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Biodiversity conservation and benefits for local communities and indigenous peoples. Case study of the luwe itota protected forest and nkuba conservation area in eastern Dr Congo

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Abstract

The Luwe Itota Protected Forest and Nkuba Conservation Area are examples of wilderness areas managed by indigenous peoples and local communities in the Democratic Republic of Congo. These initiatives are being promoted in the Democratic Republic of Congo to diversify conservation strategies and to support the country's commitments to contribute to the global collective effort to achieve Target 3 (30x30) of the Kunming-Montreal Global Biodiversity Framework by 2030. Around the Luwe Itota Protected Forest and Nkuba Conservation Area live indigenous peoples, particularly the Batwa indigenous people, whose traditions are deeply connected to the forest ecosystem. The benefits and services they derive from these ecosystems are invaluable. These protected areas, rich in biodiversity, also host endemic and flagship species of the region, notably the Eastern Lowland Gorilla (*Gorilla beringei graueri*), among others. This species is classified as Critically Endangered on the International Union for Conservation of Nature's Red List.

The objective of this paper is to analyse the benefits that indigenous peoples and local communities derive from the Luwe Itota Protected Forest and Nkuba Conservation Area, while also contributing to biodiversity conservation in these sites.

In the long term, preserving the cultural and natural values of the Luwe Itota Protected Forest and Nkuba Conservation Area requires promoting the traditional knowledge and practices of local communities, particularly those related to sacred sites and customary access norms. These practices are transmitted orally, from elder knowledge holders to the younger generation, often through initiation rites. Promoting inclusive and equitable governance that strengthens the role, capacities, and rights of indigenous peoples and local communities is essential. Therefore, it is necessary to promote sustainable self-governance mechanisms, beyond institutional support, to transition away from perpetually assisted management.

Keywords: Biodiversity conservation, indigenous peoples and local communities, luwe itota protected forest, nkuba conservation area

Introduction

An Indigenous and Community Conserved Area (ICCA) is a protected area managed either by representatives of an indigenous people or by a community living in or adjacent to the protected area (IUCN, 2019). Management decisions for these conserved territories and areas are made by indigenous peoples and local communities (IPLCs) with a view to safeguarding biodiversity. As a result, communities hold, as desired by Borrini-Feyerabend *et al.* (2013) ^[1], authority and responsibility for management through legitimate legal and customary means. This local management of natural resources is a key pathway to effective biodiversity conservation (Reyes-García, 2019) ^[17]. Community-led and co-managed conservation areas, for example, have been found to maintain or even enhance biodiversity while supporting food security, cultural identity, and social cohesion. The success of such approaches contrasts with strictly "top-down" conservation models, which sometimes alienate local communities and undermine conservation objectives (Oldekop *et al.*, 2016; Schleicher *et al.*, 2017; Garnett *et al.*, 2018) ^[8, 10, 28]. Interventions that are externally imposed especially those that attempt to replace local practices and undermine traditional institutions - often lead to ineffective conservation outcomes and social disruption, such as reduced trust, loss of rights, or weakened livelihoods (Brockington & Wilkie, 2015) ^[29].

To be successful, conservation must be rooted in respectful partnerships that empower local actors and strengthen existing governance systems.

This model of governance for protected areas, categorized as such by the International Union for Conservation of Nature (IUCN), has been promoted in international biodiversity governance since the 2008 Barcelona Congress. It is in this same spirit of improving sustainable biodiversity management that 192 countries, at COP15 of the Convention on Biological Diversity (CBD), adopted the Global Biodiversity Framework Kunming-Montreal (GBF-KM) to halt and reverse biodiversity loss by 2030. The target 3 of the GBF-KM is to achieve, by 2030, at least 30% of terrestrial and inland water areas, as well as marine and coastal areas, particularly areas of high importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through the establishment of ecologically representative, well-connected, and equitably managed protected areas, and Other Effective Area-based Conservation Measures (OECM) (CBD, 2022) ^[24].

