Safeguarding Mountain Ecosystems for Sustainability

Kariuki Muigua, Ph.D.

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Kariuki Muigua*

Abstract

Environmental changes around the world have had a huge effect on the relationship between people and the environment, especially when it comes to ecosystem services. It is important to understand how people and nature are connected to make sure that development is sustainable in the face of global environmental changes. Landscapes are important for communities to survive, and they also affect the results of sustainable development. The relationships between landscapes, ecosystem services, livelihoods, and climate change are complicated and not well understood, especially in rural Africa, where communities live next to protected areas. Mountain ecosystems, which provide a wide range of these services, are especially sensitive and vulnerable to changes caused by both human activities and natural processes. Mountain ecosystems offer vital services and resources; however, their fragility is threatened by global changes. This paper critically discusses the importance of mountain ecosystem services, the challenges facing their effective management as well as their place in the sustainability discourse. Furthermore, in order to promote sustainable conservation practices within these ecosystems, the paper explores international best practices as well as management approaches in mountain ecosystems conservation and management for sustainability.

1. Introduction

Environmental changes around the world have had a huge effect on the relationship between people and the environment, especially when it comes to ecosystem services.[1] Ecosystem services are the benefits that people get from ecosystems. They can be divided into provisioning (food and water), regulating (flood and disease control), supporting (soil formation and nutrient cycling), and cultural (recreational and spiritual) services.[2] These services are necessary for the Earth to support life and for people to be healthy. They also add to the planet's economic value.[3] They are closely linked to human health and are affected by a number of factors that cause change, such as population growth, changes in land use, and climate change, all of which lead to the loss of biodiversity.[4]

PhD in Law (Nrb), FCIArb (Chartered Arbitrator), LL. B (Hons) Nrb, LL.M (Environmental Law) Nrb; Dip. In Law (KSL); FCPS (K); Dip. In Arbitration (UK); MKIM; Mediator; Consultant: Lead expert EIA/EA NEMA; BSI ISO/IEC 27001:2005 ISMS Lead Auditor/ Implementer; Advocate of the High Court of Kenya; SC; Professor of Environmental Law and Conflict Management at the University of Nairobi, Faculty of Law [January, 2026].

[1] Pătru-Stupariu, I., Hossu, C.A., Grădinaru, S.R., Nita, A., Stupariu, M.S., Huzui-Stoiculescu, A. and Gavrilidis, A.A., "A review of changes in mountain land use and ecosystem services: From theory to practice." *Land* 9, no. 9 (2020): 336; see also Gurung, A.B., von Dach, S.W., Price, M.F., Aspinall, R., Balsiger, J., Baron, J.S., Sharma, E., Greenwood, G. and Kohler, T., "Global change and the world's mountains—Research needs and emerging themes for sustainable development." *Mountain Research and Development* 32, no. S1 (2012).

[2] Chettri N, Rasul G and Sharma E, 'Managing Ecosystem Services for Enhancing Climate Change Adaptation in the Hindu Kush Himalayas', *Impact of Global Changes on Mountains* (CRC Press 2014).

[3] Ibid.; see also 'The Vulnerability of Ecosystem Services to Land Use Change | Request PDF' [2025] ResearchGate <https://www.researchgate.net/publication/40115058_The_Vulnerability_of_Ecosystem_Services_to_Land_Use_Change> accessed 12 January 2026.

[4] Ibid; see also Liu M and others, 'Integrating Land Use, Ecosystem Service, and Human Well-Being: A Systematic Review' (2022) 14 Sustainability <https://www.mdpi.com/2071-1050/14/11/6926> accessed 12 January 2026.

It is important to understand how people and nature are connected to make sure that development is sustainable in the face of global environmental changes.[5] Landscapes are important for communities to survive, and they also affect the results of sustainable development.[6] The relationships between landscapes, ecosystem services, livelihoods, and climate change are complicated and not well understood, especially in rural Africa, where communities live next to protected areas.[7]

Mountain ecosystems, which provide a wide range of these services, are especially sensitive and vulnerable to changes caused by both human activities and natural processes.[8] Mountain ecosystems offer vital services and resources; however, their fragility is threatened by global changes.[9] It has also been pointed out that the expanding domain of "ecosystem services" encompasses the advantages these ecosystems confer upon humanity. However, it may jeopardize its efficacy due to misuse and ambiguous definitions.[10]

This paper critically discusses the importance of mountain ecosystem services, the challenges facing their effective management as well as their place in the sustainability discourse. Furthermore, in order to promote sustainable conservation practices within these ecosystems, the paper explores international best practices as well as management approaches in mountain ecosystems conservation and management for sustainability.

