J. Mountain Res. P-ISSN: 0974-3030, E-ISSN: 2582-5011 DOI:https://doi.org/10.51220/jmr.v18i1.11
Vol. 18(1), (2023), 101-115

Unveiling the Himalayan Nexus: Unraveling Anthropogenic Triggers and Pursuing Sustainable Development in Uttarakhand

Arvind Singh Rawat[1*] • M.M. Semwal[1]

[1]*Department of Political Science, H.N.B. Garhwal (A Central) University, Srinagar Garhwal -246174*

***Corresponding Author Email:** arvndarmy7@gmail.com

Received: 06.04.2023; Revised: 28.05.2023; Accepted: 03.06.2023

Abstract: The physical environment has been detreated by the impact of humans in a variety of ways including pollution, overpopulation, deforestation. These changes lead to poor air quality, soil erosion, land degradation which results into health issues. These negative consequences can have an impact on human behavior, leading to mass migrations or water wars. The state of Uttarakhand is already fragile towards natural disasters due to its topography. Over the past few decades, we have seen a large no. of disasters in Uttarakhand. Most of them are termed as natural disasters but one cannot ignore the impact of human in triggering these disasters. As a result of the unstable soil on the Himalayan range's high slopes and the fragility of the mountain range itself, heavy rainfall has wreaked havoc on the region. However, the magnitude of the calamity has been worsened by human actions. Major contributors to the extraordinary extent of destruction include the continuous expansion of hydro-power projects and the construction of highways to accommodate ever-increasing travel, mainly religious tourism. 1998 Malpa Landslide, Ukhimath Landslide, Kedarnath Floods are some of the biggest disasters the state has faced in past years. Why these disasters are so frequents nowadays and what role human have played in triggering them. These questions need to be analyzed. This paper will try to highlights the impact of human activities in making the region more fragile for Disaster. It will also try to focus on need for the sustainable development for the region.

Keywords: Anthropogenic Activities • Natural Disaster • Uttarakhand Himalayas • Char Dham • Sustainable Development • Environment

Introduction

The dominant geographical feature of India is the Himalayas. No other mountain range in the world has had the same impact on people's lives and the course of a country as the Himalayas have with respect to India. Himalaya which is called “third pole of world” and “water tower of Asia” contain 13 % of world population and is a hub of vast biodiversity and is spread in eight countries of the world. Uttarakhand one such state in central Himalayas has been gifted with immense natural beauty, magnificent views, environment which has attracted tourists for centuries. The majestic Himalayas, the holiest of rivers, the spiritual mystery, beautiful landscapes, the ceaselessly colorful dance of nature, a captivating history engraved in old stones, a bewildering floral and faunal profusion, and the simplest of people all embody Uttarakhand's innate beauty. Myths, narratives, and tales are woven throughout every picture that reveals itself to the viewer. The people of the state are as diverse as the elements of nature, and a description of the state's compelling beauty would be inadequate without mentioning them. Several separate indigenous tribal tribes live in harmony with one another while maintaining their own customs. The state is not just a one-of-a-kind tourist destination, but also a veritable treasure trove for scholars of every stripe: anthropologists, historians, ornithologists, linguists, geologists, and so on. On other side this state is extremely vulnerable to both present and future natural disasters and climate change. Uttarakhand Govt. report of 2014 recognizes “Uttarakhand as most vulnerable due to climate-

mediated risks. There is also an increase in rainfall by 2030 in comparison to 1970 in the state (Govt. of Uttarakhand, 2014). Rise in population, rapid urbanization, uncontrolled construction in the name of development is some of the major reasons for triggering disasters in such an eco-sensitive zone of Himalayas. The Himalayas are warming more rapidly than the rest of the world, so the effects of climate change are expected to be felt there before they do elsewhere in India. Reduced snowfall and snow cover, increased rainfall, mudslides, floods, and droughts are just some of the negative effects.

The state is located either Zone IV or V of India's Earthquake Zonation Map. Pithoragarh, Bageshwar, Chamoli, and Rudraprayag districts, as well as parts of Almora, Champawat, Tehri, Uttarkashi, and Pauri districts, are classified as Zone V, whereas Udham Singh Nagar, Nainital, Haridwar, and Dehradun are classified as Zone IV (Khanduri, 2020). At least 5,731 individuals were killed, according to the state's emergency management agency. The Himalayas are most disaster prone due to varying reasons and it is imperative to understand them for mitigation purposes.

