Indigenous knowledge systems and ecological stewardship: Preservation, traditional practices, and sacred landscapes in the Northern Tinderet–Nabkoi Forest, Kenya

Zipporah Jerotich Ruto

zipporahjruto@gmail.com

Masinde Muliro University of Science and Technology, Kenya

Recommended Reference: Ruto, Z. J. (2026). Indigenous knowledge systems and ecological stewardship: Preservation, traditional practices, and sacred landscapes in the Northern Tinderet–Nabkoi Forest, Kenya. *African Quarterly Social Science Review, 3*(1), 551–560. https://doi.org/10.51867/AQSSR.3.1.45

ABSTRACT

Native knowledge systems contribute greatly to the conservation and sustainable management of forest ecosystems, especially where the community engages in centuries-old cultural relationships with the environment. The paper looked at the indigenous knowledge systems in ecological stewardship in Northern Tinderet-Nabkoi Forest in Kenya. The findings were guided by actor-network theory; it adopted the qualitative research design. The target group was composed of community people with great ecological and cultural knowledge, such as elders, herbalists, diviners, women who hold medicinal knowledge, local administrators, and community forest association members. The research used purposive sampling in order to come up with respondents with specialized ecological knowledge applicable in the research objectives. Data were gathered using the semi-structured interviews, key informant interviews (KIIs), and focus group discussions (FGDs). Thematic analysis was used to analyze data and consisted of identifying repetitive patterns, concepts, and categories related to their respective research objectives. The study took a desktop research approach on secondary information in the form of scholarly publications, policy reports, and literature available on indigenous ecological practices. The research particularly addressed the continuation and passing of indigenous knowledge systems, traditional ecological practices leading to the conservation of biodiversity, and how belief systems and sacred landscapes can be pursued to take care of the environment. The results indicate that the indigenous knowledge is maintained on the basis of oral traditions, cultural rites, and the mentorship of the generations, and older people and females are the main agents of knowledge transfer. Rotational utilization of resources, agroforestry, controlled burning, and totemic taboos are traditional practices that add up to conservation of biodiversity. Moreover, belief systems, sacred groves, and environmental rituals are cultural processes that control how human beings interact with the forest ecosystem. Modernization, formal education systems, and religious change have, however, undermined traditional methods of knowledge transmission. The paper concludes that incorporating the indigenous knowledge systems in the contemporary conservation policies can help to improve the sustainable forest management without eroding cultural heritage. The study recommends that the policymakers and conservation authorities should take an active part in liaising with the local elders, women, and ritual experts to formulate inclusive conservation policies and frameworks that observe cultural values and traditional governance practices.

Keywords: Ecological Stewardship, Indigenous Knowledge Systems, Preservation, Sacred Landscapes, Traditional Practices

I. INTRODUCTION

Forests are important ecological units, which sustain biodiversity, control climate patterns and offer livelihoods to most of the communities across the world (Oldekop et al., 2020). In Africa, especially in the rural areas, forest is used not only as an economic resource, but also a cultural landscape that is entrenched in the indigenous ideologies and beliefs. Communities that co-exist with forest ecosystems have continued to come up with indigenous structures of knowledge that inform sustainable management of resources and conservation of the environment (Wiersum, 1997). Indigenous knowledge can be defined as the accruing body of a knowledge, beliefs, and practices which have been formed by local communities and are the result of years of interaction with the natural environment. This learning is normally passed on by the oral traditions, cultural rituals, and institutional social structures. Indigenous ecological knowledge is a key aspect in controlling land use, preserving biodiversity, and ecological balance in most African communities (Sinthumule, 2023).

The Northern Tinderet-Nabkoi Forest is a suitable and significant ecological landscape where the native knowledge systems have traditionally informed the forest management. To maintain the forest ecosystem, local communities have fallen on traditional ecological systems like sacred grove protection, restrictions on harvesting at certain seasons, agro forestry systems, and environmentally oriented rituals. These are practiced so hard ingrained in the cultural beliefs and social norms that encourage the respect of nature and collective custodianship of natural resources (Chandran & Hughes, 1997).

But due to the rapid social change and the changes in modernization, formal education systems and economic changes, the traditional channels of knowledge transmission have broken down. With the younger generations progressively adopting modern ways of life and propensity to formal education systems, the survival of indigenous ecological knowledge is under the risk more and more (Dutton, 2004). This change has a great impact on the sustainability of forest ecosystems that earlier relied on the traditional environmental governance. It is thus significant in know the role of the indigenous knowledge systems in saving the forests so that inclusive policies on the environment can be formulated that combine both the traditional and scientific views of the ecological management.

