

Examining the Impact of Climate Change on the Tourism Sector of Uttarakhand: An Exploratory Study

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Abstract

Uttarakhand is recognized for its scenic beauty and rich heritage. The tourism industry is an indispensable source of income for the state. However, uncontrolled tourist influx, unplanned construction of tourism-related infrastructure in eco-sensitive zones, waste generation and improper disposal have all added to the environmental degradation of this region, leading to volatile climatic conditions. The 2013 Kedarnath floods, 2016 wildfires, and the numerous earthquakes, bear testimony to this fact. These, in turn, hurt the state's tourism. In 2016, Uttarakhand reported a sharp drop in tourist numbers after wildfires. In this paper, the authors explore the sustainability of tourism in Uttarakhand and the impact on various relevant stakeholders, using secondary data as well as primary data through a personal interview and a survey. The authors also conducted a case study on Joshimath, an evident example of a tourism-dependent town in Uttarakhand, at the brink of losing its mainstay due to environmental degradation. Opposing the idea that climate change is a problem of the future, the case study showcases the urgency of the situation by presenting the real-time impact. Finally, the last section is a brief analysis of the current policies. The authors conclude that increased community participation, usage of eco-friendly

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and locally sourced construction materials, promotion of traditional and sustainable tourism practices, reassessment of forest laws, proper waste management, and increased involvement of women and elderly in the industry can pave the way for a balanced and sustained future of the tourism industry.

Keywords: climate change, tourism, Uttarakhand, policy recommendations, environmental sustainability.

1. Introduction

Uttarakhand, a state in North India, popularly known as 'Dev Bhumi' or 'Land of the Gods' has a spiritual identity attached to it. India's culture, society and economy depend heavily on the Ganges River and its tributaries. Kedarnath, Badrinath, Gangotri and Yamunetri (Char Dham) are known not only for their spiritual identities but also for their panoramic beauty (Kala, 2014). Uttarakhand is located in the snow-covered region of the Himalayas. The region is highly vulnerable to earthquakes and ecological disbalance, man-made or natural changes can cause dangerous catastrophes. The fragile nature of the oldest Himalayan crystalline bedrock makes it highly vulnerable to landslides and disasters. (Shahi et. al., 2022)

In recent years, Uttarakhand has faced high environmental degradation mainly due to rapid infrastructural development. The influx of millions of pilgrims each year and unplanned urban development are adversely impacting Uttarakhand's ecosystem (Kala, 2014). These impacts raise awareness of how natural disasters will affect the tourism sector, which employed over 80 million people in India, directly or indirectly, in 2019-2020 (Ministry of Tourism Report, 2022). They also symbolise a warning signal, indicating the steps needed to be taken on an urgent basis to protect the lives and livelihoods of millions and sustain India's growth in the global tourism industry. The high-altitude areas and the lower basins of Uttarakhand have very different climatic conditions. Temperatures vary by season, but also by altitude. For example, the valley experiences hot, humid tropical weather in summer, while vast mountain ranges 75 kilometres away support one of the highest snowfields in the world. January is usually the coldest month. Snowfall and cold are common phenomena in the

highlands, while mild winter temperatures prevail in the lowlands. Seven to eight days of snowfall every three months from January to March are regular occurrences due to westward turbulence.

Tourism plays an important role in the state's job creation and economic growth. Through its nexus and its ability to create jobs in the economy, it is widely accepted as a powerful engine for inclusive socioeconomic progress. Tourism contributes directly to an estimated 2.96% of the state's total value added and 11.8% of state employment. Taking into account the indirect share related to tourism and links with other economic sectors, these shares are calculated at a GVA of 6.59% and employment of 26.8% (Munjaj et. al., 2021). As per the Uttarakhand Tourism Policy of 2023, the state aims to develop a strategy which can facilitate sustainable development of its tourism sector (Uttarakhand Tourism Development Board Report, 2023). Tourism is a major contributor to global carbon emissions, estimated at 8-11% of total greenhouse gases. Tourism-related CO₂ emissions are now a major contributor to man-made climate change. At the same time, climate change will have direct and indirect impacts on tourism, which vary by region (World Travel & Tourism Council Report, 2021).

Hence, in this study, we focus on the impact of climate change on the tourism sector of Uttarakhand. The objectives of this research paper include: A.) assessing various natural calamities that Uttarakhand has experienced over the years and their impact on tourism. Additionally, we aim to identify the various communities affected by the decline in tourism in recent years due to climate change. B.) To undertake a case study on Land subsistence crises in Joshimath and its impact on tourism in the region. C.) To analyse the various policies and programmes undertaken by the state government to help the affected sector and recommend new ways of uplifting the state tourism sector from the vulnerability of climate change.

2. Literature Review

Uttarakhand has been prone to natural calamities for several decades and has witnessed some devastating disasters in the past. The 2013 Uttarakhand flash floods hit the region due to geographical features, cloud bursts, and excessive rainfall resulting in floods and landslides

causing harm to human lives and tourism (Das, 2013). Haphazard construction work to accommodate tourists, illegal hotel dwellings in sensitive regions as well as inadequately planned dams have resulted in an increased number of landslides in the state (Kumar, 2013). Between 2000 and 2010, the number of tourists visiting Uttarakhand increased by 300%, from 1.11 crores to 3.11 crores. The state's tourist-related infrastructure has expanded disproportionately and largely unplanned. Even in the region's eco-sensitive zones, several multi-story hotels and other amenities have been built as a result of the surge in tourists visiting the area. (Pandey et. al., 2015). Apart from floods, forest fires too have been a fairly regular occurrence in Uttarakhand. During the summer of 2020 however, as a result of the pandemic and limited human interference, the number of forest fires sharply declined, indicating the role of human activity in this phenomenon (Gaur et. al., 2021). Ecological disbalance caused by the construction of various dams for hydro projects, mass tourism, unplanned urbanisation and deforestation are all responsible for making Uttarakhand more vulnerable to climate change (Rai and Singh, 2021).

