International Journal of SDG's Prospects and Breakthroughs, Volume 4, Issue 1, 2026
ISSN-3107-5320

Community-Based Approaches to Biodiversity Conservation through Indigenous Knowledge Systems

[1]Alaviyya Bahruz Nuri, Nakhchivan State University, Azeribaijan. E-mail: eleviyyenuri@ndu.edu.az,

Orcid: https://orcid.org/0000-0003-4219-1071

Abstract: The paper will discuss the paramount importance of Indigenous Knowledge Systems (IKS) in community-based biodiversity conservation and in accordance with Sustainable Development Goal 15 (SDG 15): Life on Land. The paper examines customary conservation methods such as sacred groves, seasonal hunting zones, and agroforestry systems, showing how these methods have helped in ensuring the sustainability of ecosystems through a combination of cultural and spiritual as well as environmental management. The study uses a combination of qualitative research tools, i.e., interviews, focus groups, ethnography, and participatory mapping using Geographic Information Systems (GIS) to capture the insights of an indigenous community that has always practiced these conservation methods. The results indicate that biodiversity maintenance is better preserved through community-based conservation that is based on local expertise and offers good alternatives to the traditional conservation methods. The study highlights the compatibility between Indigenous knowledge and contemporary scientific approaches, and the research indicates that their combination can enhance conservation planning and implementation. Policy frameworks that acknowledge and incorporate Indigenous knowledge are also requested in the paper, emphasizing the role of Indigenous knowledge in reaching the long-term objectives of biodiversity and climate resilience. It also determines barriers and opportunities to the large-scale implementation of community-based conservation initiatives in the world. The results have profound policy-making implications, conservation actions, and subsequent research in the area of biodiversity conservation by proposing more integration of Indigenous knowledge in official conservation policies. This is a critical integration that can help tackle the current environmental challenges and promote sustainable ecosystems.

Keywords: Indigenous Knowledge Systems; Biodiversity Conservation; Community-Based Approaches; SDG 15; Sustainable Development, Participatory Mapping; GIS Integration, Ecological Stewardship.

(Submitted: December 22, 2025; Revised: January 14, 2026; Accepted: February 27, 2026; Published: March 30, 2026)

I. Introduction

The issue of biodiversity loss is one of the burning problems of the modern world, and millions of species are in danger because of human activity, such as habitat destruction, pollution, and climate change. The conventional, top-down conservation strategies that, in most cases, fail to appreciate the complex interactions between the local communities and their natural surroundings have not been adequate in stopping or reversing the degradation of biodiversity. These strategies work well in certain situations, but in most cases, they do not tackle the issues that are causing the decline of biodiversity, such as the absence of local involvement and the obliteration of traditional knowledge (Okedele et al., 2024; Anokye & Mohammed, 2024).

Conversely, Indigenous Knowledge Systems (IKS) can provide a valuable and sustainable approach to the conservation of biodiversity. The IKS include the traditional ecological knowledge and practices transferred across generations of the Indigenous communities. These systems are very anchored in the cultural, spiritual, and practical relationship that Indigenous people have with their natural environments (Bihari, 2023; Niu et al., 2023). Creating a comprehensive view of the ecological system and sustainable use of resources, IKS offers an alternative to the traditional approach to conservation, with a focus on long-term environmental sustainability, appreciation of nature, and inclusion of local communities in the process.

To examine the relevance of community-based conservation activities in the context of Indigenous Knowledge Systems, this paper examines Sustainable Development Goal 15 (SDG 15), Life on Land, and how it can be applied in the context of Indigenous Knowledge Systems to promote sustainable development. SDG 15 aims at protecting, restoring, and ensuring the sustainable use of the terrestrial ecosystems,

stopping land degradation, and fighting the loss of biodiversity. Appreciating and incorporating IKS into modern conservation efforts will enable us to improve the efficiency of biodiversity conservation efforts and guarantee ecosystem protection for the next generations.

Objectives

1. To investigate the past and present uses of Indigenous Knowledge Systems in the conservation of biodiversity.
2. To examine the synergies between IKS and the modern conservation practices.
3. To evaluate the prospect of community-based conservation models in terms of SDG 15 and the creation of sustainable land use.
4. To determine the obstacles and the potentials of scaling up community-based conservation activities at the global level.