1.1 Statement of the Problem

Environmental stewardship and the protection of biodiversity in communities surrounding the Northern Tinderet-Nabkoi Forest in Kenya have always been based on indigenous knowledge systems. Local people have a long history of controlling the utilisation of forest resources and ensuring ecological balance through oral traditions, cultural practices, sacred groves, and traditional rules. Activities like rotational resource utilization, agro forestry as well as the safeguarding of sacred landscapes have played a bigger role in biodiversity protection. Even these indigenous systems are getting endangered by the process of modernization, formal education, migrating to urban areas and changing cultural and religious orientations that have diluted traditional channels of knowledge delivery. With less involvement by the younger generation with the indigenous ecological practices, there is the risk that the pertinent environmental knowledge will be lost. Moreover, it is important to note that most of the formal conservation policies still stick to the scientific methods at the expense of not appreciating the role of the belief systems and knowledge systems in ecological stewardship in terms of knowledge transmission and traditional ecological practices within the Northern Tinderet-Nabkoi Forest. This paper thus looks at these indigenous processes and their role in preserving forests in a sustainable manner.

1.2 Research Objectives

i. To examine the mechanisms used in the preservation and transmission of indigenous ecological knowledge in the Northern Tinderet–Nabkoi Forest region.
ii. To analyze the traditional ecological practices that contribute to biodiversity conservation in the Northern Tinderet–Nabkoi Forest.
iii. To evaluate the role of belief systems, rituals, and sacred landscapes in promoting ecological stewardship within the forest ecosystem.

II. LITERATURE REVIEW

2.1 Theoretical Review

The theoretical viewpoints on which the study is based describe the association between human societies and ecology. The concept of indigenous ecological knowledge is rather often presented in terms of frames, which acknowledge the interdependence of cultural practices, environmental governance, and community-based management of resources (Ossai, 2024). Environmental anthropologists and political ecology scholarly communities concur that the locally based solutions to environmental issues are found through indigenous knowledge systems because they are a product of long-term relationships between peoples and ecosystems (Andersson, 2016). Such systems focus on shared responsibility, culture, and ethical standards that govern how natural resources are used.

Traditional ecological knowledge can also be used to indicate adaptive management practices that help communities to adapt to changes in the environment without disrupting the balance in the environment (United Nations Environmental Programme [UNEP], 2020). An example of how cultural institutions can be used as good systems of environmental governance is practices like seasonal harvesting, sacred forest protection, rotational management of resources, and communal management of resources (Latour, 2005). The interpretation of indigenous ecological knowledge thus needs a theoretical framework that acknowledges the interactive processes between social actors, ecology resources, and institutions of cultural knowledge.

2.1.1 Actor-Network Theory (ANT)

The Actor-Network Theory (ANT) offers an efficient approach to the explanation of intricate interactions between human actors, cultural institutions, and ecological systems. Created by such thinkers as Bruno Latour in 2005, Michel Callon in 1986 and John Law in 1992. ANT focuses on the idea that social and environmental systems are formed as a result of a network of interactions between human and non-human actors (Latour, 2005). Actors in this framework are not restricted to people and they are objects, technologies, natural resources, and cultural practices all of which have an influence in networks (Díaz & Urquhart, 2010).

The ANT states that in a network, an individual, community, institution, natural resource and cultural rituals are actors that interact in a manner that co-produces outputs in both a social and ecological system (Latour, 2005). These networks include community elders, herbalists, spiritual leadership, forest ecosystem, sacred landscapes, cultural practices, as well as traditional institutions of governance in the context of indigenous forest conservation (Osebor, 2024). The human or non-human actors all contribute to environmental behavior, transmission of knowledge, and the outcome of resource management. In the Northern Tinderet-Nabkoi Forest area, ecological responsibility is a result of these interactions. An example of sacred groves is not merely a ecological space but a cultural actor that shapes the behavior of humans by the means of taboos and spiritual beliefs (Tatay & Merino, 2023). Similarly, rituals, oral narratives, and clan totems are mechanisms that control forest utilization, ethical standards, and strengthen environmental knowledge (Sinthumule, 2023). ANT hence permits an insight in sustainability as a result of the dependency of connections between social institutions, cultural standards, and ecological bodies (Dwiartama & Rosin, 2014). Using ANT, this paper realizes that the indigenous ecological knowledge is not simply embedded in human actors, but it is also put into practice, both literally and spiritually, through non-human resources like sacred trees, ritual sites, and biodiversity. This approach emphasizes the co-construction of cultural, social, and ecological systems and the need to include human and non-human actors in the conservation strategies of forests (Berkes, 2017).

2.2 Empirical Review

The literature of empirical studies conducted in Africa indicates the importance of local knowledge systems (IKS) in the conservation of the environment, protection of biodiversity, and sustainable use of resources. Research has shown that these knowledge regimes reside in cultural practices, rituals and community governance systems that govern the relationship between humans and the natural ecosystem (Berkes *et al.,* 2000).

2.2.1 Mechanisms of Preservation and Transmission of Indigenous Knowledge

Various works have highlighted the fact that indigenous ecological knowledge is preserved and most importantly passed down to the younger generation through oral culture, elder tutelage and through community based practices. Kim *et al.,* (2017) emphasize that the most important aspects of the knowledge transfer include storytelling, proverbs, initiation ceremonies, and demonstrations in the activities associated with forests. On the same note, Ruddle (1993) also states that not only does oral transmission assists in the learning process in the ecological context, but also strengthens the cultural identity and moral principles. Gender roles also influence the inquiry of knowledge and in most cases, women are the ones who do the identification of medicinal plants, herbal preparation, and other rituals linked to fertilities and land management (Pfeiffer & Butz, 2005). In spite of these processes, current literature points to the continuity gaps of indigenous knowledge associated with the processes of modernization, formal education, and urban migration that break the traditional channels of transmitting the knowledge (Hoppers, 2002). This is the gap that the study will fill by recording and examining how exactly ecological knowledge is maintained and passed on in the Northern Tinderet-Nabkoi Forest, including not only human (elders, women, ritual specialists) but also non-human (sacred trees, ritual sites) actors.