Climate change-induced natural disasters in Uttarakhand have a significantly negative impact on the tourism industry, which is the main source of livelihood for the state. A study on the impact of climate change on Tourism-based livelihood for Nainital, Uttarakhand brings forth the change in the current situation of livelihood and related youth migration observed in Uttarakhand due to declining tourism (Jasrotia & Sharma, 2020).

Another area of interest in our research is the infamous land subsidence crisis in Joshimath, Uttarakhand. Even though the crisis in Joshimath has been building up for several decades, the literature on the same is quite sparse yet compelling. Major signs of land subsidence appeared in June 2022, which accelerated after September 2022, when an uplift was noted, and peaked in December 2022 with recorded subsidence of as much as 10 cm in some areas near Joshimath town (Pinakana & Prakash, 2023). The Mishra Committee Report (1976) was among the first to point out that Joshimath is located on a landslide, atop a layer of sand and stone and is thus highly vulnerable. Yet another old report by Heim and Gansser (1939) also suggested the same

conclusion. Most of the recent work that has sprung up, explores the geographical and physical dimension of the subsidence crisis. There are very limited scholarly works, commenting on the economic i.e. tourism side of the catastrophe apart from certain newspaper articles covering the on-ground plight of the hotel owners. Revenue earned by the majority of hotels had hit rock bottom, after the crises, with most hotels running into deep losses, while others were marked unsafe or closing down (Kumar, 2023). Our study aims to provide a thorough analysis of this situation and its current and long-term impact on the tourism industry.

The final section of our literature review looks deeper into existing research that suggests an active participation of local communities as a prospective solution to the problem of a degrading environment and a consequently vulnerable tourism industry. Kala et. al. (2018) noted that the growth of tourism affects the locals directly and has an emotional impact on their lives, community participation is, thus, considered to be of immense significance. The locals must be involved in decision-making as they are more aware of local tourist products due to their socio-cultural background. Host communities' participation in the development of the tourism industry is indicated by their awareness of local tourism offerings and their suitability for local circumstances (Tosun, 2006). We incorporate these ideas and devise more of our own, through our primary and secondary research, to ensure a sustained, balanced path of development of the tourism industry of Uttarakhand.

3. Methodology

The main purpose of this paper is to understand and analyse the impact of climate change on the tourism industry in Uttarakhand. The study is exploratory, involving a qualitative method of data collection.

3.1. Primary Data

The Primary data for this study was collected using the following two methods-

3.2. Personal Interview

To gather in-depth and first-hand knowledge, a semi-structured personal interview was conducted with Raghav Kumar, Co-Founder of Tiny Lab Farm - a two-year-old research and experimental design rural studio located in the farmlands on a small hill near Rishikesh which aims at building small houses using naturally sourced materials and investigating alternate biomaterials. The interview was conducted on Google Meet (with video) and the method of data recording was selected as note-taking. The interview questions were selected in alignment with the research objectives and were informed by existing literature. A few questions were also open-ended to get a more nuanced understanding of the interviewee. Ethical considerations and measures were taken through verbal consent.

3.3. Questionnaire Survey

The second method was a survey using a questionnaire specifically aimed at understanding the impact of the Joshimath Crisis on potential tourists. The medium of the survey was a Google Form, shared via social media channels to residents across India and the survey period was March 2023. The spatial reach of the internet-based survey made it an ideal format for analysing travel decisions.

The data was collated from 72 respondents, 33% of whom belonged to the age group of 46-55 years, 26% belonged to the 18-24 years age bracket, 16% to the 36-45 years age bracket and finally, over 12% belonged to the 25-35 years and 56 and above age bracket each, making the sample broadly representative. Amongst the sample, over 60% of respondents had previously visited Joshimath and/or the surrounding places and over 82% were aware of the recent crises in Joshimath, thus extending credibility to the survey results gauging the impact of the crises on the town's tourism. The survey included 6 questions, collecting data on the background of the individuals as well as questions specific to the objective of the study.

3.4. Secondary Data

We also used several secondary data sources like newspaper articles, journals, research papers, reports, the Uttarakhand government's tourism website, and so forth to build the background of the study.

4. Background

4.1. Climate Change in Uttarakhand and Its Impact on Tourism

The Himalayan region of India is a major tourist attraction but is also highly prone to natural disasters that adversely affect the tourism industry. Today the Himalayas are facing the consequences of an ecological imbalance (Jina and Singh, 1997) and in this regard, Uttarakhand faces under-preparedness in many areas, whether it is disaster management, weather forecasting, early warning systems, tourism management, or transparent and participatory environmental governance in vulnerable areas (Deshpande, 2022).

The Himalayas are warming at an unprecedented rate, higher than the global average of 0.74°C over the past 100 years and at least two to three times the global average as declared by IPCC in 2007 (Singh et al., 2013). Global warming has resulted in an increase in precipitation in many areas of the Himalayan region. With snow melting earlier, not only the river flow conditions, natural disasters and water supplies are affected, but also people's livelihoods and infrastructure (South Asia Network on Dams, Rivers and People, 2013).

Compared to the global average, Himalayan glaciers are retreating rapidly. This is destabilising the surrounding slopes causing catastrophic landslides that dam up rivers and sometimes cause flooding. Excessive meltwater, often combined with liquid precipitation is causing flash floods and debris flows. Melting of glaciers associated with climate change has formed glacial lakes behind terminal moraines. Moraine dams are relatively weak and burst suddenly, discharging large amounts of water and debris. The resulting glacial lake outburst flood (GLOF) can cause catastrophic flooding downstream. This is why Uttarakhand has been experiencing several disasters over the last few years (South Asia Network on Dams, Rivers and People, 2013).

4.2. Floods and Landslides

Water-induced disasters such as flash floods and debris flow are among the most severe natural disasters, with the 2013 and 2021 floods being the most devastating disasters in this region. The 2013 Kedarnath floods had such a devastating impact on the state of

Uttarakhand that thousands of people and animals succumbed to this catastrophic flood. Kedarnath in the Himalayas is the most seismically active and landslide-prone region. Located at an altitude of 3,553 metres above sea level, the area originates from the Mandakini River and Mandakini Valley near the town of Kedarnath (Sati & V. P. 2013). It is a sacred place for Hinduism and many pilgrims visit every year for pilgrimage and tourism. From 14th to 17th June 2013, there was heavy rainfall, about 375% higher than the normal monsoon rainfall baseline. Kedarnath was the main area that was affected (Dhyan et. al., 2016).