Methodology

The research will summarize its main findings and provide suggestions for further policy ramifications in this area. The study will examine both primary and secondary sources of data preferably the main emphasis is on secondary data which includes: Books, Newspapers, USDMA reports, Internet, Research Article, and RTI etc. In this paper data have been analyzed and the systematic approach has been adopted for the analysis of the study done. The Researcher has used both qualitative and quantitative methods for the data analysis.

Need for the Study

The Himalayan region of Uttarakhand has always been very fragile due to its topography. Uttarakhand is vulnerable to a variety of natural disasters due to the region's geo-tectonic structure, evolutionary history, geomorphology, and climatic features. Landslides, cloudbursts, flash floods, floods, avalanches, droughts, lightning, cold waves, and hailstorms are common in the area, in addition to earthquakes. The region has accumulated huge tension as a result of continuing tectonic processes, making it vulnerable to seismic shocks. In past few decades the state has suffered several devastating disasters such as Kedarnath Floods 2013, Rishi Ganga Floods 2021 and in recent times the sinking of Joshimath. Most of this havoc has been triggered by the rapid uncontrolled development in this region which has led to human and assets losses. The study is needed to understand the human impact on the Himalayan region of the state and to suggest need of futuristic sustainable development policies and ways forward for the region.

Anthropogenic Process

Since becoming a full-fledged state in the year 2000 construction work in Uttarakhand is increasing. Human activities have made the state more fragile towards natural hazards. Anthropogenic effects, processes, objects, or materials are human-made as opposed to natural. Environmental externalities are chemical or biological wastes produced as by-products of human activities. Carbon dioxide production is widely believed to drive anthropogenic climate change.

Some anthropogenic procedures may involve a decision-making or survey step before ground disruption. When a secondary process is said to occur ‘Before’ a main anthropogenic activity, it

usually occurs after at least one preparatory step, even if the natural environment has not changed. Secondary processes are caused by a main anthropogenic event, even if they occur before it.

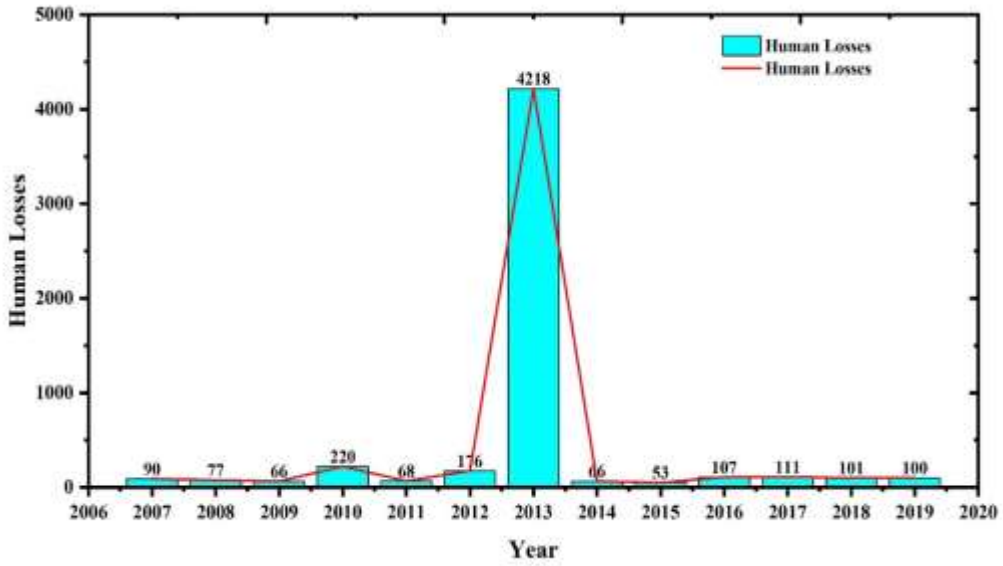

Fig 1: Data of Yearly Human Losses in Uttarakhand due to Natural Disasters

**Data is not accurate for the year 2013. Both the data of state and central govt is different for the total number of people died in Kedarnath Floods. *Data Collected through RTI.*