2. Mountain Ecosystems: Benefits and Relevance in the Sustainability Debate

The United Nations set up the Sustainable Development Goals (SDGs) in 2015. These are 17 goals that aim to promote fair development and the use of resources in a way that is good for the environment.[11] The goals stress the need to move towards more sustainable ways of doing things, deal

[5] Musakwa W and others, 'Local Community Perceptions on Landscape Change, Ecosystem Services, Climate Change, and Livelihoods in Gonarezhou National Park, Zimbabwe' (2020) 12 Sustainability <https://www.mdpi.com/2071-1050/12/11/4610> accessed 8 January 2026.

[6] Ibid.

[7] Ibid.

[8] Pătru-Stupariu, I., Hossu, C.A., Grădinaru, S.R., Nita, A., Stupariu, M.S., Huzui-Stoiculescu, A. and Gavrilidis, A.A., "A review of changes in mountain land use and ecosystem services: From theory to practice." *Op. cit.*

[9] Grêt-Regamey, A., Brunner, S.H. and Kienast, F., "Mountain Ecosystem Services: Who Cares?" *Mountain Research and Development* 32, no. S1 (2012): S23-S34.

[10] Ibid.

[11] Nandi S and others, 'Land Degradation Neutrality: A Pathway to Achieving Sustainable Development Goals and Ecosystem Resilience' (2025) 2 Discov Soil 48 <https://doi.org/10.1007/s44378-025-00078-9> accessed 12 January 2026.

with hunger, poverty, and inequality, and make it easier for people to get a good education.[12] Land degradation is a major problem that makes it harder to reach these goals because it hurts ecosystem services and sustainable development.[13]

SDG 15 under Target 15.4 requires nations to ensure that by 2030, they will guarantee the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development.[14] Notably, Sustainable Development Goal 15 (SDG 15) specifically targets the protection, restoration, and sustainable use of terrestrial ecosystems, including forests, wetlands, mountains, and drylands, along with their biodiversity.[15]

Mountain ecosystems are vital for sustainable development, offering significant benefits through biodiversity, climate regulation, water cycles, and recreation.[16] However, environmental threats jeopardize these ecosystem services, impacting the quality of life for both mountain dwellers and those elsewhere.[17] Acknowledging the value of these services is crucial for guiding policy on ecosystem management and conservation to enhance their contributions to human well-being.[18]

It has rightly been pointed out that Ecosystem services provide the link between people and nature. This is especially true for mountains, which constitute more than two-thirds of the world's land and provide a wide range of ecosystem services crucial for enhancing human well-being.[19] Mountain ecosystem services (MES) have been defined as mountain ecosystems that provide a disproportionate measure of critical ecosystem services to people living in both in and outside mountain regions.[20] Mountain ecosystems have also been defined as ecosystems with distinctive topographic relief, rich

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[12] Ibid.
[13] Ibid.
[14] Martin, 'Goal 15: Forests, Desertification and Biodiversity' (*United Nations Sustainable Development*) <https://www.un.org/sustainabledevelopment/biodiversity/> accessed 12 January 2026.
[15] Pan H and others, 'Comprehensive Assessment of Sustainable Development of Terrestrial Ecosystem Based on SDG 15—A Case Study of Guilin City' (2024) 17 Remote Sensing <https://www.mdpi.com/2072-4292/17/1/63> accessed 12 January 2026; see also 'Pursuing Sustainable Development Goal 15: Progress and Challenges in Protecting Life on Land' (*ICPAC*) <https://www.icpac.net/news/pursuing-sustainable-development-goal-15-progress-and-challenges-in-protecting-life-on-land/> accessed 12 January 2026.
[16] Glushkova, M., Zhiyanski, M., Nedkov, S., Yaneva, R. and Stoeva, L., "Ecosystem services from mountain forest ecosystems: conceptual framework, approach and challenges." *Silva Balcanica* 21, no. 1 (2020): 47-68.
[17] Ibid.
[18] Ibid; see also Häyhä, T., Franzese, P.P., Paletto, A. and Fath, "Assessing, valuing, and mapping ecosystem services in Alpine forests." *Ecosystem services* 14 (2015): 12-23.
[19] Zhao, Y., Zhou, R., Yu, Q., & Zhao, L. (2024). Revealing the contribution of mountain ecosystem services research to sustainable development goals: A systematic and grounded theory-driven review. *Journal of Environmental Management*, *373*, 123452. https://doi.org/10.1016/j.jenvman.2024.123452.
[20] Ibid.

