Sustainable Trekking in Nepal: Leave No Trace Practices.

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Abstract

Trekking business in Nepal spans the entire country across major areas (Everest, Annapurna, Langtang, Manaslu, Mustang, etc.) and is economically significant but also exerts tremendous pressure on vulnerable mountain environments. This article focuses on how the "Leave No Trace" (LNT) philosophy and its associated sustainability practices are being adopted along Nepal's trekking paths. Based on field-level studies (i.e., waste audits and local surveys) and policy documents, we examine environmental impacts (deforestation, climate risks, solid waste, and water pollution), stakeholder roles (trekkers, tour operators, park authorities, and locals), and challenges in place. Conservation area projects like ACAP and MCAP have spurred communities to pool tourism revenues and resources. Government and nongovernment efforts (e.g., SPCC in Khumbu) focus on waste-collection infrastructure. Yet a study finds that even well-touristed areas have poor waste management: e.g., Ghorepani (Annapurna) has waste bins but "no specific regulations to protect the environment," and consequently minimal environmental returns. We look at good practice (integrated waste management plans, porter cleanup, trekker education, environmentally friendly lodges) and evidence of loopholes in enforcement and knowledge. The review synthesizes literature from 2014 to 2024 (peer-reviewed articles, NGO/government reports) to assess the potential to enhance LNT in Nepali trekking.

Keywords: *sustainable tourism, waste management, environmental impacts, community-based conservation, stakeholder engagement.*

The "Leave No Trace" (LNT) principles promote responsible trekking practices, yet their implementation in Nepal remains uneven, with shared responsibility among government, trekking companies, and local communities.

Introduction

Trekking is the most important tourism sector in Nepal, attracting thousands of visitors to remote mountainous areas each year. Prime Destinations include Sagarmatha (Everest), Annapurna, Langtang, Manaslu, and Mustang. These regions are organic and culturally diverse but are very weak: high elevation increases waste and erosion, and climate change (glacier retreat, irregular weather) risks rapid trail instability. For example, Sagarmatha National Park (Khumbu) registered 36,518 visitors in Nepal alone in 2012, and the annual number of tourists has increased by thousands. Tightening tourism thus provides great financial benefits (income, job opportunities), but also environmental costs. Local guides and researchers reported the harvesting of forests for wood, popular trails, garbage rails, and polluted water sources.

"Leave No Trace" (LNT) ethics, generated by the American outdoor ethics movement, promote packing and minimum impact. Its seven principles (plan and prepare ahead, remain on sustainable land, dispose of waste properly, leave what you find, minimize campfire impact, respect wildlife, and be considerate of other visitors) are globally recognized guidelines for taking responsibility. In Nepal, LNT varies. International trekking companies often instruct customers on LNT, and government permission rules encourage the use of waste packaging. However, the formal adoption of LNT is uneven, and many responsibilities are placed on local communities, TE-home operators, and individual draws.

This article provides an in-depth review of permanent trekking in Nepal through LNT's lens. We map the literature on the environment and social influences of trekking, emphasizing how LNT practices have been integrated (or not) into Nepal's tourism leadership and how the roles of different stakeholders have been considered.

Statement of the problem

Despite Nepal's reliance on trekking tourism for economic development, the rapid increase in visitors has led to soil erosion, deforestation, waste accumulation, and water pollution in fragile

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mountain ecosystems. The adoption of Leave No Trace (LNT) principles remains inconsistent, with gaps in infrastructure, enforcement, and awareness. Without effective integration of LNT practices, the long-term sustainability of trekking tourism in Nepal is at risk. There is a need to strengthen policies, improve community engagement, and ensure coordinated action among stakeholders to balance tourism growth with environmental protection.