The term OECM was created in 2010 at the tenth Conference of the Parties (COP10) to the CBD and included in Aichi Target 11. In 2018, the CBD finally defined an OECM as a geographically defined area other than a protected area, which is governed and managed in a way that achieves positive and sustainable long-term outcomes for the *in situ* conservation of biodiversity, with associated ecosystem functions and services and, where appropriate, cultural, spiritual, socio-economic, and other values relevant at the local level (CBD, 2018). The Democratic Republic of Congo (DRC) is committed to participating in the global effort to achieve the GBF-KM 2030 Agenda. As part of its implementation and following the national dialogue held in May 2023, OECMs are being promoted in the DRC to achieve 30% of the national territory conserved. OECMs offer a significant opportunity to recognize the *de facto* effectiveness of long-term conservation that takes place outside traditionally designated protected areas, in other areas of high biodiversity importance. The Luwe Itota Protected Forest (LIPF) and NKuba Conservation Area (NCA) are among the initiatives managed by IPLCs in the DRC. Currently, there are 32 identified ICCAs, of which 12 have been mapped, 8 documented, and 4 are emblematic (Sajeva *et al.*, 2019) ^[9].

Apart from the introduction and conclusion, this paper analyses, on the one hand, the benefits that local

communities derive from the conservation of LIPF and NCA OECMs, particularly in terms of resources essential to their survival. It also highlights the contribution of local knowledge and sustainable conservation practices to the preservation of these areas. On the other hand, it examines the main challenges related to the governance of these sites as well as the prospects for ensuring their sustainable management.

Presentation of the Luwe Itota Protected Forest and Nkuba Conservation Area

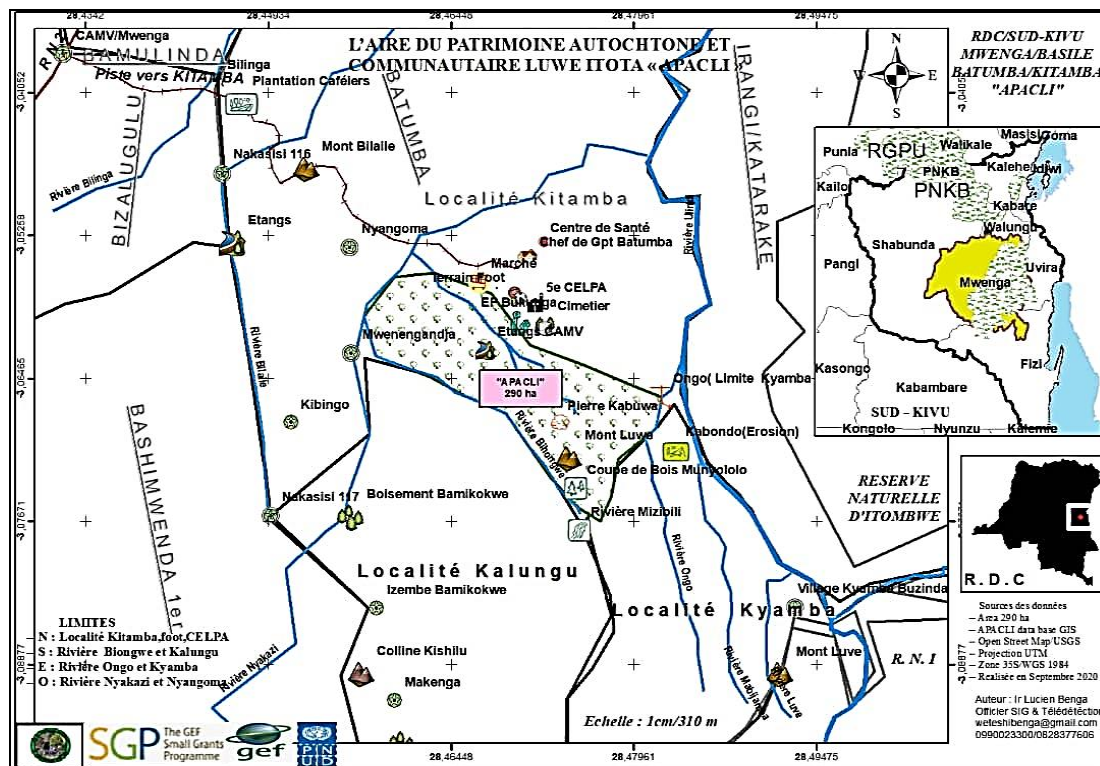
The LIPF and NCA have enormous diversity in terms of fauna and flora. An inventory of biodiversity in the NCA has already been carried out. However, LIPF has not yet been studied. Members of the communities living in these areas confirm the presence of several animal species, including antelope, porcupine, snakes, gorillas, monkeys, chimpanzees, pangolins, caterpillars, chameleons, mushrooms, gambit rats, squirrels, and several species of birds, including parrots. The main activity of households around these forests is agriculture and livestock farming. Agriculture around these sites is subsistence-based. The main crops grown are cassava, beans, corn, yams, sweet potatoes, and bananas. Chicken, goat, guinea pig, duck, and other livestock farming, as well as fish farming, are also practiced.