biodiversity and unique geographical and cultural characteristics, which are complex systems capable of providing natural habitats and ecological functions for flora and fauna, and community livelihoods and cultural well-being for humans, as well as being the basis for sustainable development in mountains.[21]

A recent report from the Food and Agriculture Organisation of the United Nations (FAO) and UNWTO, which was presented during the International Mountain Day 2021 celebration, states that sustainable tourism offers huge assistance in improving people's lives, lowering poverty, and protecting the environment in mountainous areas.[22] The fact that mountains are peaceful places for the spirit shows how important they are as tourist destinations. They are great places to reconnect with nature and the simple joys of life.[23] Mountains are also important places to watch for global change because their verticality makes it easy for habitats to change quickly over short distances.[24] Because of this vertical zonation, they are great for finding early signs of climate change and figuring out how it will affect the environment.[25] This is because climate changes have a big effect on plants and water at different heights. Because of this, mountains have a lot of different types of plants and animals, and the vegetation, soil, and ice change a lot from one area to the next.[26]

The loss of forests, rangelands, and farmland is bad for biodiversity, sustainable development, and efforts to fight climate change.[27] This loss makes people less safe when it comes to food and water, and it also makes conflict, poverty, and displacement worse. Overharvesting, unsustainable farming

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[21] Ibid.

[22] 'Sustainable Tourism Can Offer Mountain Communities a Path to Prosperity and Inclusion' (10 December 2021) <https://www.untourism.int/news/sustainable-tourism-can-offer-mountain-communities-a-path-to-prosperity-and-inclusion> accessed 8 January 2026; see also 'Sustainable Tourism | Thematic Areas | Mountain Partnership | Food and Agriculture Organization of the United Nations' (*MountainPartnership*) <https://www.fao.org/mountain-partnership/our-work/thematic-areas/sustainable-tourism/en> accessed 8 January 2026.

[23] Irandu EM, 'Global Change and Sustainable Mountain Tourism: The Case of Mount Kenya', *Impact of Global Changes on Mountains* (CRC Press 2014).

[24] Ibid; see also Kaganzi KR and others, 'Local Perceptions of Climate Change and Adaptation Responses from Two Mountain Regions in Tanzania' (2021) 10 Land <https://www.mdpi.com/2073-445X/10/10/999> accessed 7 January 2026.

[25] Ibid.

[26] Ibid.; see also Downing T and others, 'Perceptions of Ecosystem Services and Climate Change in the Communities Surrounding Mt. Kenya and Mt. Elgon, Kenya' (2023) 15 Sustainability <https://www.mdpi.com/2071-1050/15/14/11470> accessed 7 January 2026.

[27] Patel A and others, 'Ecosystem Restoration for Achieving the Land Degradation Neutrality' in Subhash Babu and others (eds), *Ecological Solutions to Agricultural Land Degradation* (Springer Nature 2025) <https://doi.org/10.1007/978-981-96-3392-0_11> accessed 12 January 2026.

methods, and the pressures of economic growth and population growth are all major causes of land degradation.[28]

It has rightly been pointed out that mountains account for 15-20% of global tourism revenues, and environmentally friendly tourism supports biodiversity and local economies and food systems through the conservation and valorization of mountain ecosystems.[29] However, these ecosystems suffer from the effects of climate change and environmental degradation, with a report from the Intergovernmental Panel on Climate Change (IPCC) predicting that glacier melting will continue for decades, even if warming stabilizes.[30] These changes could affect water supplies, energy production, ecosystem integrity, and agricultural and forest productivity. As such, local and global initiatives are needed to mitigate the effects of climate change and preserve mountain ecosystems.[31]

3. Safeguarding Mountain Ecosystems for Sustainability: Prospects and Promises

3.1. Enhanced Environmental Planning and Management of Mountain Ecosystems

Key techniques in management and conservation approaches should include mapping land use and landscape metrics for evaluating ecosystem services.[32] The effects of land use change, climate change, and socio-economic factors are significant, influencing biodiversity and community well-being.[33] Effective management strategies are needed, enhanced by stakeholder engagement and the integration of scientific research into planning practices.[34] There is also a need to address any gaps in transferring ecosystem service assessments into actionable policies, underlining the necessity for interdisciplinary approaches to inform decision-making processes for sustainable management.[35]

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[28] Ibid.

