

Building Sustainable Tourism in Disaster Affected Regions: A Case Study of the Uttarakhand Himalayas

Priya Bora¹, Dr. Manoj Kumar Pandey²

¹Assistant Professor, School of Tourism and Hotel Management, Uttarakhand Open University, Haldwani (Nainital), India.

²Assistant Professor, School of Tourism and Hotel Management, Uttarakhand Open University, Haldwani (Nainital), India.

Corresponding Author: Priya Bora

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ABSTRACT

The Uttarakhand Himalayas, a seismically active segment of the Indian Himalayan Region, attract large numbers of tourists and pilgrims despite recurring hazards such as landslides, flash floods, earthquakes, and cloudbursts, which repeatedly disrupt infrastructure, livelihoods, and visitor flows. Rapid, often unplanned tourism development, slope modification, and ecological stress have intensified vulnerability, reinforcing the need to link disaster risk reduction with sustainable and resilient tourism planning in the region. The study adopts a descriptive and analytical research design with a mixed-methods approach to examine the intersection of tourism, disasters, and sustainability in the Kumaon Himalaya of Uttarakhand. Primary data were collected through a structured survey tool comprising 15 closed- and open-ended questions administered to 67 tourism stakeholders, including hoteliers, homestay operators, tour operators, and community representatives. Secondary data were sourced from government reports, census statistics, and peer-reviewed literature. Findings indicate a critical gap in disaster preparedness, with 68% of respondents rating preparedness levels of tourism enterprises as poor and only 13% considering

them good. Coordination with authorities is mostly moderate (54%), yet a quarter of respondents perceive it as weak or absent, and 79% report a sharp decline in tourist arrivals following disaster events, alongside 72% experiencing severe impacts on income and employment. Furthermore, 74% of respondents consider existing government policies ineffective in ensuring tourism safety and continuity, highlighting institutional and regulatory shortcomings in hazard-prone areas.

Keywords: *Himalayan Region, Resilience, Tourism, Disaster, Sustainable, Uttarakhand*

INTRODUCTION

This study investigates the vulnerability and resilience of tourism in the disaster-prone Uttarakhand Himalayas, with a focus on the Kumaon region. It examines the susceptibility of tourism activities to both natural and anthropogenic hazards, including landslides, floods, forest fires, and earthquakes. (Jha, 2010), and analyzes their impacts on tourism infrastructure, communities, and visitor flows. Unplanned construction, slope modifications, and ecological stress are shown to amplify disaster consequences. (RAWAT*, The impacts of tourism on the environment of Mussoorie, Garhwal Himalaya, India, 2000

).The Kumaon Himalaya, renowned for its diverse landscapes, cultural heritage, and ecological wealth, is a prominent tourism hub within the Indian Himalayan Region (IHR). However, fragile geological conditions, young mountainous terrain, and anthropogenic pressures, such as unplanned infrastructure development, render it highly vulnerable to earthquakes, landslides, flash floods, and cloudbursts. (Krishna Mallick, 2013). These hazards not only disrupt tourism activities but also undermine the socio-economic stability of local communities.

To address these challenges, the study evaluates government policies and institutional mechanisms, including disaster management guidelines and tourism development plans. (Ministry of Tourism, 2020-2021), to assess their role in fostering resilient tourism. By integrating three core dimensions, tourism vulnerability, disaster impacts, and policy interventions, the research proposes strategies for sustainable tourism development that enhance community preparedness, adaptive livelihoods, and ecological sustainability in the fragile Himalayan ecosystem.

The region's steep terrain, variable climate, and tectonic activity create persistent risks for infrastructure and residents. Yet, its scenic beauty, cultural richness, and biodiversity continue to draw visitors, making tourism a vital contributor to local economies. Despite this importance, there is a limited understanding of how tourism growth can be harmonized with disaster risk management in fragile mountain environments. Historical events and recurring hazards have revealed critical weaknesses in infrastructure, settlement patterns, and community preparedness, while integrated safety measures remain insufficient. The significance of this study lies in its potential to inform planning and policy frameworks that balance tourism development with hazard mitigation. Using the Kumaon Himalayas as a case study, the research generates insights that can guide resilient tourism practices, strengthen local

capacity, and serve as a model for other disaster-prone mountainous regions.