2.2.2 Traditional Ecological Practices Supporting Biodiversity Conservation

As empirical evidence demonstrates, the indigenous people use traditional ecological practices, which are closely related to biodiversity preservation. Tayade (2025), underlines that the rotational resource utilization, agroforestry, preservation of sacred forests, and seasonal taboos are the practices that are based on the holistic worldviews that combine environmental ethics with cultural identity. Teague and Kreuter (2020), discovered that sacred groves, such as providing refuge to plants and animals, rotating harvest and controlled burning help in ecological balance and soil fertility. Species are also preserved against excessive exploitation by totemic systems in which some animals or trees are regarded as sacred (Mandillah & Ekosse, 2018). The practices are however challenged by external forces that include commercial logging, agricultural development and conservation policies that marginalize the local practices (Harrop, 2007). The gap in this study is the attempt to find out what are the specific traditional practices in the Northern Tinderet-Nabkoi Forest and how they positively affect ecological sustainability, thus bridging empirical information with modern conservation requirements.

2.2.3 Role of Belief Systems, Rituals, and Sacred Landscapes in Ecological Stewardship

Indigenous management of forest resources is based on belief systems, rituals and sacred landscapes. According to the studies by Ormsby and Ismail (2015), sacred groves and ritual forests are ecological and cultural agents, such that taboos limit logging, hunting, and other extractive work. The rituals of rainmaking, offering of harvests, and festivals in seasons control the use of resources and strengthen environmental ethics (Oraon, 2021). The involvement in ecological knowledge and practice is about its respect and implementation of human-environment interactions through ritual specialists, such as diviners and herbalists (Ossai, 2024). However, contemporary changes and modernization, as well

as spreading global beliefs, have caused impoverishment in ritualized practices and loss of sacred landscapes and left a gap in ecological management (Anderson, 2016). This research is relevant as it records the importance of belief systems, rituals and sacred places as tools of ensuring ecological management in the Northern Tinderet-Nabkoi Forest, and its application in the modern forest management policy.

III. METHODOLOGY

3.1 Research Design and Approach

The research design used in this study was the qualitative research design as it aimed to investigate aboriginal ecological knowledge systems and their application in conserving forests in Northern Tinderet-Nabkoi Forest region. The qualitative method was suitable as it allowed the in-depth insight into the beliefs of the communities, their cultural practices, and perception of ecological stewardship. Direct interaction with local knowledge holders, such as elders, ritual specialists, and community leaders, provided the study with rich and context-specific data that both explained how knowledge is transmitted and how the region practices ecological practices that are practical (Dodgson, 2017).

3.2 Target Population

The target group was composed of community people with great ecological and cultural knowledge such as elders, herbalists, diviners, women who hold medicinal knowledge, local administrators and community forest association members. The reason why these individuals have been chosen is that they are the people who are engaged in or who are custodians of traditional ecological practices and sacred landscapes and therefore they are also the main sources of information as to how the indigenous knowledge can promote the conservation of the biodiversity.

3.3 Sampling Strategy and Sample Size

The research used purposive sampling in order to come up with respondents with specialized ecological knowledge applicable in the research objectives. Also, the snowball sampling was adopted to get other well-informed individuals based on the recommendations made by initial respondents to have extensive coverage of the ecological practices and belief systems in various societies. There were about 50 respondents and they were comprised of older people, women herbalists, ritual leaders, forest scouts, and the representatives of the youth who are actively involved in the conservation of the forests.

3.4 Data Collection

Data were gathered using the semi structured interviews, key informant interviews (KIIs) and focus group discussions (FGDs). Interviews, FGDs examined the local processes of maintaining and passing ecological knowledge, old traditions which help in sustaining and maintaining biodiversity and the role of belief systems, rituals, and sacred landscapes in environmental management. The interview was carried out using the local languages that were used where necessary and translated into English. They were also able to make observations of sacred sites, ritual forests, and agroforestry activity that they could use to verify verbal discourse with realities on the ground.

3.5 Data Analysis

Thematic analysis was used to analyze data and consisted of identifying repetitive patterns, concepts, and categories to their respective research objectives. The themes were categorized on the basis of the interest of the study of knowledge transmission, ecological practices and systems of belief. Manual coding was done and compared with field notes to enhance consistency. Results were understood and interpreted concerning the existing theoretical models, such as Actor-Network Theory and general literature on indigenous ecological knowledge and community-based conservation (Berkes, 2017; Latour, 2005).

3.6 Ethical Considerations

Ethical practices were also observed. Respondents gave informed consent and confidentiality was ensured through anonymous of person identifiers. When it comes to interviews and visits on the field, respect of cultural norms was noted, especially when it comes to visiting sacred places or talking about rituals. This research project maintained academic integrity since it represented the rightful knowledge of respondents, used secondary literature in a proper way, and did not imply any misrepresentation.