Excessive rainfall in the Mandakini River basin caused water levels to rise, creating unfavourable flood conditions across the bottom of Uttarakhand and the Ganga River system. Several roads, buildings and other structures were swept away by the rapid water flow and associated landslides. Both remote village residents and pilgrims were adversely affected (Das, 2013; Deen & Sharma, 2020). The devastation of the Kedarnath temple was continuously covered by the global media which reduced tourism drastically. The tourism sector was severely affected. While only 20% of tourist destinations were affected by devastating floods and landslides and 80% of destinations like Ranikhet, Nainital and Mussoorie in the state of Uttarakhand were safe, the safer areas also suffered great loss because of anxiety in tourists about their safety in Uttarakhand. Most of the hotel reservations in Nainital and Mussoorie were cancelled by tourists and the yantras (Gangotri, Yamunotri, Kedarnath, Badrinath) came to a complete halt within days (PTI, 2013).

In 2021, Himachal Pradesh and Uttarakhand together were hit by 170+ landslides. This meant that there was a 2900 per cent rise in landslides in Uttarakhand since 2015 (Rai & Singh, 2021). In 2021, once the Himalayan glacier burst, the flood water surged downstream towards power plants and villages, halting 2 hydroelectric power plant projects in the state. This resulted in a massive fall in the number of tourists visiting Uttarakhand, hitting the state economy hard (February 8, 2021, Times of India).

4.3. Forest Fires

Forest fires in Uttarakhand are a common phenomenon that could become more frequent in the coming years due to the rising temperatures caused by global warming. In 2016, forest fires destroyed nearly 4,000 hectares of forest land in Uttarakhand (Akash et. al., 2022). Dry weather, low seasonal rainfall, subsequent burning of pine needles, burning of waste and shading of crops by locals, and unsustainable forest conservation policies have all contributed to the wildfires in Uttarakhand (Dalei, 2016). In fact, in 2016, Uttarakhand reported a drop in tourist numbers after wildfires. While the tourism sector was still recovering from the 2013 flash floods, forest fires accelerated the cancellations of reservations made by tourists which led to low footfall in forested areas like the national parks and sanctuaries in Uttarakhand (Pant, 2016; Thapliyal, 2016).

The data that the authors extracted to analyse the incidence of forest fires (Fig. 1.a) from the Ministry of Environment, Forest and Climate Change (MOEFCC) shows that in 2020-2021, Uttarakhand was ranked 6th in terms of incidence of forest fires, with the highest percentage rise in numbers when compared to the other major states and between an earlier period, 2019-20 (Fig. 1.b).

Figure 1.a

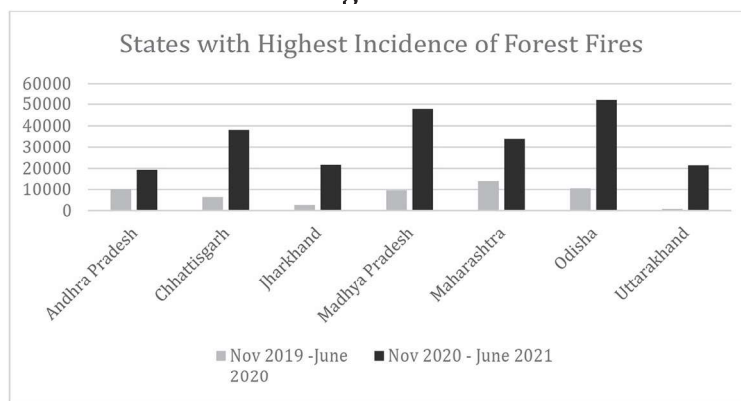
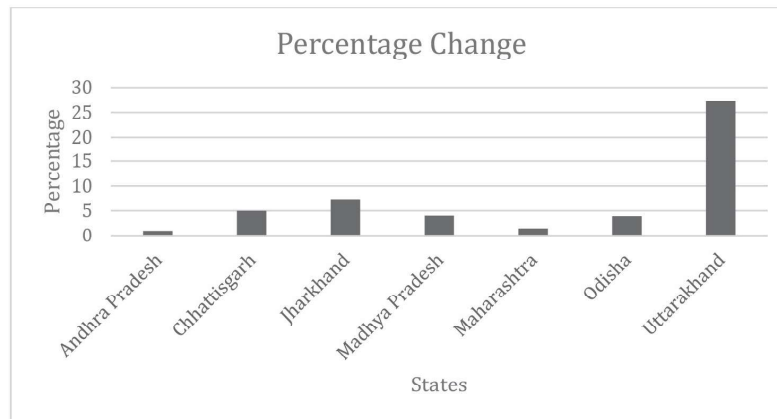


Figure 1.b

Source: Data extracted by the authors from the Ministry of Environment, Forest and Climate Change, GOI (2019-21)

4.4. Earthquakes

Uttarakhand is one of the most seismically active regions in India. Since 1900, on average, this mountain state has been hit by major earthquakes of around 5.5 magnitude (Amateur Seismic Centre, 2023). Unplanned construction, non-compliance with seismic safety measures and population concentration further increase the vulnerability of this region. Previous landslide incidents in peri-urban areas of Uttarakhand indicate that landslides are likely to be triggered when large-scale seismic activity affects the area (Rautela et. al., 2015).

4.5. Joshimath: The Gateway to a Sinking Reality

A widely popular and often quoted Keynesian viewpoint in economics argues that in the long run, all of us are dead (Jahan et. al., 2018). Highly discounting the future has led to decisions favouring the present over the future. However, the line separating the distant future from this indispensable present has been seemingly blurring with environment-related catastrophes springing all over the world, incurring massive costs on the economy for whose progress and development, the environment has been neglected.