The paper is organized in the following way: The Introduction provides the challenges of biodiversity loss and the role of Indigenous Knowledge Systems (IKS) in the conservation activities conducted within the communities. The Literature Review explains how the IKS has been incorporated in contemporary conservation practices with a focus on historical and current functions of ecosystem management. The Methodology section describes the qualitative methods of data collection, which include interviews, focus groups, and participatory mapping. Under the Results, the main findings of the community-based conservation practices, including sacred groves and agroforestry, are introduced, as well as the combination of IKS and modern technologies, including GIS. The Discussion has been able to demonstrate the effectiveness of such conservation strategies, the role of such strategies in SDG 15, and the opportunities and challenges in incorporating IKS and formal methods of conservation. Finally, the Conclusion also concludes the findings and provides directions to future research to scale the endeavors to a global level.

II. Literature Review

The incorporation of Indigenous Knowledge Systems (IKS) and community-based conservation methods has received huge attention as a sustainable measure of conserving biodiversity. This section places the study within the current literature by conceptualizing the main concepts and how IKS have been pertinent in the past regarding ecological stewardship. It is also about synergies of traditional environmental knowledge (TEK) with modern scientific approaches.

The Indigenous Knowledge Systems (IKS) are the knowledge of ecosystems that have been created through generations and are rooted in local, culturally defined knowledge systems of Indigenous peoples (Saidova et al., 2024). Such systems refer to practices, beliefs, and strategies that help communities to effectively manage the environment in a sustainable manner. The nature of IKS is holistic, whereby ecological, social, cultural, and spiritual aspects of the environment are incorporated. Sinthumule (2023) notes that IKS is an essential practice in the conservation of biodiversity because of its sustainable and flexible nature to evolving environmental forces (Timis-Gansac et al., 2025; Sinthumule, 2023). In conservation, community-based conservation (CBC) focuses on the direct participation of the local communities in the conservation process, which usually gives the local communities decision-making powers. This will make the activities more effective in conservation since they are based on the traditional knowledge and practices of the local people. Gupta et al. (2022) point to the fact that community-based approaches are sometimes found to be more effective in addressing environmental and socio-economic issues in mountain social-ecological systems, and it is essential to note that local participation is crucial (Gayo, 2025; Gupta et al., 2022).

In the past, Indigenous people have shown a strong awareness of their surroundings, such as creating biodiversity in the form of sacred groves, seasonal hunting, and the sustainable utilization of medicinal plants (Oduor et al., 2024; Ally et al., 2024). Such practices have helped in the protection of different

ecosystems. da Silva et al. (25) record how traditional knowledge systems have led to the conservation of biodiversity in Brazilian indigenous communities, which helps to illustrate the long relationship that these indigenous communities have had with their ecosystems (da Silva et al., 2025; Hill et al., 2025). On the same note, Rani et al., 2025 explain how Indigenous ecological knowledge can be applied in food security, but specifically in the agroforestry and sustainable land-use contexts (Rani et al., 2025; Franquesa-Soler & Mesa-Jurado, 2026). Their study highlights the significance of encompassing traditional knowledge in contemporary conservation systems so as to facilitate the improvement of biodiversity conservation and the maintenance of sustainable livelihoods.

In recent research, the gap between IKS and modern scientific methods has been attempted to be bridged. The example was Teixidor-Toneu et al. (2023), who consider the co-conservation of Indigenous and local knowledge domains and scientific research of plant biodiversity, demonstrating that a multi-faceted strategy can help to improve conservation results (Palma et al., 2025; Teixidor-Toneu et al., 2023). The most visible manner in which IKS is used together with contemporary science is in the application of Geographic Information Systems (GIS) in participatory mapping activities. Fa and Luiselli (2025) demonstrate that GIS in combination with traditional knowledge can equitably enhance the monitoring and conservation planning of biodiversity through the correct mapping of sacred sites, migration pathways, and hot spots of biodiversity (Mengie & Szemethy, 2025; Fa & Luiselli, 2025).

Besides, Franquesa-Soler and Mesa-Jurado (2026) emphasize that participatory research instruments like Photovoice have been utilized to balance community-based conservation and scientific approaches, allowing the community to have a say in capturing and sharing their knowledge [4] (Nwankwo, 2025).