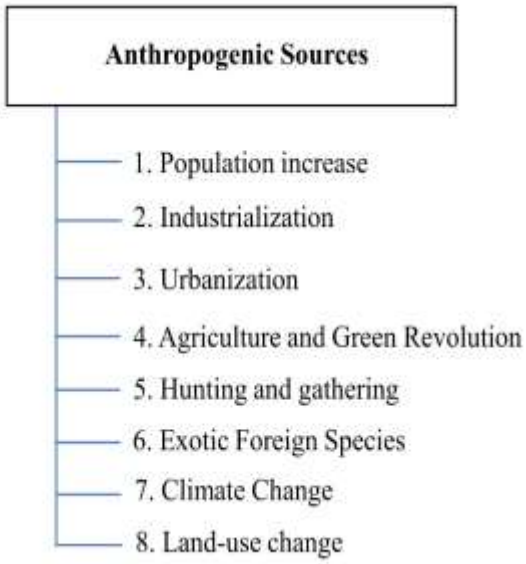

Fig 2: *Self structured Diagram representing various Anthropogenic Sources*

J. Mountain Res. P-ISSN: 0974-3030, E-ISSN: 2582-5011 DOI:https://doi.org/10.51220/jmr.v18i1.11
Vol. 18(1), (2023), 101-115

Urbanization

Uttarakhand's total urbanization rate, which is about 30.2%, is close to the national average of 31.2% (Pant, & Chand 2020). The environment of Uttarakhand's cities has been significantly changed as a result of urbanization and other forms of human-induced development.

Environmental issues are more noticeable in these rapidly growing cities. The urban settlements of Uttarakhand are now populated by individuals who are engaged in competition with one another. As a result, urbanization is resulting in significant ecological and environmental problems across the state.

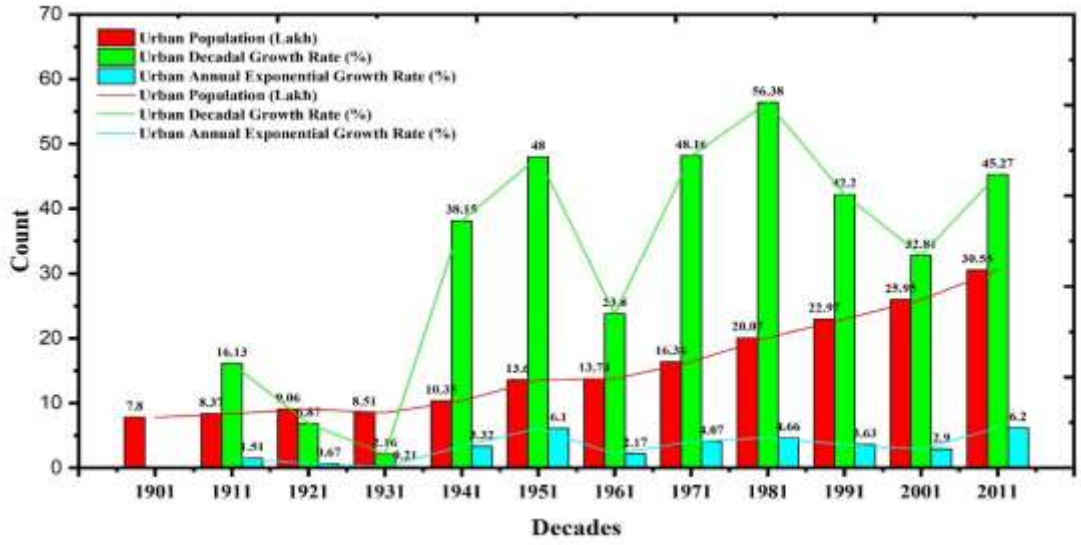

Fig 3: *Uttarakhand Rural-Urban Distribution, COI,2001-2011*

One major reason of urbanization is migration in Uttarakhand. Youth are working in other regions of the country due to a lack of resources and employment opportunities in the state. Health education and physical resources in the remote areas of Uttarakhand are also unsatisfactory, and people are migrating to urban areas at a rapid rate.

Urbanization has brought severe environmental implications in the state (Sati, 2013). It includes mining, deforestation, industrialization, water bodies etc. The issue of sewage treatment is causing many environmental problems like health issue etc. These rapid migration from hills to plains is leading to unplanned development in the cities which have made critical impact on urban centers of Uttarakhand. Rapid urbanization causes pollutions from different sources such as vehicular pollution and industrial emissions, which produces a variety of organic and non-organic pollutants. The utilization of traditional or conventional technologies, such as physical and chemical methods, for the remediation of these organic contaminants is an economically tricky job (Hasanuzzaman, & Prasad, (2020). These construction activities are neither sustainable nor resilient, and as the IPCC report points out, we must ensure minimum damage to the prevailing ecosystems (Panwar, 2021).