[29] '597. The Importance of Mountain Ecosystem | 国際農研' (*Japan International Research Center for Agricultural Sciences | JIRCAS*, 9 August 2022) <https://www.jircas.go.jp/en/program/proc/blog/20220810> accessed 8 January 2026.

[30] Ibid; see also 'Tourism Holds Potential to Benefit Mountain Ecosystems and Communities' (*Newsroom*) <https://www.fao.org/newsroom/detail/FAO-UNWTO-tourism-mountain-ecosystems-report-2023/en> accessed 8 January 2026.

[31] Ibid.

[32] Pătru-Stupariu, I., Hossu, C.A., Grădinaru, S.R., Nita, A., Stupariu, M.S., Huzui-Stoiculescu, A. and Gavrilidis, A.A., "A review of changes in mountain land use and ecosystem services: From theory to practice." *Op. cit.*

[33] Ibid.

[34] Ibid.

[35] Ibid.

3.2. Investing in Ecotourism in Mountain Ecosystems

Ecotourism is going to places that are not developed yet and enjoying the culture and environment while also promoting sustainability.[36] A lot of countries, especially those with protected areas, are seeking to promote ecotourism as it can also help the economy if done right. But if ecotourism is not managed well, it can hurt the environment and make people in the area frustrated.[37] In countries that are growing their tourism industries, this makes the balance between protecting the environment and sustainable development a hot topic.[38] The 12th World Congress on Snow, Mountain, and Wellness Tourism took place in Andorra from March 20 to 21, 2024.[39] It brought attention to some of the biggest problems the industry is facing, such as climate change and changing consumer preferences.[40] The congress stressed how important tourism is for protecting the fragile mountain ecosystem, making mountain communities more resilient, and preserving local culture.[41]

Effective planning and management of mountain tourism necessitates a comprehensive understanding of its overall size as well as its economic, social, and environmental impacts.[42] Currently, the available data on these aspects is notably limited, highlighting a significant gap in knowledge necessary for informed decision-making in the sector.[43] It is important to study local communities in areas that are vulnerable to climate change, such as Mt. Kenya and Mt. Elgon, to learn more about how climate change affects them. Their main concern is water availability, so they give detailed observations that improve global climate models.[44] The weather has become less predictable, but this is not their biggest

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[36] Tian J and Li J, 'Analysis and Treatment of the Conflict between Sustainable Development and Environmental Protection Based on the Ecotourism Concept' (2022) 10 Front Environ Sci <https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2022.1056643/full> accessed 8 January 2026.

[37] Ibid.

[38] Ibid.; see also Kuniyal JC and others, 'Carrying Capacity and Strategic Planning for Sustainable Tourism Practices in the Char Dham from the Western Himalaya, India' (2025) 15 Sci Rep 36340 <https://www.nature.com/articles/s41598-025-20166-8> accessed 8 January 2026.

[39] UN Tourism, 'New Products and Experiences: An Opportunity for Mountain Tourism' <https://www.untourism.int/news/new-products-and-experiences-an-opportunity-for-mountain-tourism> accessed 8 January 2026.

[40] Ibid.

[41] Ibid.

[42] 'Tourism Holds Potential to Benefit Mountain Ecosystems and Communities' (*MountainPartnership*) <https://www.fao.org/mountain-partnership/news/newsroom/news-detail/Tourism-holds-potential-to-benefit-mountain-ecosystems-and-communities/en> accessed 8 January 2026.

[43] Ibid.

[44] Downing T, Olago D and Nyumba T, 'Perceptions of Ecosystem Services and Climate Change in the Communities Surrounding Mt. Kenya and Mt. Elgon, Kenya.' (2023) 15 Sustainability (2071-1050) <https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=20711050

concern. Cultural services from the mountains are still important, but fewer people are using them for cultural activities.[45] People's views on changes in ecosystem services are more affected by how close they are to the mountains than by their demographics. Local guides, who spend every day on the mountain, know a lot about these changes and are important to citizen science projects.[46] This information should help with planning for adaptive strategies to deal with climate change.[47]

When done with sustainable management practices, mountain tourism can greatly improve the economic prospects of local communities while also helping to protect their natural resources and cultural heritage.[48] Even though there is a lot of potential, these communities cannot take advantage of these chances because they do not have enough information and data about mountain tourism.[49] Mountain guides, due to their daily exposure to climate change and their training in environmental observation, serve as valuable 'citizen scientists' by offering detailed insights that enhance scientific research.[50]

It has rightly been pointed out that Sustainable tourism can help mountain areas grow economically and socially by raising household incomes, creating more jobs, supporting traditional ways of life, building resilience, and protecting cultural and natural heritage.[51] For mountain tourism to last, it is important to plan for the environment so that it stays healthy, protects biodiversity, and preserves cultural heritage.[52] Good planning must find a balance between economic growth and protecting the environment. This is not easy, as it involves dealing with issues like managing visitor impact, adapting

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[45] Ibid.