Joshimath, an economically, strategically and religiously significant mountainous town, located in Uttarakhand, is a case in point.

It facilitates tourism in the state by acting as a *gateway* for visitors travelling to key religious and tourism destinations in the state, including Hemkund Sahib, Valley of Flowers, Badrinath, and Auli. The dramatic and drastic land subsidence crisis of 2023 in this sacred town has led to several demolitions, temporary rehabilitation and headlines, but the crisis in truth is far from recent and decades of unplanned development activities and unregulated tourism and urbanisation leading to structural climate change, ensured that this town was always a disaster in making (Tripathi, 2023).

Hence, in this section, we study the detrimental impact of climate change on Uttarakhand's tourism using a case study on Joshimath. The subsections provide a sequential background to the crisis. The costs it has incurred to the industry are presented in the section on Observations and Findings using data collected from a primary survey as well as secondary data.

4.6. Mishra Committee Report, 1976

Diagnosing the problem early, the Centre had appointed MC Mishra, to head an 18-member committee, to understand the cause behind the sinking town. The report brought to light the fact that Joshimath is not suited for settlement because the terrain is essentially a sand and stone deposit and not the main rock. Heavy traffic, blasts, and other vibrations will cause natural forces to be out of equilibrium and can lead to dangerous consequences. It strongly recommended a restriction of heavy construction and slope excavation. The report also advised that building activity should only be permitted after a thorough assessment of the site's stability and soil's ability to support loads. To preserve soil and water resources, it also advised against cutting down trees in the landslide zone and suggested that extensive plantation work be done there, especially between Marwari and Joshimath (Ramnani, 2023).

Despite the early warnings, relentless development projects in this fragile ecosystem, especially to promote tourism, have ironically made the tourism industry highly vulnerable as a result of deteriorating physical conditions. The Government had constructed over 500 miles of highway, 33 feet wide—in the hills of Uttarakhand to improve accessibility to religious temples in the higher Himalayas, ignoring

the advice of several environmentalists. However, the work was thwarted by the 2021 floods, directly or indirectly, a consequence of irresponsible construction (Mashal & Kumar, 2021).

4.7. Uttarakhand Floods of 2021

The downhill spiral of the region in the recent period began with the 2021 Uttarakhand floods, exacerbating the Pandemic-induced decline of tourism in this tourism-dependent town. The Nanda Devi National Park, a UNESCO World Heritage Site is where the Chamoli disaster started on February 7, 2021. It was brought on by a massive rock and ice avalanche made up of debris that had fallen from Ronti Peak, as concluded by a study published by the International Charter 'Space and Major Disasters' (Shugar et. al., 2021).

Director of the Wadia Institute, Dr. Kalachand Sain cited climate change as the paramount factor in the rapid freezing and thawing of ice that causes glacier fractures. The deluge severely damaged numerous hydropower dams. It badly damaged the Tapovan Vishnugad project, which was still being built at the time, and destroyed the Rishi Ganga Power Plant. Both the projects were in a Paraglacial zone, which had been deemed unsuitable for building dams by Dr. Ravi Chopra, the director of the People's Science Institute in Uttarakhand and a member of a scientific committee appointed by India's Supreme Court in 2014 (Goswami, 2023). It was after these floods that residents in Joshimath began to observe cracks in their homes (Tripathi, 2023a).

4.8. Land Subsidence Crises in 2023

It was observed that on the night of January 2, 2023, land submergence in Joshimath increased rapidly and murky water began seeping into the households in that region. Within twenty-three days, 2,21,40,000 litres of water seeped inside the ground which was no less than the size of a lake (Sethi, 2023). Large-scale projects are one of the root causes behind the weakening of slopes and destabilisation of the topography. The National Geophysical Research Institute's Report, Hyderabad, stated that Joshimath's sloping mountain is constructed on a mass of debris and that the river has swept away the stone-covered soil. The stones' lower portions have hollowed down. Hence, the capacity to carry loads is deteriorating over time (Sethi, 2023). In a

striking discovery, scientists found that a large part of Joshimath has become hollow. With more than 800 houses damaged and about 131 families temporarily moved to relief centres. This crisis has become disastrous for the state- of tourism (Sethi, 2023; ABP News Bureau, 2023).

5. Observations and Findings

In this section, we present our observations and findings from the primary data collated by us, supplemented by secondary data sources.

5.1. Impact of Climate Change on Various Stakeholders of the Tourism Industry

This subsection showcases the significant impact of climate change on the tourism industry of Uttarakhand, affecting various stakeholders in numerous ways.

5.2. Impact on Local Communities

The authors conducted an interview with a local in Rishikesh working at Tiny Farm Lab, which is a rural design and research studio, as part of our primary research revealed the real impact. Local communities that rely on tourism for their livelihoods are also feeling the effects of climate change. Changes in climate and natural disasters can damage local economies by reducing the number of tourists visiting the area. This can lead to job losses and economic hardship for communities that rely on tourism as a primary source of income. The various categories of these communities include a) the local youth involved in the facilitation of multiple recreational activities like rafting, paragliding, trekking, camping, bungee jumping, snow lodging, and wildlife safari that are a big attraction for young tourists; b) owners of local shops and restaurants especially located in most touristy areas and finally c.) tourist guides.

From the interview, the authors noted that most of these communities are well aware of the seasons of high tourism and earn enough during them to make up for the periods of slow tourism during the year. Usually, during off seasons they go back to their homelands and help the women in their families with farming. But sudden climatic disasters hurt the high tourism seasons which make the local people

extremely vulnerable due to large financial losses. Agriculture is also negatively impacted during natural disasters, not making it a viable alternative.

The interviewee further mentioned that most of the youth in Rishikesh are into rafting and can make a livelihood through it till the age of 35, post which they start working in local shops or restaurants as waiters or chefs since they are not educated or skilled otherwise. They require more skills and income sources. Sometimes they open Maggi shops, which prove to be highly profitable. Yet all these vocations are also heavily dependent on tourism and lack of a real alternative remains an issue. The interviewee highlighted the rapidly increasing phenomena of Ghost or deserted villages as a result of massive outmigration caused by the increasing lack of opportunities.