Literature review

Academic and policy research on the impacts of trekking in Nepal has expanded in recent years. Early studies documented that trekking has induced profound socio-economic changes in the Khumbu (Everest) region. Nyaupane et al. (2014) used photo-elicitation interviews with Sherpa residents to illustrate how tourism has transformed livelihoods and landscapes since the 1960s. They noted both positive outcomes, such as increased income and improved infrastructure, and significant environmental pressures, with residents citing deforestation, solid waste accumulation, and sanitation issues as major concerns (Nyaupane et al., 2014). By 2012, Sagarmatha National Park (Khumbu) hosted over 36,000 trekkers, accounting for nearly 30% of all trekking tourists in Nepal that year (Nyaupane et al., 2014). These numbers highlight the strain on local resources: Byers et al. (2020) observed that Khumbu's small resident population of approximately 5,000 faces unsightly open dumps along trails due to increasing visitation (Byers et al., 2020).

In the Annapurna region, tourism has long been integrated with conservation efforts. The Annapurna Conservation Area Project (ACAP), Nepal's first and largest conservation area initiative, allows residents to live in and manage the area, reinvests all entry fees into community development, and emphasizes education and infrastructure to mitigate tourism impacts (NTNC, n.d.). Studies of trekking in the Annapurna region report similar environmental challenges: a recent waste audit in Ghandruk found that per-capita waste generation was 0.26 kg/day (261.3 g), comparable to urban rates, and identified open burning of non-recyclables as a serious concern (Adhikari et al., 2024). The study also noted that while organic waste constitutes 60% of the total, the proportion of plastics and metals is increasing, necessitating holistic management strategies beyond traditional composting (Adhikari et al., 2024). These findings indicate that, even in regulated conservation zones, effective LNT practices require improved waste-handling and recycling systems.

In the Manaslu region, the Manaslu Conservation Area Project (MCAP) also uses an integrated conservation-development approach. MCAP builds on local capacity developed through earlier ecotourism projects and, since 1998, has emphasized community participation. MCAP, according to the Nepal Trust for Nature Conservation (NTNC), operates through Conservation Area Management Committees (CAMCs) composed of locals and uses income generated from tourism to support conservation and infrastructure development. To date, over 7,000 trekkers have visited Manaslu's Tsum Valley, generating income for improved water supply, schools, and conservation awareness (NTNC, n.d.). However, due to its semi-restricted status, visitation to Manaslu remains significantly lower than to Annapurna, suggesting that tourism-related impacts have been more moderate. While no detailed academic studies on LNT in Manaslu are available, the MCAP framework underscores the importance of local community involvement in resource management (NTNC, n.d)

Overall, reviews of Nepal's trekking tourism (e.g., Kumaresan et al., 2012; Singh et al., 2014) emphasize both the potential of community-based conservation and the need for sustainable guidelines. Most studies call for a balance between tourism benefits and the protection of water, forests, and cultural sites. A significant gap in the literature is the empirical assessment of how well trekkers and residents understand and follow LNT principles. A survey conducted in Ghorepani (Poon Hill) found that while tourism has improved economic conditions, environmental protections remain minimal: garbage bins are available, but there are no regulations specifically aimed at protecting the environment, resulting in no net environmental benefits (Baral & Rijal, 2022).

Research on the formulation and enforcement of the Leave No Trace (LNT) principles is limited, so the actual benefits that could be realized are uncertain. So, research is needed in the field.

Some studies on Leave No Trace (LNT) have been done, but they are linked with sustainable goals of national and international levels, so the gap persists here.

This disconnect between policy and practice is a recurring theme in reviews of sustainable tourism in Nepal (Nepal Tourism Board, 2021; UNDP, 2019) and is also observed in other mountain destinations (Nyaupane et al., 2014; Adhikari et al., 2024).