It should be noted that fishponds, commonly known as “*Mwamba*,” are located in the lowlands. These fish farming activities are supported by development organizations.

Luwe Itota Protected Forest

The LIPF is located in the Mitumba mountain range overlooking the western part of the Itombwe Nature Reserve. This traditional conservation area covers a total estimated area of 527 hectares. It is entirely located in the Basile chiefdom of *Batumba*, in the village of Kitamba, in the western ecological corridor of the Itombwe Nature Reserve. Traditionally managed by the IPLCs, LIPF contributes to maintaining the ecological integrity and conserving the biodiversity of the Itombwe Nature Reserve landscape. The village of Kitamba has 221 households with 774 inhabitants. The site is bounded:

- To the north by the village of Kitamba,
- To the south by the Biongwe and Kalungu rivers,
- To the east by the Ongo and Kyamba rivers; and
- To the west by the Nyakazi and Nyangoma rivers



Source: LIPF report, 2024

Fig 1: Map of the Luwe Itota Protected Forest

Nkuba conservation Area

NCA is a forest massif located in the Wassa group, Wanianga sector, Walikale territory, North Kivu province in the DRC. The Wassa group is bordered to the north by the Messa River (Lubutu territory), to the south by the Unua River, bordering the Banamukulumanya group (Punia territory in Maniema province), and to the west by the Osso River, Mandimba group in Lubutu territory. This area, protected by the PACL, has a total surface area of

105,344.89 hectares and is subdivided into three forest blocks consisting of local community forest concessions (LCFC). These are the LCFCs of Mbungu, Nsuhu, and Seko. This forest massif is located between Kahuzi-Biega National Park in the southeast and Maiko National Park in the northwest, approximately 70 kilometers from Walikale center. Seven villages are involved in the management of this forest massif, namely the villages of Fwamba, Batike, Bangandula, Banamwesi, Kibeke, Olomba, and Maliba.