5.3. Tourists

Our interview with the Founder of Tiny Farm Lab also helped us understand the following impact of climate change on tourists: - For tourists, climate change in Uttarakhand is causing changes in weather patterns, impacting their travel plans and experiences. Sudden extreme weather events such as landslides, floods, and forest wildfires are becoming more frequent in the state, resulting in cancellations and disruptions in travel plans. This in turn, also has an unpleasant psychological effect on the tourists and pilgrim groups who visit the state for the Char Dham yatra since they plan their trips well in advance. Videos of the frequent natural calamities in Uttarakhand go viral, which creates doubts in the travellers and cancellations go on for several months after, leaving the tourism industry dry. For instance, during the 2013 floods, hundreds were killed which instilled fear in people. These floods impacted all popular destinations of the state - Mussoorie, Nainital, Jim Corbett, Dehradun, Lansdowne and Kasauli. Tourists turned to southern India and even Southeast Asian countries (Ians, 2013).

5.4. Local Tourism Businesses

Tourism businesses, such as hotels, airlines, and tour operators, are also being affected by climate change. The interviewee explained in length how the increased frequency of extreme weather conditions is causing

infrastructure damage, supply chain disruptions, and increased operating costs to adapt to changing weather patterns. According to a report by the Uttarakhand State Council for Science and Technology (UCOST), the temperature of Almora town in Uttarakhand has risen by 0.46°C and rainfall has become less frequent over the last 53 years (Sharma, 2016). This has led to various challenges in the tourism industry, including water scarcity and difficulty in maintaining greenery around hotels and homestays. Furthermore, the interview pointed out that the simultaneous damage to agriculture as a result of the weather disruptions as well as a general lack of interest in farming among the youth further threatens the health of the hospitality industry by directly impacting its operations. Additionally, tourists are becoming more environmentally conscious, which is leading to a shift towards sustainable tourism practices, and organisations that fail to conform may lose out on potential customers (Reality, 2021).

5.5. Impact on Tourism of Joshimath

This subsection showcases the impact of the Joshimath crisis specifically, on the tourism of the town.

5.6. Immediate Impact on Tourism

Tourism is the main source of income for the town, with 70% of the town's income coming from the sector. The town attracts lakhs of visitors each year, creating allied jobs for the locals (Kumar, 2023). Joshimath had 4.9 lakh visitors in 2019, 4.36 lakhs in 2018, 2.4 lakhs in 2017 and 1.86 lakhs in 2016, increasing each year, as per the yearly statistics published by the Uttarakhand Tourism Development Board. However, with the recent crisis, tourism has virtually disappeared from the town. Joshimath, which is typically thought of as a motel town for people travelling to popular tourist attractions like the famed Badrinath and Hemkunt Sahib, is currently observing the demise of its main industry. In an interview with the owner of Hotel Mount View, Joshimath, he said with grief about how the winter season which is the peak tourism season is destroyed for the industry and the vast majority of hotel owners, revenue has dropped by over 80% (Kumar, 2023).

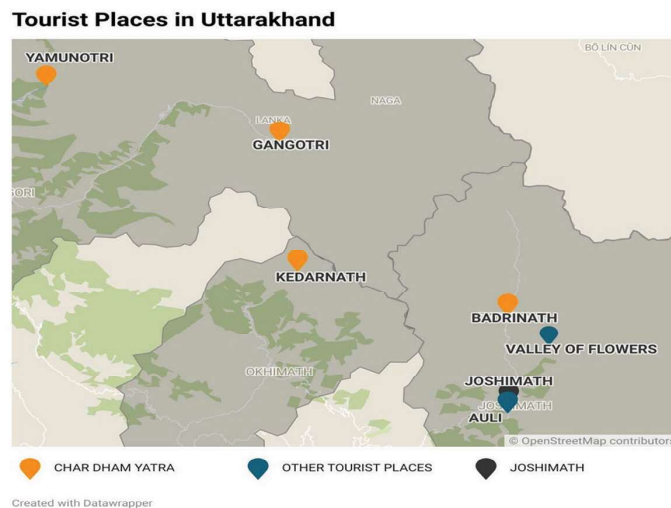
5.7. Administrative Costs

Not only has this incurred huge costs for the stakeholders of the tourism industry but also the government. The authorities faced massive protests from the owners and residents of the town when two hotels- Hotels Malari Inn and Mount View, were declared to be in the danger zone and needed to be demolished. The protests were raised on the issue of compensation which on an interim basis was decided to be Rs 1.5 lakh (Express Web Desk, 2023). Protests increase the administrative costs of the government and compensations too add to the fiscal burden.

5.8. Cost to Neighbouring Landmarks

The cost of tourism is not limited to Joshimath but also to all the renowned tourist destinations it acts as a gateway. As per the State Tourism Ministry data of 2021, more than 165 thousand people visited Joshimath yet more than half a million of them went via the town to visit Badrinath, Auli, Hemkund Sahib, etc. The figure below shows the map of Uttarakhand, with the arrows exemplifying Joshimath’s role as a gateway to Auli, Valley of Flowers, Chardham Yatra and Hemkund sahib.

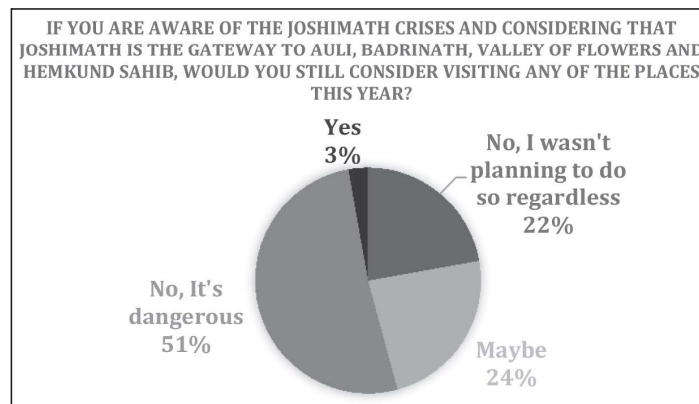
Figure 2
Tourist Places in Uttarakhand



A primary survey conducted by the authors tried to quantify the impact of the Joshimath crisis on the tourism of Auli, Badrinath, Hemkund Sahib and the Valley of Flowers. It revealed that among the approximate 73% of respondents who would choose to not visit the above-mentioned places this year (2023), 51% would not do so given the danger it poses and the remaining 22% for other reasons.