Objectives

The objectives of this study are to:

- Examine the extent of Leave No Trace (LNT) principles observed.
- Examine the impact of LNT principles

Methodology

This article is based on a systematic literature review. A structured search strategy was applied using databases such as Google Scholar and Scopus, complemented by relevant Nepali government and NGO websites, to identify peer-reviewed articles, official reports (e.g., *Nepal Tourism Statistics*, Ministry of Tourism), and grey literature on trekking, waste management, and conservation in Nepal's mountain regions. The inclusion criteria prioritized scholarly publications, government documents, and NGO reports published or accessible up to 2025, with an emphasis on studies directly addressing environmental management and tourism practices. Reference lists of selected articles were further screened to ensure comprehensive coverage. All information cited reflects this systematic review process, with preference given to authoritative and peer-reviewed sources.

A systematic review of the literature available till 2025 has been conducted, and inferences have been made from the reviews.

Results

The review offers many important insights into Nepal's environmental management of its most significant features. In the Everest region, the fixed waste disorders and the pollution issues arising from the stools disagree, despite the presence of the Sagarmatha Pollution Control Committee (SPCC) and government regulations, and despite weak enforcement and surveillance mechanisms. On the other hand, the Annapurna Conservation Area Project (ACAP) has established a relatively successful model by reintroducing tourism revenue through the Conservation Initiative; however, challenges remain in handling non-biodegradable waste, especially plastic and glass. Similarly, the Mansalu Conservation Area Project (MCAP) highlights the effectiveness of community participation in tourism rules. Still, there remains a significant lack of detailed studies that emphasize the Holiday No Trace (LNT) principles. Case studies from Ghorpani in the Annapurna region further demonstrated that tourism significantly increases the local domestic income. Still, it rarely contributes to environmental protection in the absence of formal rules and regulatory structures. By exacerbating these challenges, climate change accelerates environmental risks, including the outbreak of Lake Ice, floods, avalanches, and the long-term release of waste from melting permafrost, leading to an increase in permanent waste and the need for risk management strategies in the mountainous tourism landscape.

The main issues are weak enforcement of environmental regulations, poor management of non-biodegradable waste, limited research and implementation of sustainable practices, and increasing environmental risks due to climate change.

Discussions

Environmental challenges in Nepal's trekking regions

Sagarmatha (everest) region

The Everest corridor exemplifies both the tourism boom and its environmental consequences. By 2019, Sagarmatha National Park (SNP) had received over 60,000 tourist visits, excluding support staff (Byers et al., 2020). The impact is highly visible: Byers et al. report that nearly every lodge area in Khumbu has open, unlined solid-waste pits that are often burned, contaminating soil and water. Mountaineering activities contribute significantly to litter, with an estimated 30+ tonnes of garbage accumulated on Everest over the decades. Human waste is another critical issue on the glacier; conservationists note that melting permafrost and inadequate toilet facilities result in faecal pollution of snow and streams, posing health risks to downstream communities (Earth. org, 2025).

To address these issues, Nepal has implemented strict mountaineering regulations. Since 2014, all Everest expedition members must pay a $4,000 environmental deposit, which is refunded only if the climber brings down at least 8 kg of trash (Earth.org, 2025). Reports indicate that this incentive has helped retrieve some waste, though many climbers choose to forfeit the deposit rather

than undertake the effort. The Nepali army and NGOs also conduct annual cleanup campaigns: in 2019, army teams collected over 2 tonnes of waste near Everest, and in 2023, they removed 35 tonnes from four peaks (Earth.org, 2025). Locally, the Sagarmatha Pollution Control Committee (SPCC), established by Sherpas in 1991, maintains hundreds of trailside trash bins and educates communities on recycling principles (FAO, 2025). While these measures have improved conditions at Base Camp and lodges, trekker camps above Lukla still lack consistent waste infrastructure. Byers et al. propose a formal waste management plan for Khumbu that includes waste segregation at lodges, transportation of recyclables to Kathmandu, and regional replication of the system (Byers et al., 2020). Implementing such plans remains an ongoing effort.