The human greed has been a significant driver of urbanization. This greed is harming the

environment, as we have just witnessed in the instance of Joshimath, where growing urbanization is one of the key reasons for the sinking of this magnificent sacred town.

The sixth assessment cycle report of the Intergovernmental Panel on Climate Change (IPCC) highlighted the severity of the consequences of climate change and indicates that it is impending. It means catastrophic climate-related occurrences will become more often, with tremendous consequences. It is no surprise that carbon dioxide emissions have the greatest influence on climate change, and their contribution has increased by 50% in the previous three decades since humans emerged.

Development vs Environment

Development should be done keeping in mind the environmental ethics otherwise we will have to pay the price of development. State citizens are subject to land use restrictions, but what about government constructions? Has the Environmental Impact Assessment taken into consideration for construction of these major projects in the Himalayan Region? Time will tell the answers. Some of the major projects in the Himalayan Region of state are:

Char Dham Project

The prominent two-lane road project known as the Char-Dham Road Project is being built in the Himalayan state of Uttarakhand. In order to increase accessibility to the Char-Dham (shrines) of Yamunotri, Gangotri, Badrinath, and Kedarnath, the initiative suggests expanding roadways by up to 10 meters. The enhanced highway circuit would hopefully reduce congestion during the Char Dham Yatra, which is crucial to the state of Uttarakhand's economy. The mountain has been destroyed by more than just road construction. Landslides are a common occurrence on the Char Dham highways, which connect Yamunotri, Gangotri, Kedarnath, and Badrinath. Because of their recent origin, the Lesser Himalayas are prone to landslides and thus unstable. Blasting for road construction under the project was causing landslides in the region. A growing number of visitors speed along them, emitting noxious gases that hide the high hills ahead in an unsightly mist. The Supreme Court established a 25-member High Powered Committee to oversee the environmental concerns of the Chardham highway project, which is led by environmentalist Ravi Chopra. The committee suggested restricting road width to 5.5 meters. However, on December 14, 2021, the Supreme Court issued a ruling allowing the width of the road along the strategically critical Badrinath, Gangotri, and Pithoragarh roads to be increased to 10 meters. The sidelining of the committee report led to the resignation of Ravi Chopra (The Hindu, 2022)

The road network has grown in the state going from 8000 km in year 2000 to 50 000 km in year 2022. The debris of the road ends up in the river creating a monsoon-like flood condition. While the Char Dham project is not directly responsible for the recent tragedy in Chamoli caused by a glacier break, uncontrolled blasting during road building may create crakes in soil and rocks that might increase the likelihood of flash floods in the future. To assist local biodiversity, recover from the Char Dham project's negative effects, we must create a biodiversity management system.

Impact of Religion Tourism in Uttarakhand Char Dham

One of the biodiverse areas of the planet is the Himalayas, where local populations have a deep respect for the natural environment. They have a

storehouse of folklore, traditions, and myths based on this inescapable connection that might be useful in promoting environmental preservation. The Himalayan Zone is always sensitive zone. The fragile ecology appeared to be suffering as a result of the largely unregulated influx of tourists into the very disaster-prone state (Aggarwal, 2019).

Table 1: Total number of domestic tourists visited Char Dham and Hemkund Shahib in the year 2019,2020 and 2021

S.No.	Dham	Domestic Tourist in 2019	Domestic Tourist in 2020	Domestic Tourist in 2021
1.	Kedarnath	998956	135287	242985
2.	Badrinath	1244100	155009	144906
3.	Gangotri	529880	23736	33771
4.	Yamunotri	465111	7717	33311
5.	Hemkund Shahib	239910	8290	19909
	Total	**3477957**	**330039**	**529382**

Source- *Uttarakhand Economic Survey 2021-20*

Kedarnath is the eleventh out of twelve Jyotirlingas of India. Once a quiet place nowadays this valley is filled with the noise pollution of helicopters. During the day, these helicopters take hundreds of tourists from one place to another. On some days, as many as 300 sorties are made.

