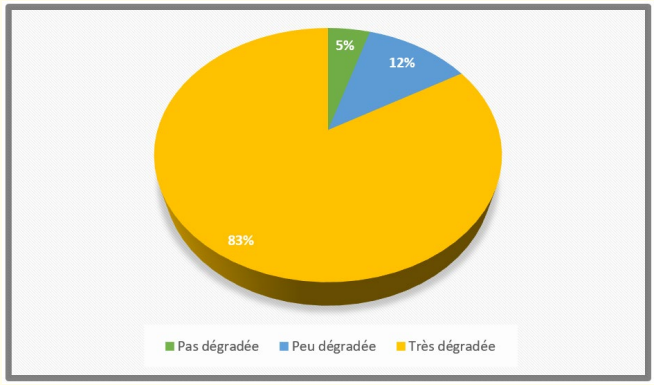
In the field, households were selected using a purposive sampling method that took into account marital status and the status of respondents (native or non-native). This approach aimed to better understand the impact of forest management on different social groups. In total, 82 women and 90 men were surveyed, representing a population estimated at 185,680 inhabitants in the selected villages. Among the participants, 144 households were native and 28 were headed by non-native individuals. A total of 172 individual survey forms were administered. Interviews were conducted in several locations, including Ouagadougou, Koudougou, Reo, Dassa, Tenado, and Kyon, and were carried out in two formats: individual interviews and focus group discussions. The individual interviews involved state officials, local authorities, and civil society actors, such as Forest Management Groups (GGF), women's group leaders, and traditional authorities. In total, 15 individual interviews were conducted, including 5 representatives of decentralized state services, 3 local government officials, 3 traditional leaders, and 4 representatives of associations and community groups. In addition, focus group discussions were organized in each of the forest-adjacent villages, for a total of 15 focus groups. Participation was open to all, regardless of age or gender, to ensure a diversity of perspectives. The administered questionnaire focused primarily on local perceptions of the dynamics of plant and animal species, allowing an assessment of the evolution of natural resources and the impacts of forest management practices on local communities.

Results

Local Perception of Forest Resource Dynamics

The analysis of perceptions among local communities reveals a clear trend of declining forest cover. In fact, 83.49% of respondents consider the forest to be highly degraded, while 11.79% believe it is slightly degraded, and only 4.72% think it is not degraded. The implementation of appropriate conservation and restoration strategies—integrating both ecological and socio-economic dimensions—appears essential to reverse this trend. A participatory approach involving local communities could strengthen sustainable forest

resource management and help mitigate the negative impacts of deforestation. Graph No. 1 illustrates how local populations perceive the state of forest degradation. Regarding forest area, 98.5% of respondents believe it has decreased significantly. This reduction is largely attributed to unregulated land occupation by farmers, whose land boundaries did not comply with those defined during the colonial era. According to forest services, this redefinition of boundaries was carried out with the aim of managing conflicts and easing tensions between different local stakeholders. However, while socially motivated, this measure has contributed to increased pressure on forest resources, highlighting the need to reassess current governance and conservation strategies.



Graph 1: Local Population's Perception of the Evolution of the Tiogo Classified Forest (TCF).

Perception of Plant and Animal Species Dynamics

The local population is highly dependent on forest resources, which provide a variety of economic and ecological benefits. As a result, they are particularly attentive to changes in the dynamics of plant and animal species.

Perception of Plant Species Dynamics

Disappearing Plant Species

The results of local community perceptions reveal a contrasting evolution of plant species within the Tiogo Classified Forest (TCF). While some species are in decline, others are expanding, reflecting both ecological and human-induced transformations affecting the forest ecosystem. The table below summarizes the plant species that local populations consider to be disappearing in the TCF. This highlights the pressures on local biodiversity and the associated conservation challenges.

Scientific Name	*French Name*	*Moore Name*	*Frequency (% of responses)*
Parkia biglobosa	Nere	Roanga	97,64%
Vitellaria paradoxa	Karite	Taanga	83,12%
Bombax costatum	Kapokier	Voaka	76,42%
Tamarindus indica	Tamarinier	Pusga	61,15%
Ximenia americana	Citron de mer	Leenga	58,47%
Andasonia digitata	Baobab	Toega	57,58%
Acacia macrostachya	Acacia	Zamnega	53,7%
Daniellia oliveri	Saucissonnier	Naasargowaga	34, 13%

Trichilia emetica	Rave de serpent	Kitga	27,12%
Combretum avicinnoides	----------	Kondre	15,94%
Terminalia avicennoides	Terminalia	Konde pougsru	11,13%
Khaya senegalensis	Cailcedrat	Kouka	3,7%
Anogeissus leiocarpus	Bouleau d'Afrique	Siiga	2,6%
Ficus gnanfalocarpa	Figuier	Kankanga	2%
Combretum micranthum	Kinkeliba	Randga	0,58%
Slerocarya birrea	Prunier d'Afrique	Nonbga	0,58%

Source: Field Survey Data.