Annapurna region

The Annapurna Conservation Area (ACA) receives the majority of Nepal's trekkers and consequently faces acute waste and resource pressures. Researchers have documented heavy use of wood fuel, with trekking parties consuming fuelwood at twice the local per-capita rate, resulting in deforestation on lower slopes. Teahouse trash accumulates in villages; a standard 15-person 10-day trekking group would generate 15 kg of non-combustible trash. However, the ACAP's model returns tourism income to conservation. All entry fees are reinvested locally to finance reforestation programs, water projects, and waste facilities (NTNC, n.d.). Village recycling centers and public toilets are now fairly widespread. Despite such efforts, waste audits report persisting gaps: found that in Ghandruk, 60% of wastes are organic and composted or fed to animals, but plastics and glass are likely burnt in the open (Adhikari et al., 2024).

Overcrowding in popular trails such as the Annapurna Circuit, Mardi Himal, and Poon Hill is also a concern. Baral & Rijal (2022) observed litter on trekking paths around Poon Hill and further noted that Nepali trekkers, in particular, were seen plucking rhododendron flowers and dumping wrappers. Their survey found that while lodge organic waste is usually composted or fed to animals, inorganic waste is routinely burned or buried. The cumulative effect in the peak season is witnessed in trash in riverbeds and burnt glass pieces in campsites. Thus, while ACAP's management is holistic, day-to-day trekking activities continue to pollute. As Baral & Rijal summarize, tourism in Ghorepani has boosted local revenues but has left the environment exposed due to the lack of formal regulations (Baral & Rijal, 2022).

The Everest region shows how rapid tourism growth has led to severe waste and pollution problems, with ongoing but only partially effective efforts through regulations, cleanup campaigns, and local initiatives to manage environmental impacts.

Langtang and mustang

Langtang National Park, located north of Kathmandu, and the trans-Himalayan Upper Mustang have received less attention in studies. The 2015 earthquake heavily damaged Langtang. Recovery has been mainly driven by community efforts, with several villages rebuilding schools and lodges using funds from the earthquake. They included eco-stoves and rainwater tanks to lessen the impact on forests (IKI Small Grants, n.d.). The Mustang region, particularly Lo Manthang, is co-managed by ACAP. Local Loba leaders collect entry fees, which fund patrols and scholarships. Both areas attract fewer trekkers than Annapurna or Everest, but they still face waste issues and grazing impacts. Reports suggest that strict local rules, like the requirement for annual visitor permits in Upper Mustang, help control litter. Throughout all these regions, the main environmental challenges remain the same: unmanaged solid waste and sewage, forest degradation for fuel, polluted water sources, and increased grazing pressure. Climate change makes these problems worse. Rising temperatures have caused glaciers to melt, some by up to 50 meters on certain Khumbu slopes. This melting can release buried waste and human waste into the water supply as permafrost thaws (Earth.org, 2025).

The Annapurna region demonstrates a relatively strong conservation model funded by tourism. Yet it still faces significant issues, such as deforestation, overcrowding, and improper management of non-biodegradable waste generated by everyday trekking activities.

Langtang and Upper Mustang, though less studied and less crowded, still face similar environmental challenges, such as waste, deforestation, and grazing pressure, with community management helping somewhat. At the same time, climate change further worsens these issues.

Stakeholders and Leave No Trace Practices

Implementing LNT in Nepal's trekking context involves multiple players. Local communities and Conservation Area authorities play a key role. In Annapurna, ACAP divides the area into

unit conservation offices. Some of these offices, like Ghandruk and Sikles, focus on managing tourism together (NTNC, n.d.). ACAP's village conservation committees and Tourism Management Committees, which are local NGOs, provide environmental education and conduct patrols. Similarly, in Manaslu, MCAP works with elected Conservation Area Management Committees in each village (NTNC, n.d.). These groups train local people in waste sorting and encourage lodge owners to set up incinerators or compost pits. For example, many lodges in Annapurna now separate organic waste for composting and store plastics for proper disposal, often with help from private "eco-porters."