Figure 3

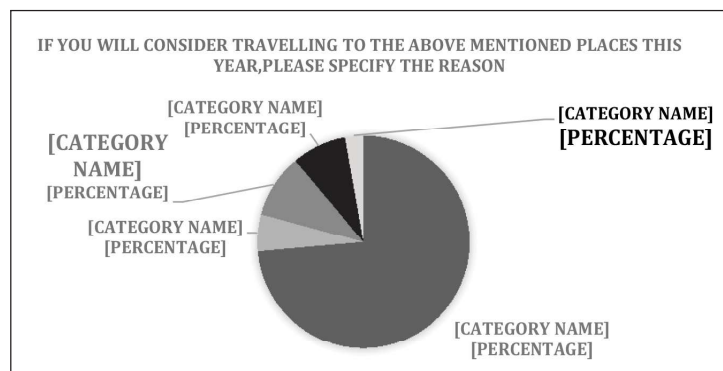
Pie chart prepared from the responses received via Primary Survey



Furthermore, as per the survey results, among the 27% of respondents who may consider travelling to the said places this year (2023), 10% will do so for adventure, 6% for religious reasons and only 3% as a result of the safety assurance provided by the government.

Figure 4

Pie chart prepared from the responses received via Primary Survey



5.9. Auli

People from all over the world travel to Auli, a well-known tourist destination, 12 kilometres above Joshimath. A ropeway and chairlift took tourists from Joshimath to Auli. The former has ceased operations after developing cracks in the pillars like several other structures of the region and the latter barely has any takers given the events. Already suffering through losses as a result of the pandemic, the current ecological crisis poses losses worth crores for homestay and hotel owners in Auli (Singh, 2023). Ajay Bhatt, a local who operates several hospitality units in the region described in an interview conducted by the Times of India how they haven't received any enquiry since the rapid escalation of the situation in January and that their operations have come to a standstill as many of these hotels are being used for temporary rehabilitation (Singh, 2023).

5.10. Char Dham Yatra

Joshimath acts as a station for pilgrims travelling to the Char Dham. The yatra generates significant income and jobs for Uttarakhand. Almost 10 lakh people are directly and indirectly employed by the yatra, including those working in the hotel sector, restaurants and eateries, taxi cabs, priests, mule drivers, porters, travel agencies, and the handicraft industry. The Char Dham yatra brings in about \$7,500 crore to the State every year. (Mishra, 2022). However, the extended effects of the crisis are sure to find their way to the yatra as well.

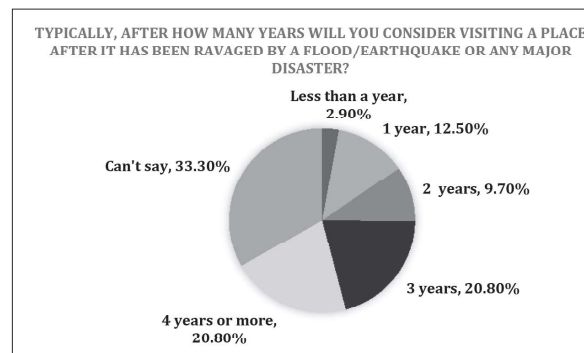
New fissures have developed on the road leading to Narasingh temple, which is on the same road that pilgrims use to travel to Badrinath from Joshimath. On the motorway that runs through Joshimath's main market and is utilised by travellers heading back from Badrinath, there have also been reports of recent cracks (PTI, 2023). Cracks have formed in the Shivling of the Shankaracharya Madhav Ashram temple in Joshimath after a landslip damaged the Maa Bhagwati temple there (Saha, 2023). The Char Dham Project meant to enhance access to the yatra is one of the projects, ironically, causing damage to the revered shrines.

5.11. Long-Term Impact on Tourism

One of the questions that our primary survey posed to the surveyors was an estimation of how long they would wait before travelling to a tourist destination ravaged by a flood/ earthquake or any other natural disaster. Over 41% of the respondents would choose to wait for 3 years or more before deeming it safe enough to visit such a place.

Figure 5

Pie chart prepared from the responses received via Survey



Given that the crisis is rather recent, a broad estimate of the long-term impact on tourism to Kedarnath, Badrinath, Gangotri and Yamunotri as well as Joshimath and Rishikesh can be drawn from the tourism data to the above-mentioned places about the years after the 2013 floods. While the floods are very different in nature and scale from the Joshimath crises, the studies point out that the situation is only going to worsen in the coming months and years, further inhibiting access to the mentioned religious destinations.

Table 1

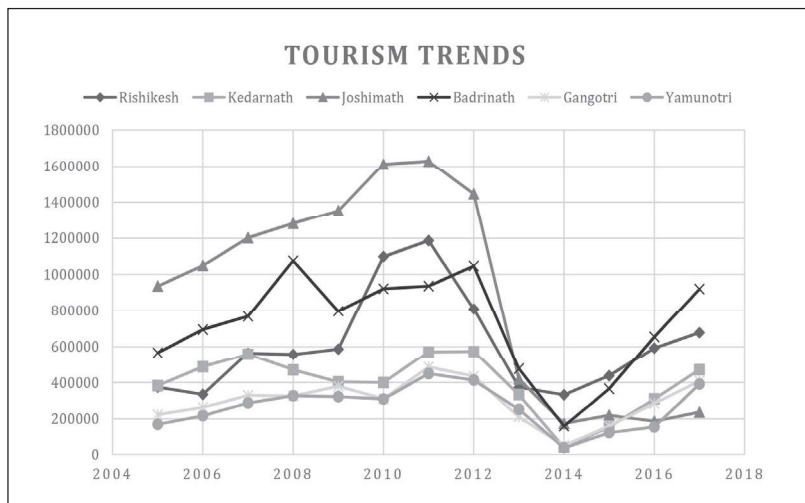
Tourism Data (2005-2017)