IV. FINDINGS & DISCUSSION

4.1 Preservation and Transmission of Indigenous Knowledge Systems

The indigenous knowledge in the Northern Tinderet-Nabkoi Forest area is highly rooted in oral cultures, rituals and day to day activities that have been developed over years. Herbalists, elders of the community and guardians of sacred locations play a crucial role as the location of such knowledge and as such, the ecological wisdom is transmitted within the family and community system. These cultural practices are also based on cultural traditions and in many cases are connected with moral codes of respect to nature and community stewardship. Ruddle (1993) state that indigenous knowledge is transmitted across generations through informal networks and plays a vital role in the conservation of biodiversity since it creates a strong bond between the community and the surrounding environment. Most of the respondents cited oral transmission as the most prevalent way of maintaining ecological knowledge. This involves narration, proverbs and guidance of the older to the younger in the case of communal meetings, initiation and in day to day interactions in activities concerning the forest. As one elder in Buret village put it:

> *"Knowledge of plants, animals, and seasons has always been passed from our fathers and grandfathers. We don't write it down, but we know it in our hearts and teach our children the same way",* (Oral Interview with an elder in Buret, on 15th March, 2025).

Similarly, scholars such as Kim *et al.,* (2017) argue that oral transmission serves not only as a means of passing knowledge but also as an essential component of cultural identity in many African communities. This intergenerational transfer is also gender-sensitive. Women, particularly older women, play a critical role in identifying medicinal plants, preparing herbal remedies, and overseeing rituals tied to rain-making and fertility of the land. A female elder from Kiptumute noted:

> "*My grandmother taught me which roots to boil when children fall sick, and which trees are sacred. I also tell my daughters and grandchildren when we go to collect herbs*", (KII in Kiptumute, on 10th March, 2025).

The role of indigenous women in ecological management is not a priority in scholarly publications; nevertheless, as Pfeiffer and Butz (2005) notes, they are the key to the sustainability of numerous ecosystems, as they know a lot about the resources available as plants and they directly participate in conservation activities. Sacred groves and ritual forests are viewed as the learning grounds, where the young members are initiated to the taboos, seasonal calendars and ethical conduct with regards to the ecosystem. The fact that often, these sacred areas are not exploited because of the taboos of communities that do not allow the exploitation of nature in terms of deforestation or hunting also contributes to the preservation of biodiversity. An elder shared:

> "T*here is a hill we don't touch; even firewood is not collected there. It is for the spirits and for the elders to speak with our ancestors. That is why it is still green when the rest of the forest is bare",* (FGD in Boot, on 5th April, 2025).

Kim *et al.* (2017) studies support the significance of sacred groves in conserving biodiversity, by stating that sacred groves commonly act as a refuge to endangered species that would otherwise be found elsewhere in the forest. There is however a threat to the continuity of these systems. Some younger interviewees were worried that their peers no longer hold the indigenous teachings highly and think that they are old-fashioned and unscientific. A youth leader from Koriomat lamented:

> "*We hear from elders, but most youths now prefer the internet and modern education. They don't know the names of trees or animals anymore. We are losing a lot of wisdom",* (KII in Koriomat, on April 2025).

This sentiment is echoed in studies by Hoppers (2002), which point to the generational gap that threatens the survival of traditional ecological knowledge. The introduction of formal education systems, often detached from local knowledge, exacerbates this divide. One local teacher observed:

> "*The curriculum does not mention our local names or practices. Children learn about Amazon forests but not Tinderet. We need to include our ways in teaching*", (Oral Interview with a School Teacher, at Chebirirbei, on 11th March, 2025).

This lack of integration of indigenous knowledge into formal education systems is a significant barrier to its continued transmission. addition, migration and modernization have disrupted communal structures. Individuals migrating to urban areas or taking up formal employment often detach from traditional ecological responsibilities. This affects not only knowledge transmission but also the actual conservation of the forest. As one local chief explained:

> "*Many of our young men are in towns or boda work. They no longer accompany elders to the forest or know when the animals migrate or which trees must not be cut",* (KII with a Local Administrator at Kapsoen, on 5th March, 2025).

Youth migration to urban centers is not just a socioeconomic phenomenon, but it is also a cultural phenomenon as migration leads to the foregoing of forest conservation practices, which were part of the community and their existence. Irrespective of these obstacles, the community-based organizations are witnessing new efforts of capturing

and transforming indigenous knowledge. These consist of cultural day organization, community herbariums and oral histories. A member of a community forest association said:

> "*We are now trying to record stories from elders. We have even drawn maps showing sacred places so that they are not forgotten when elders die*", (Oral Interview with a Community Forest Association at Serengonik, on 17th April, 2025).