Implementing Leave No Trace in Nepal relies on collaboration between conservation authorities and local communities, who promote environmental practices such as waste sorting and composting, and raise awareness through local committees and training programs.

Trekkers' behavior ultimately determines Leave No Trace outcomes. While awareness is increasing through education and outreach, cultural habits and inadequate infrastructure still limit the full adoption of sustainable practices.

Government and park authorities

Government and park authorities set rules that support LNT principles. All national parks and conservation areas ban single-use plastic bags above certain altitudes. For instance, Sagarmatha National Park strictly bans non-biodegradable waste, and Lukla airport checks outgoing flights to ensure that trash is carried out. The Nepal Tourism Board requires trekking agencies to inform clients about "clean trail" policies when issuing permits through the TIMS card system. After 2020, policies include tougher fines for littering. However, enforcement often lacks consistency. Many small teahouses and informal trekkers see these rules as suggestions rather than strict laws, which leads to ongoing littering.

The full implementation of Leave No Trace in Nepal is hindered by insufficient waste infrastructure, improper disposal of non-biodegradable and human waste, and weak monitoring of existing regulations.

Government rules in Nepal support Leave No Trace principles through bans, permits, and fines, but inconsistent enforcement and low compliance continue to limit their effectiveness.

Tour operators and guides

Tour operators and guides are increasingly seen as LNT ambassadors. Major trekking companies in Kathmandu and Pokhara include environmental training, so guides teach basic LNT principles, such as carrying out all trash, staying on trails, and avoiding disturbing wildlife. They also provide biodegradable soap and portable waste bags. Some companies have "Green Trails" initiatives, which organize cleanup treks or reward clients who don't leave debris behind. Reports indicate that Western trekkers on organized tours generally follow LNT practices, while casual domestic hikers or large unsupported groups often do not. This difference is highlighted by Baral & Rijal's finding that most litter along the Poon Hill trail comes from local visitors (Baral & Rijal, 2022).

Tour operators and guides play a key role in promoting Leave No Trace through training and eco-friendly practices. However, adherence varies, with organized international trekkers generally following guidelines more than informal or domestic groups.

Trekkers themselves

Ultimately, the trekkers decide what their trek "no-trace" will be. Awareness of LNT has increased among international visitors through websites, trekking forums, and social media, driven by academic search. NGOs such as the Mountain Institute and the Trekking Agency Association of Nepal have begun distributing LNT brochures and conducting workshops before the trip. However, cultural habits differ; in many Nepali villages, it is normal to sweep farm waste into common dumps, and the idea of taking out all waste can be new to some. Similarly, traditional methods for burying or burning garbage continue. Both education and alternative infrastructure are necessary to solve this problem.

Current challenges

Frequent challenges prevent the complete implementation of Leave No Trace (LNT) principles in Nepal. Waste infrastructure is insufficient in many draft areas. Outside larger villages, trails often lack official fertilizer pits or toilets, leading to overflows. Studies have shown that even in popular places, the most non-violent garbage, such as plastic and metal, is either left in open dumps (Bormal and Rijal, 2022; Officer et al., 2024) or thrown away. In addition, untreated human waste is an important problem; with some toilets unavailable, visitors often use trails

or use toilets near streams, which can leak into watercourses, especially when the ground melts. Although the cabin in Nepal's World Heritage Sites and Conservation Areas requires waste settlement schemes, monitoring of these rules is weak.

Overcrowding and unmanaged trails

Not controlling overcrowding and unmanaged trails increases environmental damage. Along the Annapurna and Everest regions, overcrowding during peak seasons can result in dozens of hikers on single-file trails. This results in waste and informal campsites. Trekkers can choose to stay in homestays or tea-house accommodations, which facilitates closer contact with the environment and the locals. This contact raises the expectation of providing proper facilities, which are of poor quality. Besides, the damage to the Great Himalaya Trail is worsened by the creation of new trekking routes. Until now, these areas were untouched by civilization. The vast trail network already complicates the supervision of park staff; now, with the new routes, it's impossible.