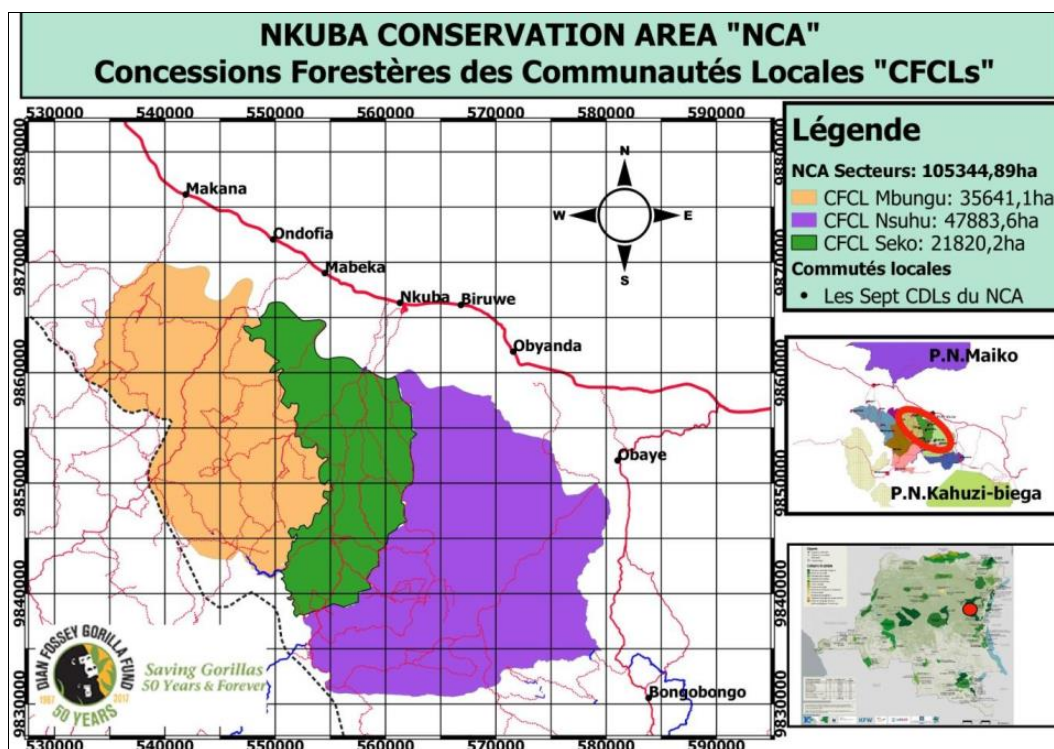


Fig 2: Map of the Nkuba Conservation Area

These two sites are corridors between several protected areas and constitute tools on which public policies must rely in order to strengthen the network of traditional protected areas in the DRC.

Ecosystem services of the Luwe Itota Protected Forest and Nkuba Conservation Area

The territories and areas conserved by IPLCs are vital pillars of global biodiversity conservation, offering not only ecological value but also essential cultural, spiritual, and economic benefits. Their importance continues to gain recognition in international frameworks and scientific literature, reinforcing the need to formally strengthen these community-led reserves at the political and legal levels (Resende *et al.*, 2021; Dawson *et al.*, 2021) ^[16, 11]. In the case of the LIPF and NCA in the DRC, conservation efforts have been notably inclusive. IPLCs are not only custodians of these forests, but also active partners in their protection—bringing deep local knowledge, long-term stewardship, and a profound sense of responsibility toward the land. Their involvement ensures that conservation actions benefit both people and nature, contributing to long-term sustainability and resilience.

During a series of interviews conducted with community members across these areas, respondents consistently expressed appreciation for the ecosystem services provided by the forests. These include access to clean water, traditional medicines, building materials, and sources of food and income. Many highlighted that the forest is not just a resource but a life system - integral to their survival and cultural identity.

At the heart of these ecosystem services is biodiversity. The diversity of species, habitats, and genetic resources provides the foundation for food security, climate resilience, and sustainable livelihoods (IPBES, 2019) ^[21]. When biodiversity is protected, communities benefit through the continued availability of resources and the ecological balance that underpins their well-being. Thus, supporting IPLCs-led conservation is not just an ethical imperative—it is also one of the most effective strategies for safeguarding biodiversity and sustaining human life in harmony with nature.

A farmer testifies

"The benefits we derive from this site are mainly ecosystem services. These services are numerous, and we have been connected to this site for a very long time. Our parents knew how to protect these forests sustainably, and I think that's why we still benefit from them today. However, serious management threats weigh on our heritage."

(Interview with a farmer in the village of Kitamba, September 2024)

The perception of the benefits of ecosystem services is linked to the community's relationship with the landscape and its accessibility. Thus, the links between services and benefits, and between benefits and different types of values, are undeniably associated (Haines-Young *et al.*, 2010; Chan *et al.*, 2012; Díaz *et al.*, 2015) ^[2, 6]. These services are numerous and include, but are not limited to:

- **Provisioning:** Tangible goods that communities obtain from the forest, such as food, wood, fiber, and water for household needs and fish farming,
- **Regulation:** These services are reproduced in the forest and provide benefits such as microclimate regulation,

flood management, and water filtration,

- **Cultural:** these services are linked to community well-being through recreational and educational benefits, as well as the establishment of spiritual connections. At this level, the site abounds with spaces for cultural initiation and,
- **Support:** the forest functions through nutrient cycling, soil formation, and the provision of habitats for biodiversity, which form the basis for the other three services mentioned above.