Such efforts are critical toward preservation and renewal of indigenous knowledge and it echoes the results of Kim *et al.* (2017), who supports the idea of engaging local communities in the process of protecting their culture. In short, the main components of preservation and passing of indigenous ecological knowledge in the Northern Tinderet-Nabkoi Forest are oral traditions, sacred sites, and gendered roles in the community. As long as these systems are adopted, they face sustainability challenges because they create generational distance, have no formal acknowledgment, and socio-economic changes. Nevertheless, the local players are doing noble things to record and revitalize the ancient practices to secure continuity. This is informed by the growing awareness concerning the necessity of incorporating indigenous knowledge into the modern conservation activities to enhance ecological resilience (Hoppers, 2002).

4.2 Traditional Ecological Practices and Biodiversity Conservation

Communities surrounding Northern Tinderet-Nabkoi Forest have traditionally depended on the ecological tradition; this has played a major role in conserving biodiversity. Such practices are not only utilitarian but are inherent in cosmological beliefs, social norms and customary law. Unwritten rules that the respondents highlighted controlled such practices to achieve harmony between people and nature. The given point of view aligns with the results of Tayade (2025), who claims that indigenous ecological knowledge is not merely a collection of practices but a worldview providing the means of developing the sustainable relationship between human beings and their environment. The rotational use of forest resources is one of the most underlined practices. The members of the community described how they would not touch some parts of the forest during some of the seasons to enable regeneration of the forest. A forest elder in Ndururo noted:

> "*In the past, we harvested honey from a section of the forest and left the other to rest. Trees and animals were also left to recover. It was known that if you overuse one place, the spirits get angry*", (KII at Ndururo, on 23rd March, 2025).

This traditional land management system is a form of rotational systems that adopt the dynamic cultivation systems that are evident in other indigenous societies around the world as emphasized by Teague and Kreuter (2020). This strategy would make sure the resources in the forest are not depleted and the land remains productive with time. External policing was not instituted by means of this rotational method but through social sanctions and collective responsibility. Any violator had to undergo the shame of the people or a ritual cleansing. As explained in a focus group:

> "*If you cut a sacred tree or hunted during the wrong season, the elders would summon you. Sometimes, you had to offer a goat or perform rituals to cleanse your offense*", (FGD at Nabkoi, on 4th March, 2025).

The relevance of social sanctions in ensuring environmental sustainability has been recorded in several studies, such as Mandillah and Ekosse, (2018) who has observed that in most African cultures, the traditional rules are enforced since they are viewed as being ordained by God hence it is broadly followed. Another practice that was noteworthy was the management of fire. Controlled burning was not only used to open up land to be cultivated, but also in the management of undergrowth and the destruction of devastating wild fires. A herder in Kibirirkut explained:

> "*Every dry season, the old men would light small fires to burn dry grass. This stopped big fires from starting. Now we are told fire is bad, but our way was safer*", (Oral Interview with a Herder, at Kibirirkut, on 4th April 2025).

This practice, though now discouraged by government forestry policies, was reported to have played a crucial role in nutrient cycling, pest control, and maintaining grazing paths for both livestock and wild animals. Respondents lamented that modern regulations have undermined these practices without offering effective alternatives. This perspective aligns with the findings of Harrop (2007), who argue that many indigenous fire management practices were sustainable, providing benefits to both the ecosystem and human communities. Additionally, respondents highlighted the role of agroforestry as a traditional land management system. It was common to find indigenous trees such as *Prunus africana* and *Croton megalocarpus* growing alongside crops, serving as windbreaks, sources of herbal medicine, and shade. A woman farmer from Ngwankoris shared:

> "*My grandmother planted trees with her maize. We knew which trees improved the soil and which ones scared away birds. Now we are told to cut them and use fertilizers*", (Oral Interview at Ngwankoris, on 4th April 2025).

Such agroforestry techniques indicate a complex ecological awareness of the interdependence of the ecology and played important roles in sustaining the soil fertility and ecological stability within the buffer areas of the forest. This is also supported by research by Mandillah and Ekosse (2018) who pointed out the positive effects of the inclusion of indigenous trees in the farming system including better soil fertility and enhanced biodiversity. The other outstanding

conservation technique was the veneration of totemic species. There are a number of clans that consider certain animals or plants to be sacred and do not harm them. This taboo system helped to save the instilled species. One elder explained:

> "*Our clan does not eat porcupine. It is our totem. If you kill or eat it, it brings misfortune. Because of that, these animals have survived here even when others disappeared*", (KII at Kapcheplanget, on 7th March, 2025).

Such conservation by religious and cultural beliefs has been extensively recorded, and researchers such as Tayade (2025) have noted that the taboos are effective in the conservation of the biodiversity since they have been regarded as offering community-based protection to the endangered species. In addition, some species of trees such as *Mukinduri* or *Mutamaiyu* were sacred and could not be destroyed even when in need of some money. The fact that they have managed to survive in a more and more degraded landscape is testimony to the usefulness of such traditional conservation ethics. Sacred trees have also been known to support ecosystems in other areas of Africa, where taboos of sacred forests have been observed to play an important role in the preservation of biodiversity (Harrop, 2007). Despite the evident ecological value of these practices, respondents noted that they are being eroded due to pressures from commercial logging, farming expansion, and externally driven conservation models. One youth leader reflected:

> "*We are told to adopt modern ways, yet our old ways worked. Now trees are cut by outsiders and sold. Our own rules are ignored because they are not in government books*", (Oral Interview with a Youth Leader, at Kapilat, on 2nd April, 2025).