Table 1: Disappearing Plant Species.

The analysis of local community perceptions highlights a hierarchy of plant species based on their socio-economic and ecological value. The most frequently mentioned species, such as *Parkia biglobosa* (97.64%) and *Vitellaria paradoxa* (83.12%), are highly valued for their food and medicinal uses. Less frequently cited species, such as *Khaya senegalensis* (3.7%) and *Anogeissus leiocarpus* (2.6%), may be experiencing ecological decline or are less commonly used locally. This disparity reflects the impact of human activities on biodiversity and underscores the need for appropriate conservation strategies. Community awareness is crucial to preserving declining species while promoting those essential to the local economy.

Expanding Plant Species

The expansion of these species can be attributed to several ecological and anthropogenic factors. Some species, such as *Balanites aegyptiaca* (85.4%) and *Detarium microcarpum* (74.91%), are known for their resilience to arid climatic conditions and their ability to regenerate rapidly. Others, like *Acacia nilotica* (68.47%) and *Ziziphus mauritiana* (65.73%), are favored by agroforestry practices and landscape changes driven by human activities. The expansion of *Azadirachta indica*, cited by 54.5% of respondents, and *Faidherbia albida* (43.7%) may be linked to their frequent use in reforestation programs and their tolerance of degraded soils.

Conversely, species such as *Combretum micranthum* (21.49%) and *Sclerocarya birrea* (16.73%) show more limited expansion. This may be due to ecological constraints or lower perceived value by local populations. Species with low expansion rates, such as *Anogeissus leiocarpus* (15.2%), *Vitellaria paradoxa* (14.3%), and Parkia biglobosa (9.5%), are nevertheless essential for biodiversity and ecosystem services. Their lower citation rates may be explained by stronger anthropogenic pressure or slower natural regeneration. These findings highlight the importance of adaptive natural resource management that integrates both the conservation of declining species and the monitoring of expanding ones in order to maintain ecological balance.

Perception of Animal Species Dynamics

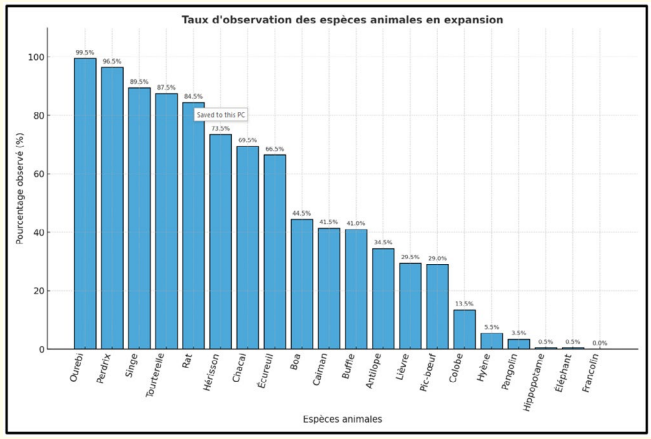
Community Perception of Disappearing Species

The analysis of local community perceptions reveals a marked decline in animal species within the Tiogo Classified Forest (TCF), with frequent mentions of large mammals such as the lion (98.3%), buffalo (96.2%), and elephant (91.5%). This decline is primarily attributed to human pressures, the reduction of natural habitats, and poaching, which have led to fragmentation of wildlife territories and a decrease in available food resources. Carnivores such as the leopard (86.8%) and hyena (88.62%) are also affected, likely due to the scarcity of prey and increasing conflict with local populations. Herbivores like the warthog (72.9%) and antelope (68.13%) show notable disappearance, while some smaller species, such as the agouti (54.21%) and wildcat (47.38%), are declining but still present. Less frequently cited species such as the hippopotamus (15.12%), roe deer (7.9%), and jackal (6.9%) may still exist in residual populations. However, according to the president of the local hunters' association, "we are noticing a gradual return of large animals thanks to awareness campaigns and the demarcation of the forest area." Additionally, focus group discussions indicate that rising water levels

are causing migration of large animals such as lions, antelopes, and roe deer from other forests into the TCF. These results highlight a significant decline in wildlife biodiversity, requiring urgent conservation measures and sustainable natural resource management to protect endangered species and restore the ecological balance of the TCF.