Beyond the well-documented medicinal properties of biodiversity, spending time in natural environments has profound positive effects on human health and well-being. Research increasingly shows that simply being outdoors, whether walking through a forest, sitting near water, or spending time in a green space, can enhance overall life satisfaction and happiness. These nature-based experiences have also been linked to lower blood pressure, reduced anxiety, improved mood, and a decreased risk of cardiovascular diseases (Jimenez *et al.*, 2021; Bratman *et al.*, 2019) ^[14, 27].

As people reconnect with nature, even for brief moments, they often report feeling calmer, more focused, and emotionally uplifted. This highlights the vital importance of preserving biodiverse landscapes, not only for their ecological value but also for the tangible health benefits they provide to communities, especially those in urban settings where access to green space is limited. These benefits of life satisfaction are confirmed by a landowner interviewed in Nkuba. He says:

"Throughout my youth and up to now, I feel healthy when I spend time in this space where I interact with nature. And above all, in this forest, there are places where I find solutions to my family's problems. These are places of incredible spirituality. Protecting the Nkuba forest is, for me, the best thing I can leave to my children, because my parents also left it to me in this state."

(Interview with a landowner in Nkuba, October 2024).

This statement shows the intrinsic value and sense of well-being experienced by IPLCs stem from the biodiversity of these sites. Many IPLCs living around protected areas rely on access to natural resources to secure their food, sustain their livelihoods, and uphold their cultural traditions. It is important to ensure that the values of IPLCs are fully recognized and incorporated into development programs. Finally, existing legal mechanisms in the DRC, such as the Forest code, recognize the possibility of establishing community forests that meet IPLCs requirements. Some species, such as *Dillenia indica*, are used as roofing material by local communities living around the NCA.



Source: Author, 2024.

Image 1: Roof of a house near the Nkuba conservation area

Local knowledge and practices of indigenous peoples and local communities in the Luwe Itota Protected Forest and Nkuba Conservation Area

Indigenous knowledge carried by IPLCs can be defined as "cumulative and complex sets of knowledge, skills, practices, and representations that are perpetuated and developed by people with a long history of interaction with their natural environment, these cognitive systems being part of a whole that includes language, attachment to place, spirituality, and worldview" (UNESCO, n.d.)^[18]. This worldview is based on empirical knowledge of the surrounding environment, the use of which has been validated from generation to generation (Huntington, 2000; Berkes, 2012; Fréguin-Gresh, 2017)^[3, 4, 12]. Indigenous communities living around the LIPF and NCA have acquired and passed on knowledge to protect their forests, including selective hunting, deadwood cutting, and traditional intercession ceremonies. Thus, management by community members has always been based on their traditional knowledge and practices.

As the livelihoods and culture of IPLCs depend on nature, they have developed their own governance systems and practices to conserve their territories, as these are strongly linked to their identity.

In the LIPF, there are initiation sites called "*Lutende*," "*Yando*," and "*Bwali*"^[1]. This tradition has been going on for years and is a source of pride for the communities around LIPF. For two months, the traditional initiation takes place in the middle of the forest, far from homes and everyday activities. Only those who have already been initiated are allowed to enter. The *Kimbilikiti*, also known as the "god protector of culture," is always male and remains active, his voice continuing to echo through the forest as he waits for new candidates to join.

There are also protected plant species that are off-limits to everyone in the community. These sacred sites and the biodiversity surrounding them are formally protected by these cultural practices. This traditional knowledge helps to protect the biodiversity of LIPF. Such is the case with *Muao*, which is subject to cultural restrictions or outright prohibitions. These cultural sites are in this case and access is prohibited to those who are not initiated. Also, culturally, hunting is prohibited during the breeding season of wild animals.

However, due to the lack of a regular monitoring system and sanctions, people can afford to ignore this measure. Knowledge is also developed by those initiated through the location of species in the LIPF. In the NCA, there are places within the forest where "*Tambiko*"^[2] is practiced.