This issue is supported by a study conducted by Tayade (2025), who refers to the conflict between the traditional conservation efforts and commercial activities intrusion, as a result of which the sacred forest regions are degraded. The implication of the responses that were made across the villages was that there was a strong desire to have the traditional practices to be taken into consideration in formal environmental policies. They stressed on the necessity of government conservationists and local elders in partnerships, which they said leaves interventions in bad shape when indigenous knowledge is not involved. A forest scout elaborated:

> "*When officers come, they don't ask us anything. They bring foreign plans and ignore elders. If they listened, they would learn that we know how to care for this forest*", (KII with a Forest Scout, at Cheboror, on 3rd April, 2025).

This view is reflected in the conclusions of Harrop (2007), who claims that marginalization of indigenous knowledge in the formal conservation work results in poor management practices and lack of attachment to local people and the conservation authorities. The people of the community also suggested that cultural conservation areas in which traditional regulations were to be legalized and implemented. According to them, such zones would enable the communities to run forests on the basis of indigenous ethics and also help in national conservation efforts. This recommendation conforms to the suggestions of Harrop (2007) who is in support of the idea of including the indigenous governance systems in the formal conservation systems to make them more sustainable. Overall, the ecological wisdom that is embodied in the traditional ecological practices in the Northern Tinderet-Nabkoi Forest is a deep, situational wisdom of biodiversity and sustainability. Such practices, such as rotational harvesting and fire management, totemic taboos and agroforestry are also ecologically efficient as well as culturally important. Nonetheless, they are marginalized by the existing conservation models. These practices would be beneficial to the contemporary environmental governance, which would improve conservation of biodiversity and preservation of cultural heritage as proposed by Mandillah and Ekosse (2018). The result of such integration is the possibility of a more participative and sustainable way of environmental management that is informed by the contemporary scientific knowledge and the ancient ecological wisdom.

4.3 Belief Systems, Rituals, and Sacred Landscapes in Ecological Stewardship

Ecological stewardship amongst the people of the Northern Tinderet-Nabkoi Forest is centered on belief systems, cultural practices and sacred places. These religious and cosmic aspects affect the way people behave with nature, governing the rules that control the utilization of space and property. These findings are supported by secondary data which stresses the relevance of indigenous systems of knowledge in promoting sustainable use of resources. As noted by researchers such as Ormsby and Ismail (2015), indigenous spiritual beliefs tend to influence environmental ethics to the extent that a feeling of responsibility toward natural resources can be present and is usually lacking in modern conservation practices. The results indicate that these indigenous spirituality constitute an ethical system that makes people focused on the surroundings and take care of them with respect and care, which are the general tendencies of African environmental governance (Oraon, 2021). Among other traditions is the notion of sacred groves, also referred to as kapkorosiek, which is a forest area that is defended against the activities of cutting trees, hunting or gathering firewood. According to an elder of the male based in Kaptebee, sacred groves are said to be the habitats of the ancestral spirits and any human activity is said to bring bad luck. This opinion is also supported by secondary data because religious groves are traditionally recognized as the key to biodiversity conservation in most African societies (Ossai, 2024). The groves serve as habitats to different species of plants and animals which would otherwise be endangered by

human activities. Anderson (2016) assert that these belief-based conservation activities play a key role in ensuring that the ecological integrity is ensured, which ultimately ensures sustainability due to cultural limits on use of resources.

> "*The kapkorosiek is not just trees—it is where the ancestors live. If you disturb it, people may fall sick or cattle may die. That is why we keep away from it",* (KII at Keben, on 20th March, 2025).

In addition to sacred groves, rituals play a key role in regulating environmental behavior. Respondents mentioned rainmaking rituals and harvest festivals, where environmental harmony is renewed through offerings and prayers. These rituals are aligned with traditional African cosmologies, where humans are seen as part of a larger, interconnected natural world (Osebor, 2024). A community elder from Mogobich recounted:

> "*Before planting, we would go to the sacred hill and offer grains and milk. The elders would pray for rain. We believed that planting without blessing the land would bring poor harvests",* (Oral Interview at Mogobich, on 24th March, 2025).

These rituals were not simply symbolic but were embedded in practical environmental management strategies. They involved communal participation and helped to reinforce the moral codes that governed sustainable land use. The connection between rituals and ecological ethics is widely recognized in literature, with numerous studies showing how spiritual ceremonies promote environmental stewardship (Ossai, 2024). Ritual leaders, often from specific lineages, were considered custodians of this vital knowledge, emphasizing the serious role they played in sustaining ecological balance. Respondents also emphasized seasonal taboos that restricted activities such as harvesting, grazing, or entering certain parts of the forest. These taboos, based on lunar cycles, animal migrations, or ancestral instructions, ensured that natural resources had adequate time to regenerate, discouraging overexploitation. A woman from Kelbui shared:

> "*There were times we were told not to fetch firewood from the forest. Our grandmothers said it was a time of rest for the trees. If you disobeyed, something bad could happen to your family*", (FGD at Kelbui, on 10th April, 2025).