RESEARCH METHODOLOGY AND AREAS OF STUDY

The research methodology is a mixed-methods approach, combining both quantitative and qualitative data to provide a comprehensive analysis. Primary data were collected through structured questionnaires administered to stakeholders directly involved in the tourism sector, such as hoteliers, homestay operators, trekking service providers, and community representatives. The survey consisted of both closed- and open-ended questions exploring disaster disruptions, their impact on tourism activities, preparedness levels, and the effectiveness of government mechanisms. A total of 67 valid responses were obtained.

Secondary data included official government reports, census data, peer-reviewed literature, and archival records, which allowed for triangulation and contextual depth. Purposive sampling was used to ensure that participants had direct experience with the intersection of tourism and disasters. Quantitative data were analyzed primarily through descriptive statistics, including frequency distributions and visual tools like bar charts and pie diagrams. Qualitative data from open-ended responses were subjected to thematic content analysis to identify recurring themes, stakeholder perceptions, and policy implications. The study was conducted in the Kumaon Himalaya region of Uttarakhand, India, which constitutes a vital segment of the central Himalayan belt. The region has been selected for its distinctive geographical, geological, climatic, and socio-economic characteristics, which simultaneously render it highly disaster-prone and strategically significant for tourism development. Administratively, Uttarakhand is divided into two divisions, Kumaon and Garhwal, of which we have taken the Kumaon Himalayas as the core study area.

THE NEED AND SIGNIFICANCE OF THE STUDY

The Kumaon Himalaya in Uttarakhand represents a unique mountain landscape where tourism potential coexists with high exposure to natural hazards. The region's steep terrain, variable climate and tectonic activity make it susceptible to earthquakes, landslides and flash floods, posing challenges to both residents and infrastructure. At the same time, the area's scenic beauty, cultural richness and biodiversity have positioned it as an emerging center for tourism, which contributes significantly to local livelihoods and regional development. This study is necessary because there is a limited understanding of how tourism development can be harmonized with disaster risk management in fragile mountain environments. Historical events and recurring hazards have revealed vulnerabilities in infrastructure, settlement patterns and community preparedness, yet strategies for integrating tourism growth with safety measures remain insufficient. The study's significance lies in its ability to inform policy-making and planning frameworks that prioritize sustainable tourism while mitigating disaster risks. By exploring the Kumaon Himalaya as a case study, the research aims to generate insights that can support resilient tourism practices, enhance community capacity and serve as a model for other disaster affected mountainous regions.

Objectives

- To examine the vulnerability of tourism activities in disaster-prone regions of the Uttarakhand Himalayas.
- To analyze the impacts of natural disasters (landslides, floods, forest fires, earthquakes) on local tourism infrastructure, communities, and visitor flows.
- To evaluate government policies and institutional mechanisms aimed at promoting resilient tourism in the Himalayas.

LITERATURE REVIEW

The Uttarakhand Himalayas, encompassing both the Garhwal and Kumaon regions, are characterized by their rich cultural heritage, spiritual significance, and ecological diversity.

The Himalayan region, home to a large population, sustains millions through its vital resources, including water, biodiversity, forests, minerals, and hydropower. However, despite its vast natural wealth and global significance as one of the world's largest mountain ranges, it remains one of the poorest regions on the planet. The local communities here are increasingly vulnerable to the combined pressures of climate change, economic and social transitions, dense population, poverty, and worsening environmental decline. (Shivani Chouhan a).

Acknowledging the dangers of unplanned tourism, several organizations and institutions in the region recognized the need to launch sustainable, community-based tourism initiatives that conserve local wildlife and natural resources while providing alternative livelihood options for local people. (Anupam Anand, 2012).

While tourism generates income and livelihood opportunities, the region's fragile geology, steep slopes, and climatic variability make it highly vulnerable to natural disasters, including landslides, floods, cloudbursts, forest fires, and earthquakes. (Jha M. K.).