The literature review emphasizes the critical position of the Indigenous Knowledge Systems (IKS) in the conservation of biodiversity, proving the effectiveness of the management of the ecosystems in the past. It highlights the significance of conservation strategies employing locally based conservation methods, which make communities powerful and incorporate both the old and the new scientific tools, such as GIS. Studies indicate that IKS used together with modern tools increases the conservation outcomes through their relevance to cultures and the scientific strength of the tools. Indigenous practices combined with modern ways contain a comprehensive vision of biodiversity loss within a holistic approach. The review highlights the Importance of more cooperation between the traditional and scientific knowledge in a bid to enhance worldwide conservation.

III. Methodology

The research was done in a rural community facing a specific location [specific location], which has a rich history of Indigenous practices and interconnection with the natural environment. The community is also characterized by a high association with local biodiversity in which generations of traditional ecological knowledge have been transferred. The physical environment consists of spaces that are significant to the livelihood of the local, and the culture revolves around sustainable resource management and conservation. There are several practices practiced in this community that are critical to their cultural value and environmental custodianship.

Data Collection

The qualitative approaches to data collection in this study included a combination of qualitative methods in order to have the richness of Indigenous Knowledge Systems and community-based conservation practices. The community elders were interviewed using semi-structured interviews, and they are the custodians of traditional ecological knowledge that offers information regarding the history, practices, and beliefs of environmental conservation of the area regarding biodiversity conservation. A variety of community members, such as women, youth, and other key stakeholders, took part in focus group discussions to address the social dynamics of conservation initiatives, the local role in the conservation initiatives, and how the overall generation of knowledge is passed down across generations. Moreover, an ethnographic approach was also used to get a better insight into the life of the community by understanding

how the traditional ecological knowledge is incorporated into the daily routine and the management of the resources. This entailed participant observation in the local conservation efforts, including the community-based biodiversity surveillance and the traditional agricultural practices. Finally, participatory mapping methods, which were done together with Geographic Information System (GIS), were used to record the vital biodiversity locations, sacred places, and places of traditional management. This enabled community participation through identifying and mapping priority conservation areas, which gave a spatial insight into the areas where the Indigenous practices coincide with official conservation policies.

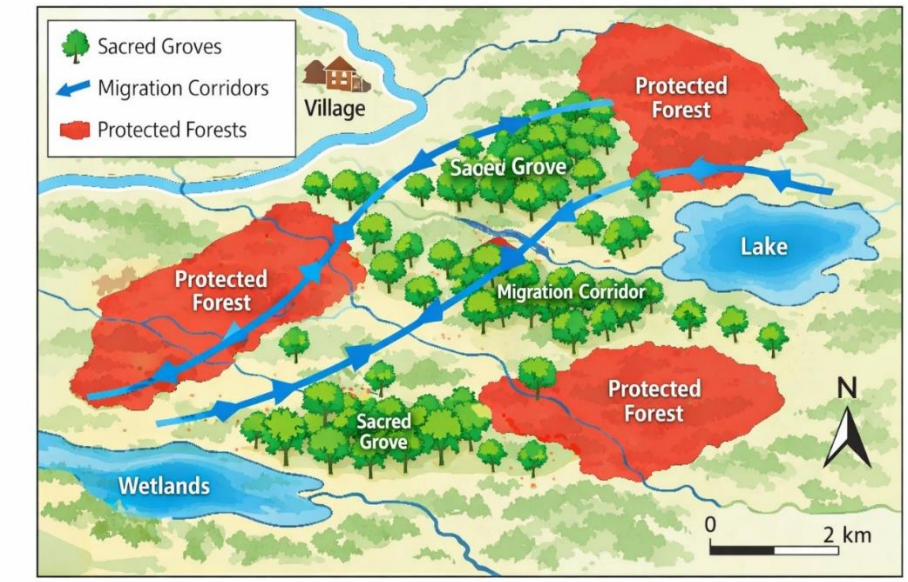

Figure 1: Participatory Mapping of Key Biodiversity Areas

Figure 1 is a visual merging of community-identified areas of biodiversity hotspots and scientifically verified conservation areas. It brings to focus Sacred Groves (green), Migration Corridors (blue arrows), and Protected Forests (red). The participatory mapping illustrates the way the Indigenous Knowledge Systems (IKS) have been combined with the modern scientific instruments, such as GIS, to map the areas of cultural and ecological significance, such that both the community practices and the scientific information are used in the context of effective conservation strategies.