Challenges and sustainable prospects for managing the Luwe Itota Protected Forest and the Nkuba Conservation Area

Most studies demonstrate that positive outcomes for both biodiversity conservation and community well-being are more likely when IPLCs play a central role in governance. When IPLCs have meaningful and substantial influence

over decision-making processes or when local institutions, particularly those managing land tenure, are embedded in governance structures, conservation initiatives tend to be more effective, equitable, and sustainable. This approach ensures that conservation is not imposed, but rather aligned with local knowledge systems, cultural values, and livelihoods (Dawson *et al.*, 2021; Garnett *et al.*, 2018)^[11, 28]. The LIPF faces many challenges, both internal and external. Internal challenges include weaknesses related to the management committee and community members themselves, while external challenges relate to external threats facing the site. The LIPF has management structures, but they are not functional. There is little regulation. As a result, the resources of the LIPF are at risk of falling into the trap of the tragedy of the commons (Garrett, 1968)^[13], as they are non-excludable but rivalrous in their consumption. The most frequent and worrying threats to the site are bush fires (slash-and-burn agriculture), poaching/unregulated hunting, and timber exploitation.

However, the NCA has formally established functional management bodies. The environmental Non-Governmental Organisation Dian Fosey Gorilla Fund is responsible for the sustainable management of the NCA. In addition to the existence of management institutions, with the supreme management body being the management committee composed of landowners, there are also tools for planning and managing the site, such as the simple management plan for the NCA, the fishing and hunting plan, the annual operations plan, and annual reports.

Four functional programs (Gorilla and monitoring, Biodiversity, Community conservation, and Administration, human resources, and finance) ensure the day-to-day management of the site. As part of this initiative, the management of the NCA involves 160 agents from different indigenous families. 348 patrols have already been organized with staff, 60 community patrols, and around 1,260 temporary patrols per year are used to support household economies.

Equitable and inclusive governance of the Luwe Itota Protected Forest and the Nkuba Conservation Area

Equitable and inclusive governance of conservation areas is essential for achieving lasting biodiversity outcomes, particularly in regions where IPLCs have long-standing cultural, spiritual, and ecological ties to their lands. Despite their central role in conservation, limited data exist on the extent to which IPLCs are genuinely empowered to govern sites such as the LIPF and NCA in DRC. Ensuring meaningful participation of IPLCs, especially women, in governance and decision-making processes is vital. It not only as a matter of justice and rights but also because it leads to more effective conservation outcomes (Schreckenber *et al.*, 2016; Dawson *et al.*, 2021)^[26, 11]. Unfortunately, formal assessments of governance equity remain scarce, and this gap may mask underlying imbalances in power and benefit-sharing.

Currently, both LIPF and the NCA are managed primarily by IPLCs, with the support of national and international NGOs. This model holds promise—but only if the support provided respects the autonomy, customary governance systems, and territorial rights of local communities, and does not impose externally driven priorities (Tauli-Corpuz *et al.*, 2020)^[22]. External actors must act as facilitators and not decision-makers. These measures will ensure that IPLCs

¹ Initiation rite into sexual life and circumcision for boys. This rite is practiced by other forest tribes in the region. This place of cultural initiation for communities is located in the LIPF and contains sacred sites that also serve as mechanisms for protecting biodiversity.

² A traditional ritual performed within the forest (sacred sites) that involves seeking solutions from ancestors to problems facing the community. These places are respected by the entire community and protected.

remain at the heart of planning, implementation, and monitoring processes.

Importantly, these territories represent high-value areas not just for biodiversity, but also for local livelihoods and cultural identity. As such, they are well suited to be recognized as OECMs, or as new categories of protected and conserved areas under Target 3 of the GBF-KM, which aims to protect at least 30% of terrestrial and marine environments by 2030 (CBD, 2022) ^[24].

As highlighted by Neugarten *et al.* (2020) ^[15], achieving this target requires prioritizing areas where conservation aligns with sustainable use and community-led governance. In this light, the recognition of IPLCs-led conservation models as legitimate and effective must be strengthened through policy, legal frameworks, and long-term financial support. This also means moving away from "fortress conservation" models that have historically excluded or displaced local communities, towards rights-based, inclusive, and adaptive governance structures (Borrini-Feyerabend *et al.*, 2013) ^[11]. Furthermore, these governance structures must explicitly recognize the leadership of Indigenous women, who often serve as stewards of local knowledge systems and bear disproportionate burdens when access to natural resources is restricted (Leach *et al.*, 2018) ^[25]. True progress on Target 3 will only be possible if conservation efforts are rooted in co-governance, cultural sensitivity, and community empowerment.