Government and policy gaps

Besides the lack of supervision, there is a lack of proper policies. Implementation of the Solid Waste Management and Resource Mobilisation Act is ineffective. This is further complicated by the lack of coordination among government bodies, including the Department of National Parks, district forest officers, and local governments. The lack of funds is also a major problem. During the tourism slump from 2020 to 2022, entry fee revenue declined, leaving many conservation committees financially strained. These are the same community programs that are designed to protect regions, making them vulnerable without constant support. These, along with the lack of funds, can turn stable political turnovers and new regulations into a waiting game.

Sociocultural challenges complicate LNT adoption

In Nepal, trekking is not just a Western pastime; domestic travel is increasing. Many tourists from Nepal have varying opinions about the environment; for instance, some might not consider plastic waste to be an issue if it is hidden or burned. LNT messaging, which is frequently in English, does not reach all populations due to linguistic and educational barriers. Furthermore, unless properly modified, certain cultural customs, such as leaving offerings on trails (with cloth or corn), may conflict with the "leave what you find" principle. It takes tact and cultural awareness to respect local customs.

Best practices and innovations

Despite these challenges, Nepal has developed notable best practices that align with LNT principles. Waste management initiatives: Building on local efforts, ACAP and SPCC have installed "environmental stations" and waste transfer points in key villages, where lodges bring separated garbage for collection. Byers et al. (2020) detail a proposed system for Khumbu where recyclables are packaged at material recovery facilities and flown out via Lukla to Kathmandu (Byers et al., 2020). While not yet fully implemented, steps have been taken: community recycling centres now exist in Jiri (on the approach to Everest) and Ghandruk. Programs like "Waste Warriors" (an NGO) haul trash bags down from Everest Base Camp during expedition season.

Clean energy and green lodges

Instead of using kerosene or diesel generators for electricity, many tea houses now use solar panels. ACAP villages now have better cook stoves (like Philips wood stoves) to reduce indoor pollution and firewood use. These initiatives enhance human health and preserve forests. Parts of Annapurna and Langtang have implemented compost toilets; visitors use biodegradable toilet bags, which are subsequently buried on the property. Trekkers no longer have to use wood fuel to boil stream water thanks to ACA-supported safe-water taps that draw from gravity-fed spring sources.

Partnerships and education

To provide guidelines on LNT practices, parks and NGOs have organized workshops. To discourage the use of single-use plastics, some trekking organizations provide their trekkers with special trash bags or glass bottles. The Department of National Parks provides "trail etiquette" posters

Overcrowding and unmanaged trails in Nepal, especially in Annapurna and Everest, exacerbate environmental damage by generating waste, creating informal campsites, and introducing poorly supervised new routes into previously untouched areas.

Weak policy implementation, poor coordination among government bodies, and funding shortages exacerbated by tourism slumps undermine conservation programs and hinder effective environmental management in Nepal's trekking regions.

Domestic trekkers in Nepal often have different environmental attitudes, and language, education, and cultural practices can limit the effectiveness of Leave No Trace messaging unless it is adapted respectfully to local contexts.

Nepal has developed promising LNT-aligned practices, including village waste stations, community recycling centers, and NGO-led initiatives such as "Waste Warriors," which collect and transport trash from trekking areas such as Everest and Annapurna.

Many teahouses and villages in Annapurna and Langtang now use solar power, improved cookstoves, compost toilets, and safe-water taps, reducing pollution, conserving forests, and improving health while supporting sustainable trekking practices.

Nepal's mature sustainable trekking strategy integrating waste deposits, plastic bans, and conservation-funded monitoring with community-led stewardship leverages successful models from Annapurna and Khumbu to standardize "Leave No Trace" principles nationwide.