These taboos were indispensable to sustainability of local ecosystems, because, in that way, it enabled the natural environment to recover. The secondary data also confirms this opinion, as the research on the topic indicates that indigenous taboos and rituals help to control resource extraction in a number of African communities (Oraon, 2021). Although they are not enforced in the present time, these traditions still have an effect on ecological behavior, especially in older generations. The services of ritual experts are also important to keep the knowledge about the environment in terms of diviners, herbalists, and spiritual guardians. These people who act like a linkage between the spiritual and ecological worlds possess the great ecological wisdom that is transmitted through generations. A diviner from Kiprungu explained:

"*The spirits tell me what plant to use, when to harvest, and how to give thanks. If I misuse a tree, they can take away my gift. That is why I must follow the rituals exactly*", (Oral Interview with a Diviner, at Kiprungu, on 22nd April, 2025).

These specialists of rituals are critical towards making recommendation on sustainable activities including when to harvest and where sheep can graze. Secondary data also highlights the paramount importance of the holders of indigenous knowledge to maintain the ecosystem by their spiritual affiliation with nature (Oraon, 2021). Ritual specialists make sure that the communities follow rituals that uphold ecological balance even when such ritual knowledge is expressed in a spiritual manner. Nevertheless, the respondents were worried about the fact that these cultural practices were eroded under the impact of Christianity, formal education and modernization. Most of the practices that were previously used to regulate environmental care are not carried out on a regular basis and holy places have been cleared so that more land could be used to build farms or cut timber. A youth from Sirwo noted:

> "*We go to church now, and we are told those traditions are evil. But the forest is getting worse. Maybe those old ways helped more than we know*", (FGD with Youth Group in Sirwo, on 13th March, 2025).

Such a loss of customary practices has been seen in some African communities, whereby the use of formal education and new religions has contributed to a loss of the local conservation traditions (Ormsby & Ismail, 2015). The deterioration of the quality of the environmental rituals is a major challenge to the sustainability of the local ecosystem that were previously flourishing in such systems of governance. To address these issues, some of the respondents suggested the restoration and conservation of sacred landscapes. They proposed local government appreciation and community based efforts to preserve these sites. A cleric from Ndakatanaa reflected:

> "*Not all traditional beliefs are against the Bible. Respecting nature, honoring elders, and protecting the land are things we all believe in. We should find a way to work together*", (KII with a Cleric, at Ndakatanaa, on 18th April, 2025).

This view is in line with an emerging trend of environmental conservation that aims at integrating indigenous knowledge with contemporary practices. The United Nations Environmental Programme (2020) notes that combining traditional ecological knowledge with official conservation systems can help create more inclusive and sustainable forms of environmental governance. Conclusively, belief systems, rituals and sacred landscapes have been effective in ecological conservation in the Northern Tinderet-Nabkoi Forest. Such practices do not only dictate how people live but

they also help to preserve biodiversity by spiritual restrictions and respecting the land. Even though these traditions are now threatened by the process of modernization, they are still deeply rooted in the worldview of the population. Preservation, rehabilitation of these practices as proposed by some respondents would offer some novel solutions on how sustainable environmental governance can be achieved based on cultural identity and spiritual ecology. Many studies support this view and emphasize the role of cultural heritage in environmental management (Anderson, 2016).

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This paper shows that the Northern Tinderet-Nabkoi Forest has indigenous knowledge systems (IKS) that are essential in managing the forests and protecting the biodiversity. Oral traditions, mentorship by the aged and involvement of women in activities are some of the assurances that environmental knowledge is being passed down the generations. Cultural identity and ecological ethics are strengthened with the help of storytelling, initiation rituals, and practical demonstrations, but modernization, formal education, and urban movement are serious challenges to knowledge continuity. Conventionally, communities use rotational exploitation of resources, agro forestry, controlled burning, sacred groves and totemic taboos that keep the soil fertile, preserve species, and control use of forest resources. The practices are good and are becoming sidelined by the commercial activities and the conservation policies, which do not consider the local knowledge. The last finding of the study was that the belief systems, rituals and sacred landscapes were informal mechanisms of regulation in ecological stewardship. The sacred groves, seasonal taboos and rituals are used in shaping sustainable resource management and also strengthening the moral accountability towards nature. Modernization is eroding these practices thus the importance to incorporate culture and spiritual knowledge into formal conservation plans. Overall, the conservation of biodiversity, ecological resilience, and cultural heritage would be improved through the support of indigenous knowledge systems and modern conservation strategies, which would offer a sustainable and culturally-inclusive system of managing forests.