[46] Ibid.

[47] Ibid.

[48] 'Tourism Holds Potential to Benefit Mountain Ecosystems and Communities' (*MountainPartnership*) <https://www.fao.org/mountain-partnership/news/newsroom/news-detail/Tourism-holds-potential-to-benefit-mountain-ecosystems-and-communities/en> accessed 8 January 2026.

[49] Ibid.

[50] Downing T, Olago D and Nyumba T, 'Perceptions of Ecosystem Services and Climate Change in the Communities Surrounding Mt. Kenya and Mt. Elgon, Kenya.' (2023) 15 Sustainability (2071-1050) <https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=20711050&AN=169711377&h=QfOAzBzcpCwWDuXeMA6GiEQU9uSLaW%2FJg1HeMzQ79p0rd1xWw5id07Hq4j%2FRf98VIlTEfnWmN3JnzTQrafKPew%3D%3D&crl=c> accessed 8 January 2026.

[51] 'Sustainable Tourism Can Offer Mountain Communities a Path to Prosperity and Inclusion' (10 December 2021) <https://www.untourism.int/news/sustainable-tourism-can-offer-mountain-communities-a-path-to-prosperity-and-inclusion> accessed 8 January 2026.

[52] Al-Romeedy BS, 'Eco-Blueprints for Mountain Tourism: The Essentials, Challenges, and Imperative of Environmental Planning', *Balancing Mountain Tourism, Cultural Heritage, and Environmental Stability* (IGI Global Scientific Publishing 2025) <https://www.igi-global.com/chapter/eco-blueprints-for-mountain-tourism/378840> accessed 7 January 2026.

to climate change, working with stakeholders, and getting resources.[53] To reach these goals, policymakers, planners, and tourism operators need to work together to promote sustainable practices. This will improve the long-term sustainability, economic stability, and visitor experiences in mountain areas.[54] There is a need for a collaborative initiative that includes both public and private stakeholders throughout the value chain to enhance data collection, standardization, and delivery.[55] This effort aims to achieve a comprehensive assessment of mountain tourism regarding its volumes and impacts, thereby facilitating a better understanding and development of the sector in alignment with the Sustainable Development Goals.[56]

3.3. Use of Traditional Ecological Knowledge

Mountain forest ecosystems are considered very important to local communities because they help stabilise slopes, control water flow, maintain biodiversity, and support economically vulnerable populations from different cultures.[57] To manage these services in a way that lasts, we need to recognise, assess, and value the different benefits they offer.[58] It is important for stakeholders to promote identification and assessment of socio-cultural values of ecosystem services as an important part for the planning and management of forest resources.[59] Key information necessary is how different forest user groups perceive and prioritize different ecosystem services based on their local setting.[60]

It is important to encourage the use of traditional ecological knowledge in community-based management of mountain ecosystems. To make cross-border cooperation stronger, people need to share information and learn about mountain ecology.[61] Evaluating ecosystems that are in danger helps

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[53] Ibid.
[54] Ibid.
[55] 'Tourism Holds Potential to Benefit Mountain Ecosystems and Communities' (*MountainPartnership*) <https://www.fao.org/mountain-partnership/news/newsroom/news-detail/Tourism-holds-potential-to-benefit-mountain-ecosystems-and-communities/en> accessed 8 January 2026.
[56] Ibid.
[57] Paudyal K, 'Approaches and Tools for Assessing Mountain Forest Ecosystem Services' <https://www.academia.edu/63842211/Approaches_and_tools_for_assessing_mountain_forest_ecosystem_services> accessed 12 January 2026.
[58] Ibid.
[59] Dorji K, 'Socio-Cultural Values of Ecosystem Services from Oak Forests in the Eastern Himalaya' Sustainability <https://www.academia.edu/52490122/Socio_Cultural_Values_of_Ecosystem_Services_from_Oak_Forests_in_the_Eastern_Himalaya> accessed 12 January 2026.
[60] Ibid.
[61] Dhyani S and others, 'Ecosystem Health and Risk Assessments for High Conservation Value Mountain Ecosystems of South Asia: A Necessity to Guide Conservation Policies' (2022) 1 Anthr Sci 211 <https://link.springer.com/10.1007/s44177-022-00010-8> accessed 8 January 2026.