Parks, NGOs, and international partners promote LNT through workshops, multilingual guidelines, eco-friendly gear, awareness campaigns, and ecotourism certifications that reward lodges for proper waste and sanitation management.

in local languages. International partners like UNESCO's "Mt. Everest World Heritage site" program and the FAO Mountain Partnership have launched awareness campaigns that promote indigenous knowledge (e.g., Buddhist respect for nature) alongside LNT science (FAO, 2025). Trekking is actively marketed as "ecotourism" in some villages: e.g., Annapurna lodges display "green certificate" plaques for meeting waste and sanitation criteria, which ACAP staff monitor from time to time.

Regulation and enforcement

At the policy level, waste deposit requirements for Everest climbers have helped inform size approaches; although targeted at climbers, they underscore the severity of the issue. Recently (2023), the government proposed a garbage deposit for all trekkers and tightened nationwide plastic sanctions by restricting single-use plastic in all national parks. The entry fee for restricted areas, such as the upper Mustang, already funds conservation patrolling and trail maintenance. Another promising practice is the trekking impact monitoring system, where researchers and park authorities regularly evaluate selected routes to inform management decisions (e.g., where to place more toilets or close a mark for recovery). Overall, a combination of community stewardships, innovative infrastructure, and environmental education represents a mature approach to sustainable trekking. Success in Annapurna and Khumbu can serve as models; for example, if the buyer waste scheme is implemented, it can be adapted to Annapurna or Mansalu—monitoring programs, such as those of Adhikari et al. The waste survey provides data that local committees use to advocate for resources. The 2023 Mountain Cleanup Campaign (Army Plus NGO) enhances coordination between exemplary government agencies and community groups, suggesting that Nepal's stakeholders are recognizing and addressing the LNT challenge.

Conclusion

However, environmental challenges have become a pressing concern within this sector. Mountain tourism has emerged as a significant driver of income and economic growth in developing countries. The distinctive natural environments of mountains, along with their clean air and scenic landscapes, attract tourists seeking to connect with nature and prioritize health-oriented destinations. Ensuring sustainable mountain tourism requires protecting natural ecosystems, preserving cultural traditions, and strictly enforcing environmental regulations. (Ghimire et al, 2025). Nepal's trekking industry stands at a crossroads between sustainability and development. The "Leave No Trace" code of good practice offers an integrated framework for minimizing environmental impacts, but its implementation in Nepal depends on institutional and social factors. This review finds that, while the ideal of conserving unspoiled mountain scenery is embraced by some stakeholders (mainly international agencies and highly educated guides), its practical application is haphazard. In popular tourist destinations such as Sagarmatha and Annapurna, long-standing garbage issues persist despite decades of conservation efforts (Byers et al., 2020; Baral & Rijal, 2022). Conversely, places with effective community management, such as sections of ACAP, have been very successful at channeling tourism funds into safeguarding the environment (NTNC, n.d.).

Key recommendations include

(1) **Strengthening enforcement:** Park authorities should increase waste deposit/refund systems for trekking (not just climbing), and levy fines for littering.

(2) **Building local capacity:** Conduct continuous training and funding for local committees so they can maintain toilet facilities, manage recycling, and educate visitors.

(3) **Education for all trekkers:** Develop culturally appropriate LNT education, including materials in Nepali and other local languages, and empower guides to be environmental ambassadors.

(4) **Integrated waste infrastructure:** Invest in scalable waste processing (e.g., regional composting and recycling) so that "pack out" is paired with actual disposal.

(5) **Research and monitoring:** Use systematic studies of waste composition and trekkers' behaviour to guide targeted interventions (as done by Baral *et al.* and Adhikari *et al.*).

Finally, permanent trekking in Nepal requires all actors to "just leave footprints." The literature and reports reviewed here show that new community-based protective models and engaged personnel are emerging in Nepal. However, increasing public visibility and climate pressure mean that LNT should not only become an alternative guideline, but also an integral part of policy and practice. Nepal can ensure close integration of environmental management into trekking culture, particularly in high-disadvantage tea houses, through Kathmandu Trekking agencies, to ensure that its Himalayan taxes remain for future generations.