5.2 Recommendation

According to the results, the indigenous knowledge systems within the Northern Tinderet-Nabkoi Forest are suggested to be formally recognized and incorporated into the national and local environmental policies so that the biodiversity conservation and sustainability could be improved. It is necessary to integrate the indigenous ecological knowledge into formal education programs to ensure younger generations learn, appreciate and conserve local environmental practices in addition to modern science. The community-based documentation programs like capturing oral histories, mapping sacred sites, and opening local knowledge centers should be reinforced to protect the knowledge that is in danger of loss because of the generational divide and modernization. Also, the policymakers and conservation authorities should take an active part in liaising with the local elders, women, and ritual experts to formulate inclusive conservation policies and frameworks which observe cultural values and traditional governance practices. Sacred groves and cultural conservation areas should also be given priority protection and legal status because they are also important repositories of biodiversity. In addition, a move towards sustainable conventional activities like agro forestry, rotation of resources as well as controlled burning under controlled systems is a requirement, but not rejection. Last, there should be awareness campaigns that address the disparity between the aboriginal philosophy and those of the modern religions and education systems, thereby understanding each other and upholding the importance of cultural heritage in environmental management.

REFERENCES

Anderson, E. N. (2016). *Caring for place: Ecology, ideology, and emotion in traditional landscape management*. Routledge.

Berkes, F. (2017). *Sacred ecology*. Routledge.

Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications, 10*(5), 1251–1262.

Chandran, M. S., & Hughes, J. D. (1997). The sacred groves of South India: Ecology, traditional communities and religious change. *Social Compass, 44*(3), 413–427.

Díaz Andrade, A., & Urquhart, C. (2010). The affordances of actor network theory in ICT for development research. *Information Technology & People, 23*(4), 352–374.

Dodgson, J. E. (2017). About research: Qualitative methodologies. *Journal of Human Lactation, 33*(2), 355–358.

Dutton, W. H. (2004). *Social transformation in an information society: Rethinking access to you and the world* (Vol. 13). UNESCO.

Dwiartama, A., & Rosin, C. (2014). Exploring agency beyond humans: The compatibility of actor-network theory (ANT) and resilience thinking. *Ecology and Society, 19*(3), 1–10.

Harrop, S. R. (2007). Traditional agricultural landscapes as protected areas in international law and policy. *Agriculture, Ecosystems & Environment, 121*(3), 296–307.

Hoppers, O. C. (2002). Indigenous knowledge and the integration of knowledge systems. *Towards a Philosophy of Articulation*, 2–22.

Kim, G., Vaswani, R. T., Kang, W., Nam, M., & Lee, D. (2017). Enhancing ecoliteracy through traditional ecological knowledge in proverbs. *Sustainability, 9*(7), 1182.

Latour, B. (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.

Mandillah, K. L., & Ekosse, G. I. (2018). African totems: Cultural heritage for sustainable environmental conservation. *Conservation Science in Cultural Heritage, 18*, 201–218.

Oldekop, J. A., Rasmussen, L. V., Agrawal, A., Bebbington, A. J., Meyfroidt, P., Bengston, D. N., Blackman, A., Brooks, S., Davidson-Hunt, I., Davies, P., Dinsi, S. C., Fontana, L. B., Gumucio, T., Kumar, C., Kumar, K., Moran, D., Mwampamba, T. H., Nasi, R., Nilsson, M., Pinedo-Vasquez, M. A., … Wilson, S. J. (2020). Forest-linked livelihoods in a globalized world. *Nature plants*, *6*(12), 1400–1407. https://doi.org/10.1038/s41477-020-00814-9

Oraon, J. (2021). Role of traditional community festivals of the Oraon in maintenance of ecological balance and mitigation of global warming effects. *International Journal of Multidisciplinary Research, 10*(1), 5.

Ormsby, A. A., & Ismail, S. A. (2015). Cultural and ecological insights into sacred groves: Managing timber resources for improved grove conservation. *Forests, Trees and Livelihoods, 24*(4), 244–258.

Osebor, I. M. (2024). The symbolism of forest in the native centric ecology. *Euromentor Journal, 15*(3), 100–117.

Ossai, A. (2024). Traditional ecological knowledge in Igbo society: Exploring Igbo culture for environmental sustainability. *Sist Journal of Religion and Humanities, 4*(1), 19–39.

Pfeiffer, J. M., & Butz, R. J. (2005). Assessing cultural and ecological variation in ethnobiological research: The importance of gender. *Journal of Ethnobiology, 25*(2), 240–278.

Ruddle, K. (1993). The transmission of traditional ecological knowledge. In *Traditional ecological knowledge: Concepts and cases* (pp. 17–31).

Sinthumule, N. I. (2023). Traditional ecological knowledge and its role in biodiversity conservation: A systematic review. *Frontiers in Environmental Science, 11*, 1164900.

Tatay, J., & Merino, A. (2023). What is sacred in sacred natural sites? A literature review from a conservation lens. *Ecology and Society, 28*(1), Article 12.

Tayade, M. R. (2025). Traditional ecological knowledge and cultural practices of forest tribes. *Van Vishwa, 66*.

Teague, R., & Kreuter, U. (2020). Managing grazing to restore soil health, ecosystem function, and ecosystem services. *Frontiers in Sustainable Food Systems, 4*, 534187.

United Nations Environmental Programme. (2020). *Integrating indigenous knowledge into biodiversity conservation*. UNEP.

Wiersum, K. F. (1997). Indigenous exploitation and management of tropical forest resources: An evolutionary continuum in forest-people interactions. *Agriculture, Ecosystems & Environment, 63*(1), 1–16.