Year	Rishikesh	Kedarnath	Joshimath	Bardinath	Gangothri	Yamunothri
2005	375111	382973	935652	566224	223061	169046
2006	335304	487003	1048901	695242	263807	216883
2007	563171	557423	1202006	768107	329385	287870
2008	556547	470048	1281070	1075583	326366	327611
2009	586419	403636	1352499	798204	380157	322242
2010	1098712	400511	1611292	921526	310561	309634

Year	Rishikesh	Kedarnath	Joshimath	Bardinath	Gangothri	Yamunothri
2011	1186529	570601	1628447	936172	485137	448945
2012	809738	573052	1446171	1046619	435552	413615
2013	374409	333774	419441	476430	210239	253110
2014	332988	40946	173439	159575	51694	38294
2015	437756	154435	220492	366455	160192	122926
2016	592227	309764	186346	654355	285459	155129
2017	678041	471235	23714	920466	408738	392208

Source: Data extracted by authors from Uttarakhand Tourist Development Board Reports (Department of Tourism, Govt. of Uttarakhand, India)

The data (Table 1) suggests that post-2013 floods, it took an average of 3-4 years for tourism to recover to pre-flood figures in all the specified locations. This can be seen more clearly in the following chart (Fig. 5), which graphs the given data. After hitting record lows in 2013 and 2014, the figure shows a slow recovery. If these trends are anything to go by, the ongoing crises in Joshimath are sure to have long-standing impacts on this industry.



Source: Data extracted by authors from Uttarakhand Tourist Development Board Reports (Department of Tourism, Govt. of Uttarakhand, India)

The state government has been taking measures to ensure that yatra-related tourism carries on as usual, by promoting the 'not-so-well-known temples' near the Char Dham yatra's route and elsewhere in Uttarakhand (Sharma & Moudgil, 2018) as well as through other

policies such as Prime Minister's appeal to the devotees to spend 5% of their tourism budget in buying local products, which will promote local producers (Mishra, 2022), there are practical concerns regarding the availability of accommodations, knowing that most of the hotels of Joshimath and surrounding areas are being used for rehabilitation.

6. Discussion and Policy Recommendations

Community participation is the foundation of a democratic nation ensuring the inclusion of all communities in decision-making on issues that directly affect their lives. This helps to promote entrepreneurial ventures, build partnerships and collaborations, and rejuvenate relationships between the different stakeholders (Tosun, 2000). Inclusion of all at an early stage creates fewer delays and a more harmonious development in tourism. It has been observed by Tiny Farm Lab that often active participation by local communities doesn't take place due to highly centralised structures and exclusive decision-making. It has also been observed that prevailing socio-economic reasons are the major contributing factors to community participation in developing countries. Low levels of education, unawareness, limited means of information, lack of access to funds, seasonality, power disparities, elite dominance, and the absence of marketing and promotional activities all contribute to the under-development of the sector and act as barriers to community participation. This applies to the tourism industry of Uttarakhand as well.

The government has been taking various policy initiatives to promote tourism in the state of Uttarakhand. However, it has different effects on different stakeholders. Most decisions have been in favour of big businesses that do not incorporate community participation. Only a few elite members are invited by the tourism development authorities to participate in the decision-making process, and the majority of the local community members are left out (Mustapha, Azman and Ibrahim, 2013). This poor institutional framework affects efficient coordination between departments. Very little has been happening in terms of infrastructure and capacity building in the tourism sector, resulting in local perceptions of tourism as a vulnerable and unwelcome sector (Kala and Bagri, 2018).

During the survey in Uttarakhand, it was observed that there is a prevailing culture of voluntary non-participation. This is because the community members feel they don't understand the industry and are incapable of making professional decisions due to a lack of education. Further, since most of the population is engaged in agricultural activities, it is difficult for them to venture out into tourism-related activities without migrating to cities and financial support from the government.

6.1. Construction and Forest Laws

Based on the experiences of Rahul, co-founder of Tiny Farm Labs, Uttarakhand, the materials used in infrastructure development in Uttarakhand are not green. Cement and brick industries contribute to the release of millions of tons of carbon emissions every year. However, these materials are used due to their cost effectiveness by both the government and private players. Additionally, due to forest protection laws, the material palette is quite limited. 60% of the Jim Corbett National Park, almost all of Sitabani Wildlife Reserve and Pawalgarh Conservation Reserve are dominated by the Sal tree. However, Sal wood cannot be used as a construction material. Further, slate mining is also banned, which is usually used for the construction of roofs. This leaves people to use easily and economically available brick and cement for the construction of houses, hotels, roads etc. The recent Deen Dayal Upadhyaya Homestay scheme provides subsidies in the form of capital and interest on loans. However, it does not incentivize the usage of eco-friendly materials or the use of traditional methods.

Uttarakhand is a state rich in natural resources that can be used for construction. If used in a balanced manner, it can be sustainably used for construction. There should be more research undertaken on using lantana, clay soil, and straws as construction materials. Incentives and subsidies should be provided by the government to promote the use of these materials in construction.

6.2. Improper Waste Management

During our field interview, it was noted that with the rising number of tourists each year, the waste produced within the state has also increased. Some initiatives banned the use of single-use plastic;

however, they were counted as failures in Uttarakhand. Scenic and pilgrimage places have been polluted by tourists, whose waste is later dumped in the fields, affecting the fertility of the land. This is also one of the negative impacts of tourism as perceived by the local communities, as they fear a reduction in the quality and quantity of agricultural produce and, therefore, a decline in income.