Disasters in the Himalayas are often exacerbated by human activities, including unplanned infrastructure development, road widening, slope cutting, and tourism-related construction. (RAWAT*, 2000). The catastrophic floods in Kedarnath in 2013 highlighted the complex interactions between extreme rainfall, glacial outbursts, and anthropogenic interventions, resulting in extensive damage to infrastructure, settlements, and tourism flows. (Kumar, 2022). Studies further indicate that areas such as Nainital with excessive carrying capacity are highly prone to landslides, which not only will disrupt tourism but also

threaten the livelihoods of local vendors and small commercial establishments dependent on tourist inflow. (RAWAT*, The impacts of tourism on the environment of Mussoorie, Garhwal Himalaya, India, 2000).

A review of Disaster reduction risk policy positions reveals a strong international and Indian drive for localism in bringing greater 'inclusion' and use of 'local knowledge'. Combining indigenous and local knowledge with external expertise is vital for resilience. (Accelerating Change: Engaging Local Communities in Disaster Risk Reduction in the Indian Himalayan Region, 2020). Effective strategies include slope stabilization, early warning systems, controlled development of tourist infrastructure, and the integration of sustainable practices into local tourism planning. (Dr. Satendra, 2014). Furthermore, accelerated glacial melting and formation of unstable glacial lakes have increased the probability of glacial lake outburst floods (GLOFs), highlighting the urgency of monitoring and preparedness in high-altitude areas. (Georg Veh, 2019).

Overall, existing studies underscore the dual role of tourism in the Uttarakhand Himalayas: while it contributes to economic growth and livelihood generation, it also interacts with ecological fragility, thereby increasing disaster vulnerability. This literature reinforces the need for integrating resilient tourism strategies, disaster risk reduction frameworks, and sustainable infrastructure planning to safeguard both the natural environment and tourism-dependent communities in the region.

METHODOLOGY

This study employs a descriptive and analytical research design to investigate the intersection of disaster vulnerability and sustainable tourism practices in the Uttarakhand Himalayas. A mixed-methods approach was adopted, combining quantitative survey data with qualitative insights to ensure methodological rigor and a holistic understanding of the phenomenon under investigation.

Ethical approval statement

According to the research ethics policy of Uttarakhand Open University for low-risk social science survey studies, formal institutional ethics approval is not required for anonymous surveys of adult participants that do not collect sensitive personal data or involve vulnerable groups. In line with this policy, no formal ethics committee approval was sought. The study nonetheless followed national and international guidelines for research involving human participants and respected principles of autonomy, beneficence, and confidentiality.

Informed consent

The survey targeted adult tourism stakeholders (aged 18 years and above) in the Uttarakhand Himalayas, and no data were collected from minors. An introductory statement on the questionnaire described the aims of the research, the voluntary nature of participation, the approximate time required, confidentiality of responses, and that data would be used only for academic purposes; completion and return/submission of the questionnaire were taken as implied informed consent.

Data Collection Procedures

Primary data were collected through the administration of a structured questionnaire designed in alignment with the study objectives. The instrument comprised 15 close- and open-ended items aimed at eliciting responses on the frequency of disaster disruptions, the nature and extent of their impacts on tourism activities, preparedness levels among tourism enterprises, and the efficacy of government mechanisms. A total of 67 valid responses were obtained from stakeholders, including hoteliers, homestay operators, trekking service providers, and community representatives.

Secondary data were derived from official government reports, census statistics, peer-reviewed literature, and archival disaster records, thereby enabling the triangulation of

findings and providing contextual depth to the analysis.

Sampling Strategy

Given the specificity of the study, purposive sampling was employed to identify respondents directly engaged in the tourism sector and significantly affected by disaster events. This strategy ensured the inclusion of informed perspectives from individuals and organizations with practical exposure to disaster-tourism interactions across different districts of the study area.

Data Analysis

The survey responses were subjected to descriptive statistical analysis, with results presented through frequency distributions, bar charts to highlight dominant trends. Qualitative data, particularly open-ended responses concerning resilience measures and sustainability strategies, were analyzed

using thematic content analysis, thereby identifying recurring themes, stakeholder perceptions, and emergent policy implications.