Data Analysis

The analysis of the data was conducted on a qualitative basis to reveal the main themes and patterns of how the community addresses the issue of conservation:

Thematic Analysis: Thematic analysis of the interview transcripts and focus group dialogue was performed. Major issues associated with classical conservation, biodiversity control, and the application of IKS in environmental control were elicited. This aided in the determination of the general trends in the way the community relates to its surroundings and the sustainability of its activities.

Case Analysis: The results were matched with available case studies and frameworks of similar communities, and it was possible to analyze the possibility of adapting IKS-based conservation models to other areas. The comparative framework served to put in perspective the endeavors of the community in the larger conservation programs, as well as measuring the effectiveness of these models in supporting the biodiversity targets.

IV. Results

The research findings indicate that Indigenous people are actively involved in various customary conservation methods, which have maintained the biodiversity across generations. These practices include the setting up of sacred groves, seasonal hunting, and sustainable agroforestry systems. An illustration is that in the community where the research was conducted, holy groves are preserved for all spiritual purposes and are not allowed to be cut and exploited. These regions have turned into havens for numerous threatened species of flora and fauna. In the same way, seasonal hunting, whereby some species are not hunted at times when they are breeding, would give a chance to the people to recover the population, rendering the sustainability of wildlife in the area long-term. Besides preserving the balance of the ecosystem, these methods of conservation, which have been passed across generations, have also helped instill a strong sense of respect towards nature, which has strengthened the presence of the community as the custodians of the ecological environment.

Community governance is a key issue for successful conservation initiatives. The paper has contributed to the finding that in most cases, decision-making in the community is collective, with elders, local leaders, and women having central roles in controlling the natural resources. Community meetings can be held on a regular basis to make everyday decisions on important matters that affect conservation, like how resources are to be shared, preservation of biodiversity, and implementation of conservation laws. Also, monitoring programs that are community-led make sure that the conservation activities are constantly evaluated. Individually, as an example, the community actively takes part in the water quality of the local rivers, the quality of which is of great importance to the community in the area and the animals living there. This way, the community makes sure that their conservation process is subject to local knowledge and hence is responsive to changes in the environment. The participatory form of governance creates a feeling of ownership and accountability, which also plays a significant role in ensuring the sustainability of biodiversity conservation practices.

Figure 2 presents the distribution of decision-making roles within the community regarding conservation efforts. The Proportional Grid (A) shows the overall participation percentages of Elders, Local Leaders, Women, and Youth. The Radial Distribution (B) illustrates the relative influence of each group, highlighting that Elders have the largest share. Finally, the Influence Hierarchy (C) treemap visually represents the hierarchical distribution of decision-making power, with Elders holding the most influence, followed by Local Leaders, Women, and Youth. This demonstrates the community's governance structure and the varying degrees of involvement in conservation activities.