Threats to indigenous peoples and their knowledge

Uncontrolled human activities are increasingly endangering the ecological integrity of biodiversity-rich areas, particularly those inhabited and managed by IPLCs. Rapid population growth, coupled with unsustainable land-use changes, often leads to the conversion of natural habitats into agricultural fields, settlements, or mining zones, contributing to severe habitat loss and fragmentation. These pressures directly impact the stability and survival of many species, some of which may be driven to local extinction (IPBES, 2019; FAO, 2021) ^[21, 20].

Extractive activities, such as artisanal and small-scale mining and overhunting, present acute threats in regions where natural resources are both ecologically vital and economically attractive. The loss of biodiversity caused by these activities is not only ecological, it is also cultural. When forests are cleared for mining or agriculture, it is often at the expense of IPLC territories, customary rights, and knowledge systems (Tauli-Corpuz *et al.*, 2020) ^[22]. The destruction of sacred forests, ritual sites, and areas of traditional harvesting interrupts spiritual practices, seasonal celebrations, and long-standing ecological knowledge passed down through generations.

The erosion of traditional knowledge - including sustainable harvesting techniques, ethnobotanical knowledge, and oral traditions tied to the landscape - has profound implications for cultural resilience, food security, and health (Berkes, 2018; Reyes-García *et al.*, 2019) ^[19, 4, 17]. Once disrupted, many of these knowledge systems are difficult, if not impossible, to recover. This loss not only undermines biocultural diversity, but also the adaptive capacity of communities to respond to environmental changes, particularly in the face of climate crises. Recognizing, respecting, and securing the rights of IPLCs is critical. Without inclusive conservation and governance mechanisms that protect both biodiversity and cultural heritage, the

world risks losing irreplaceable knowledge and values that sustain not just ecosystems, but human societies (UNEP-WCMC, 2021) ^[23].

Conclusion

The experiences of the Luwe Itota Protected Forest and the Nkuba Conservation Area in the Democratic Republic of Congo highlight the vital role that indigenous peoples and local communities play in the sustainable management and conservation of biodiversity. These territories are more than ecological spaces - they are living landscapes deeply rooted in community identity, livelihood, and cultural heritage. The benefits derived from ecosystem services in these areas are not abstract; they are tangible lifelines that support food security, traditional medicine, housing, and socio-cultural continuity.

The strength of conservation in these landscapes lies in the transmission and practice of ancestral knowledge systems. Practices such as selective hunting, harvesting only dead wood, and ceremonial intercessions in the forest reflect a form of environmental stewardship that is often underrecognized in formal conservation discourse. These communities have built and refined their customary governance systems over generations - systems that respect the forest not only as a resource, but also as a space of spiritual and social meaning.

Yet, these territories remain vulnerable. The Luwe Itota Protected Forest, for instance, faces multiple threats, from uncontrolled hunting and bush fires to increasing pressure from timber exploitation. Looking ahead, artisanal mining poses a significant and emerging risk, as extractive industries expand into nearby zones and encroach on community lands. These threats are compounded by the absence of formal protection mechanisms and the limited recognition of indigenous governance in national legal and policy frameworks.

To ensure the long-term sustainability of these conservation efforts, it is essential to move beyond tokenistic inclusion toward genuine recognition and empowerment of indigenous peoples and local communities. This includes supporting equitable and inclusive governance models that reflect the aspirations and rights of these communities. National and international frameworks must align with local realities, recognizing indigenous peoples and local communities not merely as stakeholders, but as rightsholders and leaders in conservation.

Importantly, the focus should not be solely on external technical assistance or institutional oversight. Rather, the path forward should emphasize the strengthening of community self-governance, autonomy, and resilience. By doing so, conservation efforts can shift from externally driven interventions to locally grounded solutions, where communities are fully empowered to manage their own landscapes in ways that are ecologically effective, socially just, and culturally meaningful.

Ultimately, the future of biodiversity in places like Luwe Itota Protected Forest and Nkuba Conservation Area will depend on how well conservation frameworks embrace plural forms of knowledge, respect indigenous rights, and invest in long-term partnerships with indigenous peoples and local communities. It is in these relationships of trust and mutual learning that truly transformational conservation can take root.

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