6.3. Loss of Indigenous Knowledge

With increasing urbanisation, the traditional and indigenous methods of agriculture and construction are fading away, as noted by the co-founder of Tiny Farm Labs. Stubble burning and forest fires contribute to pollution in Uttarakhand. Intentional forest fires often get out of control and are then left to burn out naturally. Awareness about methods like mulching and permaculture can be used to reduce the carbon footprint of agriculture. Urbanised methods of construction can be replaced by traditional methods using locally available materials like timber, bamboo, stone, mud, clay, and straw. Stone masonry is a sustainable local method of construction and has been used for centuries. It is durable, fire-resistant, and an excellent insulator. Similarly, the government can spread awareness of methods like thatch roofing, earthbag construction, and rammed earth construction. These methods don't use machinery and are labour intensive, thereby also creating employment opportunities.

6.4. Promoting Eco-Tourism

One major problem in the state is that there is a negative connotation attached to houses made of clay, soil and straw, as they are considered a sign of poverty. 75.8% of tourists in Uttarakhand are Indians (Devlal and Singh, 2018). It was noted in the field interview that if proper marketing and promotional initiatives are taken, tourists living in urbanised areas with houses made of brick and cement would prefer spending their travel retreats in homestays, resorts, and hotels made using local materials and traditional techniques. Construction of eco-stays can be incentivized/subsidised by the government and sold to tourists as traditional and local experiences, in contrast to what they experience in bigger towns and cities. This would also drive traffic away from famous tourist destinations in Uttarakhand to smaller cities and towns that are locally and sustainably developed.

6.5. Bias Against Women

Women are the backbone of the economy of Uttarakhand. During field visits, it was observed by the authors that women perform all household activities as well as work in the fields. They have an extremely busy schedule, which leaves them no time to engage in tourism-related activities. Further, the harvest season often clashes with peak tourist seasons, leaving no choice but for men to migrate into cities and involve themselves in tourism activities. Further, because women have agricultural work and pastors to take care of, they are not allowed to leave the village to gain skills and education. During the discussion, the interviewee said, *“At least one woman in a family always stays back at home, even in times of weddings, to take care of the cattle and look after the farm.”*

The Tiny Farm Lab emphasised how young men migrate to cities and engage themselves as tour guides. They are low-skilled and don't have an alternative source of income during the off-season. They usually migrate to the villages and help their families in agriculture. However, recently, it has been observed that they are averse to agriculture and spend time in villages even if that means not being employed during the off-season. This makes the land unfit for the next season due to the growth of weeds. This argument implies that agriculture has been on the decline for young men. Since married and middle-aged men often migrate to cities, this leaves only women performing agricultural activities. Therefore, this structure has created a bias against women.

To promote women in tourism, schools, colleges, and skill development institutes could be set up at the village level so that women and young girls could educate and skill themselves with the little time they have in their busy schedules. Further, to remove the bias and promote sustainability, handicrafts made out of locally available materials (e.g., lantana, pine needles, candle making) can be promoted among women in villages through government programs.

6.6. Isolated Elderly

During the field visit, it was observed that lately even women and children in Uttarakhand have been migrating to nearby cities for employment opportunities and access to better education. This leaves

the elderly population in villages alone to take care of the cattle and crops. They engage in agricultural activities but have low productivity due to their ageing. The government can initiate programs in villages that can initiate this population into activities such as handicrafts, eco-stays, etc. where they have higher productivity.

6.7. Need for Regulated Tourism

Finally, the field interview highlighted that one of the biggest threats to the sustainability of tourism in the state is tourism itself. Since 2000, there has been a rapid influx of tourists to Uttarakhand. Along with the influx of tourists, tourism infrastructure such as hotels, lodges, Dharamshala, shops, dhabas, cell towers and roads are also booming. They are built near river channels to access roads that mostly run along the rivers, even in active floodplains. Landslides and roadblocks occur when constructing various buildings on deforested and unstable slopes. Eco-friendly zones such as Gangotri Glacier, Yamnetri, Flower Valley, Kedar Dom, Hemkund Sahib, Nagutiva, Binsar and Chandrasil are famous among pilgrims and trackers. These areas are overexposed. The ecological balance and resilience of glaciers are threatened by the emission of greenhouse gases from vehicles, stoves, generators, etc.

In addition, tourist sites are polluted with large amounts of plastic and other non-degradable elements, causing landslides and flash floods (Das, 2013). This induces a cyclical phenomenon wherein unregulated tourism today, contributes to the precarious condition of the state, threatening directly the longevity of tourism in the state. This generates a need for Government intervention in the form of clampdowns on unplanned urban structures, creation and promotion of public transport, heavy fines on litterers and improper disposal of waste by businesses as well as a close monitoring of the tourist influx per season and imposition of adequate restrictions when the numbers go beyond the carrying capacity.

7. Conclusion

Uttarakhand has historically been highly susceptible to natural disasters, having experienced several severe catastrophes in the past. Further increasing its vulnerability to climate disasters are

unplanned and rapid urbanisation, mass tourism, hydro projects and deforestation. The majority of its population is directly or indirectly reliant on tourism for livelihood. Increasing calamities thus have adverse effects on the economy of the state. Moreover, Uttarakhand faces under-preparedness in many areas like disaster management, weather forecasting, early warning systems, tourism management, and transparent and participatory environmental governance in vulnerable areas.

The impact of climate change on tourism not only affects local communities but also future tourism prospects in the state. Unplanned tourism can lead to a strain on natural resources, overcrowding, pollution, and degradation of cultural heritage sites. It is imperative to strike a balance between the economic development of the state and the preservation of its cultural heritage and environment. Sustainable tourism practices can help mitigate the impact of climate change on tourism while also benefiting the local economy.

Community participation is crucial for the development of local tourism given their knowledge of local offerings. Uttarakhand currently faces barriers to proactive community engagement in its tourism industry due to highly centralised decision-making processes. The onus of non-discriminatory policy-making that puts local minorities and underprivileged groups at the forefront lies on the government. This is not only a moral obligation but will ensure that key communities do not get discouraged in the future. Lastly, capacity building of underdeveloped regions by conducting tourism-focused skilling programmes may not only shift the focus from popular tourist destinations but also bring in more tourism. All this can be achieved through collaboration between the government, private tourism service providers, NGOs, and local communities.

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