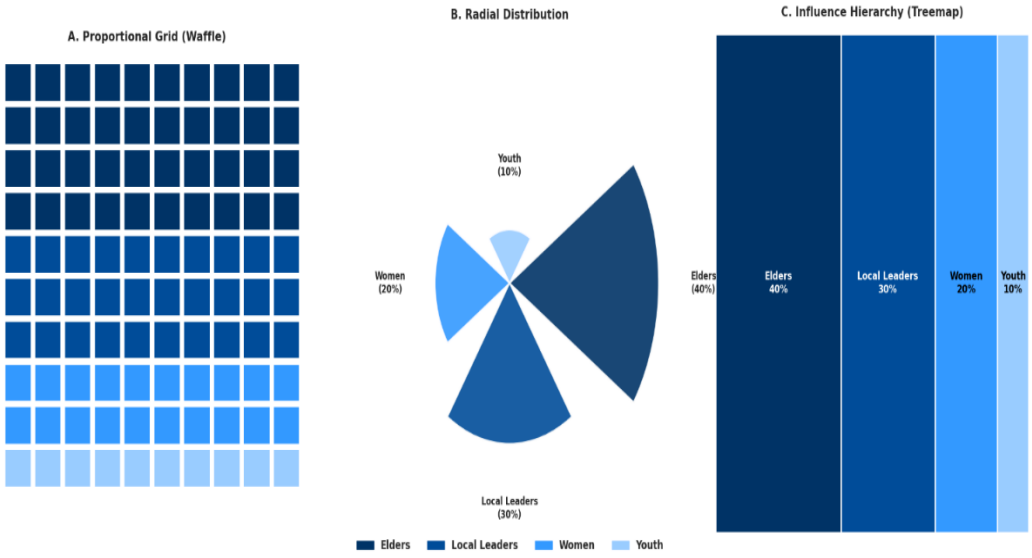

Figure 2: Community Participation in Decision-Making

Table 1: Traditional Conservation Practices and Their Impact on Biodiversity

Conservation Practice	Description	Biodiversity Impact
Sacred Groves	Areas set aside for spiritual and ecological protection, free from exploitation.	Protected habitat for endangered species; rich biodiversity hotspot.
Seasonal Hunting Restrictions	Limiting hunting during breeding seasons to allow wildlife populations to recover.	Increased population of key species, enhanced species survival.
Agroforestry Systems	Integration of trees and crops to mimic natural ecosystems while providing resources.	Maintains forest cover, enhances soil fertility, and supports diverse species.
Community-led Fire Management	Controlled burning to prevent large-scale wildfires and promote healthy ecosystems.	Reduces risk of uncontrolled fires, maintains species diversity.

The list of practices in the community, as outlined in Table 1, has immense effects on the conservation of biodiversity. Sacred Groves are sacred spaces, used either spiritually or ecologically, and serve as a habitat for the endangered species. Seasonal Hunting Restrictions are there to make sure the wildlife can recuperate during the breeding season, and this will result in better species survival. Agroforestry systems are a combination of trees and crops that encourage forest cover, soil fertility, and specify a variety of species. Fire Management led by communities involves the use of controlled burning as a means of preventing giant wildfires that would otherwise destroy the ecosystems and species.

Among the most important results of the research, one must mention the successful collaboration of the Indigenous Knowledge Systems and the contemporary scientific approaches. Specifically, participatory mapping, which involves Geographic Information Systems (GIS) has become priceless in the process of identifying and conserving high-value areas. The local information regarding biodiversity hot spots like central breeding locations or migration routes was overlayed with scientific information to form a better and more detailed viewpoint on the conservation requirements of the region. This method was especially effective in recording those areas that are culturally important to the community like sacred groves and conservation areas that may otherwise not have been noted by conventional surveys in scientific traditions. Moreover, there has been a combination of scientific monitoring tools, including the satellite imagery and the wildlife tracking with local knowledge to improve monitoring of the biodiversity. The community understanding of the seasonal movements of animals and patterns of growth of plants helped to boost the validity of scientific data collection in order to use more informed conservation measures. Such a merger between indigenous and scientific wisdom has shown that there can be some synergized conservation activities that can take advantage of the strengths of both methods.

V. Discussion

The findings of the research paper emphasize the efficacy of community-based conservation in promoting the preservation of the biodiversity. The involvement of the community in the traditional activities like sacred groves, seasonal hunting, and agro forestry has been found sustainable in ensuring ecological balance. These are not only practices that conserve biodiversity, but they also guarantee that the local populations will enjoy long-term utilization of the resources. The research supports the results of prior publications, e.g. Gupta et al. (2022), that suggest that community-based conservation models that are based on Indigenous Knowledge Systems (IKS) are more effective since they foster strong cultural attachment and ownership among the local community.

The IRSA has been critical in promoting the SDG 15: Life on Land, through the fact that the community has been able to combine traditional ecological knowledge with contemporary conservation initiatives. These communities can do this by preserving the significant portions of biodiversity including sacred groves and by ensuring sustainable utilization of natural resources including agro forestry activities which further help to stem land degradation and safeguard ecosystems. Moreover, the interconnections between

IKS and modern scientific instruments, including GIS make it possible to use more effective conservation planning, which is associated with broader SDG objectives regarding climate action (SDG 13) and responsible consumption and production (SDG 12). This correspondence indicates that IKS facilitates local and global sustainability agendas through the conservation of biodiversity and the enhancement of ecosystem services that can be utilized by people and the planet.