ANALYSIS OF FINDINGS

[1] Disaster Preparedness

The disaster preparedness survey highlights a critical gap among tourism stakeholders in the Uttarakhand Himalayas. A substantial 68% of respondents indicated that preparedness levels of businesses such as hotels, homestays, and trekking operators are poor, while only 19% rated them as moderate and 13% as good. This overwhelming perception of inadequate readiness reflects limited access to training, emergency planning, and resilient infrastructure. The lack of systematic preparedness places both visitors and local communities at heightened risk during disaster events.

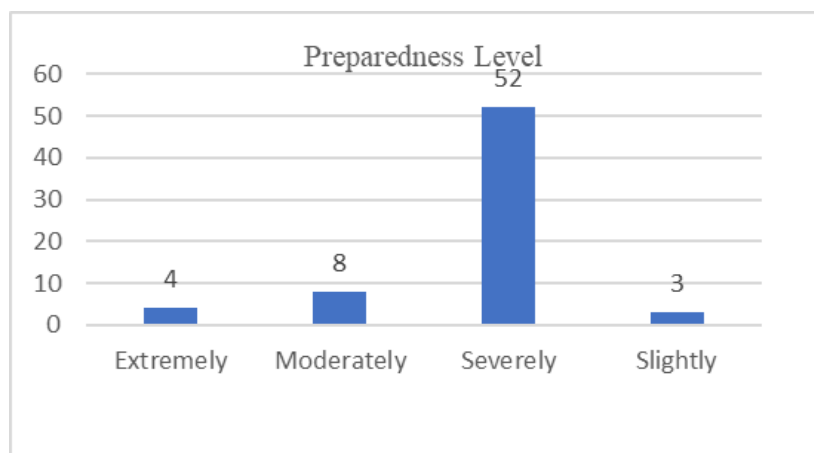


Figure 1: Preparedness Levels of Tourism Stakeholders

[2] Coordination with Authorities

Findings on coordination between tourism operators and local authorities reveal a mixed picture. Approximately 54% of respondents reported that coordination is moderate, suggesting that some level of collaboration exists but remains insufficient for comprehensive disaster management. Only

21% perceived coordination as strong, whereas 25% described it as weak or absent. These outcomes indicate that institutional mechanisms are not fully aligned, thereby delaying disaster response and recovery. Strengthening stakeholder networks and institutional linkages thus emerges as a priority.

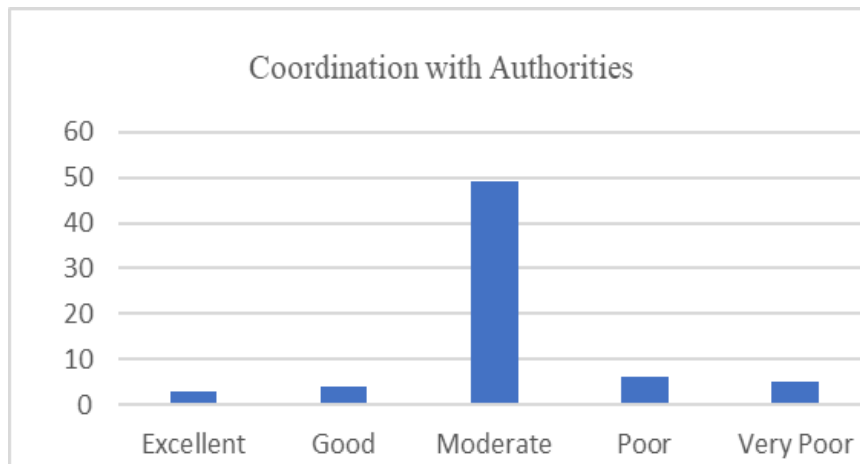


Figure 2: Coordination Between Tourism Operators and Local Authorities

[3] Impact on Livelihoods

Tourism-dependent livelihoods have been disproportionately disrupted by recurring natural disasters. An overwhelming 72% of respondents stated that their income and employment were severely affected following disaster events, with an additional 18% reporting moderate impacts. Only 10%

claimed minimal disruption, reflecting the acute vulnerability of households relying on seasonal tourism. These results confirm the heavy dependence of mountain communities on tourism revenues, underscoring the urgent need for livelihood diversification and safety-net programs.