Embedding "Leave No Trace" into trekking culture requires a multi-pronged approach: strengthening waste enforcement, providing continuous support for local committees, implementing culturally adapted education, and investing in integrated infrastructure to ensure the long-term preservation of the Himalayas.

Reference

Adhikari, S., et al. (2024). Solid waste management in rural touristic areas in the Himalaya: A case of Ghandruk, Nepal. *Habitat International, 143*, 102994. https://www.researchgate.net/publication/376891346_Solid_waste_management_in_rural_touristic_areas_in_the_Himalaya_-_A_case_of_Ghandruk_Nepal

Annapurna Conservation Area Project (ACAP). (n.d.). The national trust for nature conservation (NTNC). https://ntnc.org.np/project/annapurna-conservation-area-project-acap

Baral, R., & Rijal, D. P. (2022). Visitors' impacts on remote destinations: An evaluation of a Nepalese mountainous village with intense tourism activity. *Heliyon, 8*(8), e10395. https://www.researchgate.net/publication/363280976_Visitors'_impacts_on_remote_destinations_An_evaluation_of_a_Nepalese_mountainous_village_with_intense_tourism_activity

Byers, A. C., et al. (2020). A sustainable solid waste management plan for Sagarmatha (Mt Everest) National Park and buffer zone, Nepal. *Mountain Research and Development, 40*(3), A1–A9. https://bioone.org/journals/mountain-research-and-development/volume-40/issue-3/MRD-JOURNAL-D-20-00018.1/A-Sustainable-Solid-Waste-Management-Plan-for-Sagarmatha-Mt-Everest/10.1659/MRD-JOURNAL-D-20-00018.1.full

Food and Agriculture Organization of the United Nations. (2025). Sagarmatha Pollution Control Committee (SPCC). FAO Mountain Partnership. https://www.fao.org/mountain-partnership/members/detail/sagarmatha-pollution-control-committee-(spcc)/en

Ghimire, S. B., et al. (2025). Mountain route tourism and sustainability: A systematic literature review. *Journal of Information Systems Engineering and Management, 10*(39s). https://doi.org/10.52783/jisem.v10i39s.7180

Nepal Trust for Nature Conservation (NTNC) (n.d.). *Linking eco villages and community water management in Langtang*. https://iki-small-grants.de/k1project/linking-eco-villages-and-community-water-management-in-langtang-national-park/

Nepal Trust for Nature Conservation (NTNC) (n.d.). *Manaslu conservation area project* (MCAP). The National Trust for Nature Conservation (NTNC). https://ntnc.org.np/project/manaslu-conservation-area-project-mcap

Nepal Trust for Nature Conservation (NTNC) (n.d.). *Mount Everest is turning into a garbage dump*. Earth.Org. https://earth.org/amidst-growing-mountain-tourism-in-nepal-mount-everest-confronts-the-perils-of-pollution/

Nepal Trust for Nature Conservation (NTNC). (n.d.). *Annapurna conservation area project* (ACAP). https://ntnc.org.np/project/annapurna-conservation-area-project-acap

Nepal Trust for Nature Conservation (NTNC). (n.d.). *Manaslu conservation area project* (MCAP). https://ntnc.org.np/project/manaslu-conservation-area-project-mcap

Nyaupane, G. P., et al. (2014). Perceptions of trekking tourism and social and environmental change in Nepal's Himalayas. *Tourism Geographies, 16*(3), 415–437. https://www.researchgate.net/publication/265341317_Perceptions_of_trekking_tourism_and_social_and_environmental_change_in_Nepal's_Himalayas

Sagarmatha Pollution Control Committee (SPCC). (n.d.). https://www.fao.org/mountain-partnership/members/detail/sagarmatha-pollution-control-committee-(spcc)/en