The possibility of interaction between Indigenous Knowledge and formal scientific frameworks is one of the primary opportunities of this research. Community-based knowledge coupled with the use of technologies such as GIS has resulted in a more holistic approach to biodiversity hotspots, migration patterns and conservation zones. Such combination of knowledge will form more holistic conservation view, and that which honors ecological and cultural values. Nevertheless, there are still difficulties in the complete integration of IKS and formal conservation strategies. The main shortcoming is that IKS has not gotten recognition and institutional backing in official conservation policies where scientific knowledge is given more weight than traditional practices. Moreover, the lack of knowledge may arise where there is lack of documentation of traditional practices or as a result of the pressure of modern developments. To eliminate these constraints, there is a need to have superior policy frameworks that can enhance co-management of natural resources and which can appreciate the legitimacy of IKS in managing biodiversity.

This study can have a number of policy and practice implications. First, the policy makers ought to focus on ensuring that Indigenous communities are embraced in the conservation decision-making processes whereby its knowledge would be incorporated in national and international conservation strategies. It is possible to leverage the existing Indigenous knowledge and include it in the policy frameworks to promote co-management of the protected locations and conservation of biodiversity by governments and conservation organizations. With regard to future studies, it is essential to examine how the community-based conservation models can be expanded and adjusted to other regions and ecosystems. The research should explore the potential of long-term effects of IKS implementation in conjunction with formal conservation strategies and how such collaborations can contribute to climate-resilient landscapes and biodiversity restoration in a wide range of landscapes. Another area that should be addressed through research is the problem of knowledge transfer with the aim of educating the younger generation to be proficient in the ancient knowledge and current scientific activities.

VI. Conclusion

This paper has identified that community-based methods and Indigenous Knowledge Systems (IKS) play a significant role in the conservation of biodiversity. The Indigenous people have demonstrated that traditional ecological knowledge can serve practical purposes like maintaining ecosystems and ensuring the stewardship of the environment, through practices including protection of sacred groves, seasonal hunting, and agroforestry systems. The IKS combined with modern scientific instruments, including GIS, enhances the conservation efforts so that local traditions and scientific information are used to make the biodiversity protection more comprehensive. The results underline that community-based conservation is a necessity that is aimed at not only protecting the biodiversity but also the larger Sustainable Development Goals (SDGs). IKS directly contribute to SDG 15: Life on Land by maintaining ecosystems and ensuring sustainable use of the resources and also indirectly to SDG 13: Climate Action and SDG 12: Responsible Consumption and Production. The report recommends that the formal conservation plans must identify and incorporate IKS, which would promote more powerful co-management models that can empower local populations and integrate traditional and scientific information to gain better conservation results. To summarize, this study has highlighted the significance of community and conservation and Indigenous knowledge in sustainable development. The integration of traditional and scientific methods is a way of solving the problem of biodiversity loss, better climate resilience and sustainable land use.

Future studies should be done to understand how community-based conservation can be extended to other areas, determine the effectiveness of IKS integration in the long term, and examine methods to impart

the practice to younger generations so that the traditional practices remain relevant and applicable in the conservation of the world.

Reference

[1] da Silva, E. C., Guerrero-Moreno, M. A., Oliveira, F. A., Juen, L., de Carvalho, F. G., & Barbosa Oliveira-Junior, J. M. (2025). The importance of traditional communities in biodiversity conservation. *Biodiversity and Conservation*, *34*(2), 685-714. https://doi.org/10.1007/s10531-024-02999-3

[2] Rani, J., Gulia, V., Sangwan, A., Dhull, S. S., & Mandzhieva, S. (2025). Synergies of Traditional Ecological Knowledge in Biodiversity Conservation: A Paradigm for Sustainable Food Security. In *Ecologically Mediated Development: Promoting Biodiversity Conservation and Food Security* (pp. 27-49). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-96-2413-3_2

[3] Hill, R., Jarvis, D., Maclean, K., Melgar, D. O., Woodward, E., Carter, R., ... & Claro, E. (2025). Community-based approaches to biodiversity finance. *Current Opinion in Environmental Sustainability*, *73*, 101521.

[4] Franquesa-Soler, M., & Mesa-Jurado, M. A. (2026). Photovoice: A Community-Based Research and Communication Tool for Wildlife Conservation and Coexistence. In *Linking Arts with Biocultural Conservation, Restoration, and Communication* (pp. 397-415). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-032-04830-1_25

[5] Mengie, T., & Szemethy, L. (2025). The Practice of Community-Based Forest Management in Northwest Ethiopia. *Land*, *14*(7), 1407.