Community Perception of Expanding Animal Species

The analysis of local community perceptions reveals an expansion trend of several animal species in the Tiogo Classified Forest (TCF), with significant variations across faunal groups. The species most frequently cited as expanding are the hare (97.6%), partridge (94.00%), and monkey (89.12%), suggesting a strong ability to adapt to ecological changes and human-modified environments. The dove (85.71%), rat (84.4%), and hedgehog (74.33%) are also among the species showing significant growth, likely due to their resilience and capacity to exploit altered habitats. The jackal, cited both as a disappearing and expanding species (69.52%), may reflect local population fluctuations or recolonization of certain territories. The expansion of the squirrel (66.3%), boa (43.67%), and caiman (42.12%) could be influenced by changes in food chains and favorable hydrological conditions. The antelope (34.2%), oribi (31.2%), and hippopotamus (28.5%) are also mentioned, suggesting a gradual recolonization of certain protected areas or migration from other interconnected reserves. Less frequently cited species include the oxpecker (17.3%).



Source: Field Survey Data.

Graph 2: summarizes local community perceptions regarding the expansion of animal species. Likewise, the surrounding populations expressed their views on the factors contributing to the degradation of the TCF.

Community Perceptions of the Factors Contributing to the Degradation of the TCF

The findings on the factors contributing to the degradation of the Tiogo Classified Forest (TCF) fall into two main categories: natural environmental factors and human (anthropogenic) factors.

Natural Environmental Factors

The main natural causes of degradation in the Tiogo Classified Forest (TCF) identified by the population include drought, insufficient rainfall, strong winds, erosion, and excessive heat. Drought is the most frequently mentioned factor, cited by 137 out of 172 respondents (79.65%). It reflects the lengthening of dry periods, even during the rainy season, which hampers the natural regeneration of vegetation and leads to the gradual disappearance of certain species. Insufficient rainfall, mentioned by 71.51% of respondents, is per-

ceived as a major driver of forest cover decline, as it limits plant growth and soil water recharge. Strong winds, cited by 59.88%, cause uprooting of trees, destruction of flowers, and disrupt plant reproduction. Both strong winds and the irregular spatial and temporal distribution of rainfall are seen as local manifestations of climate change—particularly changes in rainfall patterns in the Sudano-Sahelian zones. These climatic phenomena, well documented in the scientific literature, play a major role in ecosystem degradation and are significant drivers of vegetation loss in West Africa. Erosion, illustrated in Photo 1, was mentioned by 24.42% of respondents. It leads to soil fertility loss and siltation of water reservoirs, reducing storage capacity and triggering conflicts over water use. Additionally, erosion contributes to riverbank degradation and the uprooting of riparian plants. This finding highlights the need to include short-term climatic hazards—especially strong winds—in forest protection strategies. Finally, excessive heat, though mentioned by only 4.65%, increases plant water stress, making them more vulnerable to other climatic pressures. These perceptions reflect a heightened awareness of the impacts of climate change on forest ecosystems and emphasize the need to integrate environmental concerns into sustainable natural resource management strategies.

Photo 1: Bank Erosion in the Tiogo Classified Forest.

Anthropogenic Pressures on the TCF

Survey results reveal that the degradation of the Tiogo Classified Forest (TCF) is largely driven by human activities, primarily bushfires (82.3%), gold panning (74.12%), agricultural clearing, uncontrolled fires (68.3%), and population pressure (56.9%). Bushfires, often set for farming or hunting purposes, cause massive destruction of vegetation and degrade soil quality. Gold panning, which began in 2014, leads not only to large-scale tree cutting but also to severe soil and water pollution through the use of cyanide and mercury, affecting flora, fauna, and biological cycles. Illegal land clearing, linked to the expansion of farmland into forest areas despite official prohibitions, contributes to the loss of forest cover. Additional practices such as charcoal production (27.4%), overgrazing (25.4%), and the overexploitation of non-timber forest products (12.3%) further weaken the ecosystem. These anthropogenic pressures reflect the overuse of natural resources in a context of demographic growth and poverty, highlighting the urgent need for sustainable management policies, community-based reforestation, and viable economic alternatives for surrounding communities. The photos below illustrate and validate the perceptions expressed by local populations regarding the drivers of degradation in the TCF. They particularly show the extent of deforested areas, visible traces of bushfires, and mining-related installations within the forest.