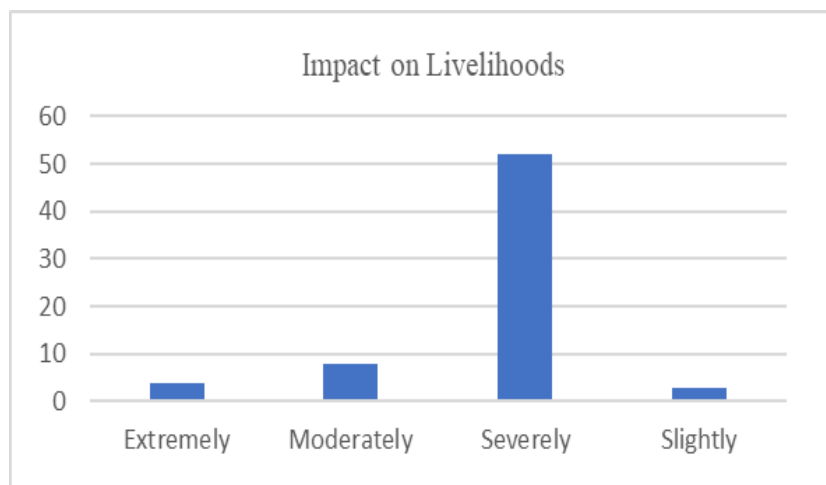


Figure 3: Impact of Disasters on Tourism Livelihood

[4] Decline in Tourist Arrivals

The effect of disasters on tourist flows is particularly pronounced. A significant 79% of respondents confirmed that they observed a sharp decline in tourist arrivals immediately following disaster events such as landslides, floods, or earthquakes. Another

15% noted a moderate decline, while only 6% perceived little or no impact. These findings illustrate the fragility of visitor confidence in the region, where perceptions of safety play a crucial role in shaping tourism demand.

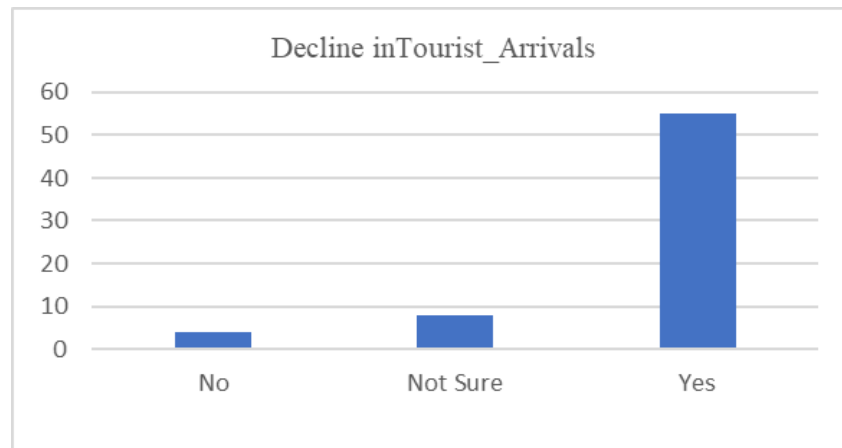


Figure 4: Decline in Tourist Arrivals Following Disasters

[5] Effectiveness of Government Policies

Perceptions of government policies and institutional mechanisms were largely unfavorable. Nearly 74% of respondents rated existing policies as ineffective in ensuring tourism safety and continuity during disaster events. A smaller proportion (17%) considered them moderately effective, while only 9% viewed them as effective. The widespread dissatisfaction points toward

structural gaps in policy enforcement, insufficient regulation of construction in hazard-prone areas, and weak implementation of disaster risk reduction initiatives. The findings call for evidence-based policymaking, better enforcement of building codes, and integrated approaches linking tourism development with disaster management.