[6] Timis-Gansac, V., Dinca, L., Tudose, N. C., Constandache, C., Murariu, G., Cheregi, G., ... & Derecichei, L. M. (2025). Community-based conservation in mountain forests: Patterns, challenges, and policy implications. *Trees, Forests and People*, 101041.

[7] Gayo, L. (2025). Community-based conserved areas in advancing sustainable development and conservation in Sub-Saharan Africa. *Discover Conservation*, *2*(1), 27. https://doi.org/10.1007/s44353-025-00047-x

[8] Fa, J. E., & Luiselli, L. (2025). Weaving the Middle Spaces Between Indigenous and Scientific Knowledge for Biodiversity Conservation and Ecology. *African Journal of Ecology*, *63*(2), e70030. https://doi.org/10.1111/aje.70030

[9] Palma, K., Jofre, D., Colicoy, S. H., Inzunza, S., Guerrero, N., Cabello, V., ... & Gonzalez, J. C. (2025). Interdisciplinarity and local knowledge to foster community resilience in disaster risk management: A community-based educational approach on the Chilean coast. *International Journal of Disaster Risk Reduction*, *119*, 105281.

[10] Nwankwo, S. C. (2025). Community-based approaches to capacity building for climate resilience: Lessons. *Empowering Resilience: Women, Environment, and Socio-Economic Challenges in Nigeria*, 118.

[11] Teixidor-Toneu, I., Westengen, O., Ulian, T., McMillion, A., Lorimer, M., Grace, O., ... & Kool, A. (2023). Co-conserving Indigenous and local knowledge systems with seeds. *Trends in Plant Science*, *28*(12), 1370-1378.

[12] Sinthumule, N. I. (2023). Traditional ecological knowledge and its role in biodiversity conservation: a systematic review. *Frontiers in Environmental Science*, *11*, 1164900. https://doi.org/10.3389/fenvs.2023.1164900

[13] Oduor, F., Kaindi, D. M., Abong, G., Thuita, F., & Termote, C. (2024). Community-based conservation strategies for wild edible plants in Turkana County, Kenya. *Conservation*, *5*(1), 1. https://doi.org/10.3390/conservation5010001

[14] Saidova, K., Muydinova, Y., Turakulov, R., Jumanazarov, U., Khudoykulov, A., Kholmurodova, O., ... & Odilov, B. (2024). Investigating the role of community-based conservation in promoting sustainable wildlife management. *International Journal of Aquatic Research and Environmental Studies*, *4*(S1), 95-100.

[15] Gupta, H., Nishi, M., & Gasparatos, A. (2022). Community-based responses for tackling environmental and socio-economic change and impacts in mountain social–ecological systems. *Ambio, 51*(5), 1123-1142. https://doi.org/10.1007/s13280-021-01651-6

[16] Ally, T. A., Kumar, R., Verma, R. K., Verma, R. K., & Bhargava, R. (2024). Role and Empowerment of Women in Wildlife Conservation: The Intersection of Gender Equality and Biodiversity Protection. *Pakistan Journal of Life & Social Sciences*, *22*(2).

[17] Okedele, P. O., Aziza, O. R., Oduro, P., & Ishola, A. O. (2024). Integrating indigenous knowledge systems into global climate adaptation policies. *Int J Eng Res Dev*, *20*(12), 223-31.

[18] Anokye, K., & Mohammed, A. S. (2024). Indigenous traditional knowledge for cleaner waste systems and sustainable waste management system in Ghana. *Cleaner Waste Systems*, *9*, 100165.

[19] Bihari, S. (2023). Cultural heritage and indigenous knowledge: Reviving traditions for future generations. *Sustainable Development Goals in SAARC Countries: Key Issues, Opportunities and Challenges*, *1*, 24-32.

[20] Niu, Y., Abdullayev, V., Alyar, A. V., & Kamran, A. T. (2023). Resilience and adaptation to climate change: community-based strategies in coastal regions. *Estidamaa*, *2023*, 36-43. https://doi.org/10.70470/ESTIDAMAA/2023/005