Photo 2: Cattle grazing in the forest. ***Photo 3:*** Impact of fire on vegetation.

Photo 4: Gold panning in the forest. ***Photo 5:*** Gold panning site in the forest.
Photograph: SAWADOGO B.

Discussion

The analysis of community perceptions regarding the dynamics of the Tiogo Classified Forest (FCT) reveals that the forest demarcation process was perceived as having led to a significant reduction in forest area. This perception is accompanied by a clear sense of floristic and faunal resource decline, reflecting a general impoverishment of local ecosystems. However, this popular representation contrasts with the findings of certain scientific studies, notably those by Sawadogo et al. (2022, p.243) and Tankoano et al. (2015), which, based on spatio-temporal satellite image analyses, highlighted vegetation cover changes using rigorous methodologies. These interpretative discrepancies can be explained by the inherent limitations of local perceptions, often influenced by immediate and subjective utility criteria. Nevertheless, satellite-based findings also have their limitations, particularly concerning image quality and acquisition timing. Yelkouni M. (2004) and Zabre N. G. (2019) further point out that local populations were not involved in the initial demarcation process of the FCT, a legacy of the colonial era. This lack of community involvement may have fostered persistent distrust toward conservation policies and amplified local feelings of illegitimacy surrounding the forest boundaries—calling into question the sociopolitical validity of those boundaries. Based on the works of Konate et al. (2024), Tankoano et al. (2015), and Sawadogo et al. (2022), it appears that between 1992 and 2018, the FCT experienced a progressive decline in wooded savannas (-49%) and shrub

savannas (-15%), in favor of agricultural zones (+27%), bare land (+5%), water bodies (+3%), riparian formations (+1.5%), and gold mining sites (+1%). These changes are largely attributable to weak governance, characterized by an ineffective control of the territory and tacit acceptance of uncontrolled land use, particularly by farmers, herders, and gold miners. Additionally, Yameogo B. (2021) emphasizes that low seedling survival rates in the FCT stem from poor reforestation techniques, lack of maintenance, free-ranging livestock, and, most critically, recurring bushfires. Similar observations have been made in other classified forests in Burkina Faso, pointing to systemic issues in reforestation and ecological restoration efforts. The study of local perceptions on the evolution of animal and plant species presents numerous methodological challenges. As noted by K. Hahn-Hadjali and A. Thiombiano (2000), cited in Bordes (2010), species perceived by communities as disappearing or expanding are often those with direct utility (for food, medicine, or economic purposes). Species perceived as less useful often escape users' attention, introducing observational bias in perception-based analyses. In the Nazinga Game Ranch, for example, local populations develop empirical knowledge of species evolution. Nevertheless, this knowledge remains partial, especially due to animal migration and spatial redistribution toward core zones of the ranch, which are better protected and have more reliable access to water (Sawadogo B. et al., 2024, p.869). While imprecise, community perceptions of ecological dynamics must not be overlooked. They represent a relevant indicator of the relationship between rural societies and their environment and reflect how social practices and beliefs shape natural resource management strategies. Local knowledge, though sometimes fragmented, informs community practices such as customary designation of protected zones, conservation awareness, prohibition of harmful practices, and agroforestry techniques that promote natural regeneration.

Furthermore, ritual practices and local beliefs contribute to the preservation of certain species considered sacred. These cultural dimensions often neglected in environmental policies—can play a strategic role in enhancing local ecosystem resilience. Finally, it is important to recognize the limitations of this study, particularly in terms of its geographically limited scope and the subjective nature of self-reported data, which may introduce perceptual biases. It is thus essential to integrate local perceptions with multi-source empirical data to strengthen the analytical framework and guide more inclusive and context-sensitive management policies.

Conclusion

The study on community perceptions of the FCT reveals a concerning regression of forest resources. Although some natural factors were cited by local populations as contributing to this degradation, anthropogenic pressures are perceived as the primary causes. This degradation highlights the urgent need to rethink management strategies by fully involving local communities—not merely as beneficiaries, but as key stakeholders in the conservation process. These results emphasize the importance of integrating local knowledge, needs, and representations into sustainable management strategies. A more inclusive and participatory governance approach would promote greater community ownership of conservation measures and help reverse the current trend of environmental degradation.

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