with smart land use planning and reducing the effects of land degradation, deforestation, and other problems.[62] To deal with changes in land use, it is important to make people more aware of ecosystem services, especially those related to water and forests. To reach the Sustainable Development Goals, there is a need to make detailed plans for reducing poverty and creating jobs based on nature.[63] This requires support from the government and cooperation between regions to assess the health of ecosystems.[64]

3.4. **Adopting Integrated Landscape Management Approaches**

Holistic and multi-transdisciplinary approaches aim to enhance resilience in societies and ecosystems over various time frames.[65] Science and practical experiences stress the importance of a 'landscape' level of work, as landscapes serve as socio-ecological systems crucial for sustainability.[66] Current international efforts have shifted focus to an Integrated Landscape Approach (ILA), which integrates conservation, development, climate change, and human well-being.[67] This approach is characterized by its social and idealistic foundations, emphasizing the importance of the journey towards sustainability itself.[68]

Integrated landscape approaches (ILA) aim to reconcile multiple, often competing, interests across agriculture, nature conservation, and other land uses.[69] Integrated landscape approaches (ILAs) are governance approaches that are meant to deal with the interconnected social and ecological problems caused by climate and biodiversity crises, land, water, and food access conflicts, and different types of land management and livelihoods.[70] These strategies call for integrated solutions on a landscape scale to deal with these complicated problems in the best way possible.[71]

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[62] Ibid.
[63] Ibid.
[64] Ibid.
[65] Pedroza-Arceo NM and others, 'A Knowledge Review on Integrated Landscape Approaches' (2022) 13 Forests <https://www.mdpi.com/1999-4907/13/2/312> accessed 12 January 2026.
[66] Ibid.
[67] Ibid; see also 'Structuring the Complexity of Integrated Landscape Approaches into Selectable, Scalable, and Measurable Attributes - ScienceDirect' <https://www.sciencedirect.com/science/article/pii/S1462901123001612> accessed 12 January 2026.
[68] Ibid.
[69] Waeber, P.O., Carmenta, R., Carmona, N.E., Garcia, C.A., Falk, T., Fellay, A., Ghazoul, J., Reed, J., Willemen, L., Zhang, W. and Kleinschroth, F., "Structuring the complexity of integrated landscape approaches into selectable, scalable, and measurable attributes." *Environmental Science & Policy* 147 (2023): 67-77.
[70] Zafra-Calvo N and others, 'Engaging with Justice in Integrated Landscape Approaches' (2025) 30 Ecology and Society <https://ecologyandsociety.org/vol30/iss3/art6/> accessed 12 January 2026.
[71] Ibid.

4. Conclusion

It is now well established that if mountain ecosystems are to be safeguarded in a way that maximizes their positive contribution to sustainability, different management strategies may be needed since different mountain areas have different abilities to provide ecosystem services.[72] This has effects on strategies for sustainable development and conservation that take into account local needs and the health of the ecosystem.[73] In order to address the existing data gap, it is essential to enhance partnerships and foster multi-stakeholder participation.[74] This involves engaging the private sector, cooperating with civil society, involving local communities, and acknowledging indigenous and local knowledge systems to create viable options and opportunities.[75]

It is evident that mountain ecosystems not only play a critical role in promoting sustainability an biodiversity conservation but also as a source of livelihood and economic development for the communities living near and far from them. It is thus important for stakeholders to take urgent steps to address the challenges facing their conservation for the sake of current and future generations.

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[72] Grêt-Regamey, A., Brunner, S.H. and Kienast, F., "Mountain Ecosystem Services: Who Cares?" *op. cit.*
[73] Ibid.
[74] Dhyani S and others, 'Ecosystem Health and Risk Assessments for High Conservation Value Mountain Ecosystems of South Asia: A Necessity to Guide Conservation Policies' (2022) 1 Anthr Sci 211 <https://link.springer.com/10.1007/s44177-022-00010-8> accessed 8 January 2026.
[75] Ibid.

'Structuring the Complexity of Integrated Landscape Approaches into Selectable, Scalable, and Measurable Attributes - ScienceDirect' <https://www.sciencedirect.com/science/article/pii/S1462901123001612> accessed 12 January 2026.

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