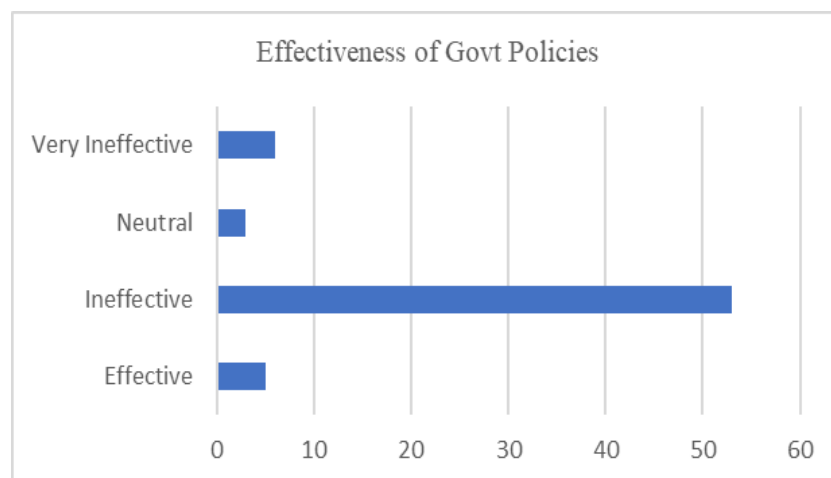


Figure 5: Perceived Effectiveness of Government Policies

Recommendations

- The document proposes several strategies to build sustainable tourism in disaster-affected regions:
- Strengthen disaster-resilient infrastructure and regulate construction in hazard-prone zones with strict enforcement of safety guidelines.
- Institutionalize community-based disaster preparedness programs and regular training for tourism stakeholders.
- Establish effective coordination mechanisms between local authorities and tourism operators.
- Implement transparent and inclusive government policies supported by early warning systems.

- Promote eco-friendly planning and visitor awareness campaigns to enhance resilience.
- Diversify livelihoods and establish safety-net programs for tourism-dependent communities.
- Policies seen as ineffective: About 74% considered government policies ineffective for ensuring tourism safety and continuity, with very few respondents expressing confidence in existing measures.

Limitations

The study acknowledges certain methodological constraints. The modest sample size of 67 respondents restricts generalizability across the broader Himalayan context. Moreover, reliance on self-reported perceptions introduces the possibility of subjectivity. Nevertheless, the integration of secondary data and cross-verification of responses enhances the validity and reliability of the findings.

Result And Suggestions

- The study's results show that tourism in the Uttarakhand Himalayas is highly vulnerable to disasters, and current systems for preparedness, coordination, and policy support are largely inadequate.
- Low disaster preparedness: 68% of surveyed tourism stakeholders rated the preparedness of hotels, homestays, and trekking operators as poor, and only 13% as good, indicating serious gaps in training, planning, and resilient infrastructure.
- Weak coordination: 54% reported only moderate coordination with authorities, while 25% said it is weak or absent, showing that institutional links for disaster management are not robust.
- Severe livelihood impacts: 72% experienced severe loss of income and employment after disasters, and 18% reported moderate effects, confirming the high economic vulnerability of tourism-dependent households.
- Sharp fall in tourist arrivals: 79% observed a sharp decline in tourist inflow after events like landslides, floods, or earthquakes, reflecting how quickly perceived risk reduces demand.

Key Suggestions

1. Strengthen infrastructure and regulation: Develop disaster-resilient tourism infrastructure, strictly regulate and monitor construction in hazard-prone areas, and enforce building and safety codes.
2. Build local preparedness: Institutionalize community-based disaster preparedness programs, conduct regular training and mock drills for hoteliers, homestay owners, and guides, and prepare standard operating procedures for emergencies.
3. Improve coordination mechanisms: Create formal coordination platforms or committees linking local authorities, disaster management agencies, and tourism stakeholders for faster response and information sharing.
4. Enhance policies and early warning: Frame transparent, inclusive tourism-disaster policies, integrate early warning systems into tourism operations, and ensure proper implementation at district and local levels.
5. Promote sustainable, eco-friendly tourism: Encourage eco-friendly planning, control over-crowding and over-building, and run visitor awareness campaigns on safety, environment, and responsible behaviors.
6. Support livelihoods and diversification: Provide social protection and safety nets after disasters and promote alternative or supplementary livelihood options so that communities are not solely dependent on seasonal tourism.

Data Availability

The data that support the findings of this study are not publicly available due to considerations of participant confidentiality and the presence of potentially identifying

information in qualitative responses. However, de-identified data and supporting materials are available from the corresponding author, [initials], upon reasonable request, in line with the Taylor & Francis “Share Upon Reasonable Request” data sharing policy.

Declaration by Authors

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