During the June 2013 floods, the Kedarnath Valley, suffered devastating damage. However, this has not stopped tourists. After a temporary decline, the number of visitors has increased again. Uttarakhand is experiencing traffic congestion and environmental issues. Due to Uttarakhand's geographic circumstances, extra attention is needed to develop its infrastructure, which is why tourism and infrastructure facilities in the state are degrading and no significant measures are being done to correct or repair the infrastructure. Tourism in Uttarakhand help in flow of economy in the state. Some major problem due to tourism are Traffic Congestion, Vehicular Emission which leads to melting of glaciers, Noise Pollution of Choppers in Kedar Valley.

Plastic Waste generated by these tourists need strict laws. Plastic, a natural heat absorber, is heated by solar light. In a world where climate change is increasing, plastic contributes to mountain warming. The rising warmth at high elevations is melting glaciers and forming glacial lakes (Vitamin, 2022). The problem of plastic litter will stop only when tourists change their habits and understand their duty towards nature.

Global Warming/ Climate Change

The Green House gases emission by the human have triggered the disaster. According to a recent assessment on the status in the center of the Himalayan range by the Potsdam Institute for Climate Impact Research in Germany and the Energy and Resources Institute in New Delhi, the harshest consequences would be at higher altitudes. Climate change in Uttarakhand

will force more and more people to stop farming at high altitudes and move to the plains over the next 30 years. According to this report Uttarakhand temperature may increases by 1.6 degrees Celsius-1.9 degrees Celsius warmer by 2050 (Das, 2021). Changing temperatures, rising snowlines, retreating glaciers, fluctuating rainfall, reduced snowfall in the winter, altered cropping seasons, shifting cultivation zones for some crops, and drying up perennial streams are already being experienced by the state's people. Increasing water stress, low crop yield and increasing risk of flooding are some of the negative effects of climate change on agriculture of the region. The increasing use of concrete and cement structures in place of traditional wood and stone masonry is accelerating the mountain region's heat-island effect. As a result of global warming, an increasing number of glaciers are disappearing completely or retreating, and there is significantly less snow.

Hydro Dam Impact on Uttarakhand

Since its formation in year 2000, the slogan for infrastructure development in the Indian Himalayan state of Uttarakhand has been Urja Pradesh (power state). During the last 22 years, more than 100 hydropower projects have been initiated in various river valleys throughout the state. When it comes to planning, building, and operating these projects, many of them encounter cultural, ecological, and financial difficulties. Recently, it has been claimed that these initiatives are increasing the effects of natural disasters. In its report from 2013, the National Institute of Disaster Management (NIDM) made it clear that anthropogenic activities, such as hydropower projects, were to blame for the Kedarnath flash floods' escalating effects.

The state lost 40 billion rupees' worth of property as a result of the 2013 flash flood, according to estimates made by the government. This expense far exceeds the total investment that the state has thus far attracted to fund the development of power projects. Although hydropower, which is regarded as a clean energy source by many, has an estimated potential in the state of 24,551 MW, it could only find and process projects of about 16,000 MW. Expert had warned against construction of dams above the main central thrust or the paraglacial zone (Aggarwal, 2021b) Hydropower generated little state revenue despite its economic potential. Uttarakhand's 2021-22 budget estimates hydropower revenue at Rs. five billion, less than 1% of the state's entire budget.

Name of the Dam	**Location**	**Year of Commissioning**	**Capacity at installation**
Tehri Dam	Tehri	2006	1000 MW
Alaknanda Hydroelectric Project	Srinagar (Pauri)	2015	330 MW
Chilla Power Plant	Pauri	1980-81	144 MW

Chibro Power Plant	Dehradun	1975	240 MW
Dhakrani	Herbertpur, Dehradun	1965	34.5 MW
Maneri Bhali-2	Dharasu Chinyalisaur	2008	304 MW
Ramganga	Kalagarh (Pauri)	1975	198MW

Table 2: *Major Hydro Dam Project in Uttarakhand, www.uttarakhandirrigation.com/hydropower-projects*

Fig 3: *Forest Fire An incident of forest fire near HAPPRC Department Srinagar Garhwal*

An estimated 63 percent of fires are caused by humans, whereas 37 percent are the result of natural causes. Both culminate in a disastrous catastrophe. Forest fire occurrences are a worldwide problem. Recent developments in the Amazon of California and in Australia are the most recent instances of this.

There were a record-breaking 3,45,989 fires reported in India between November 2020 and June 2021, as documented by the Forest Survey Report 2021 (Azad, 2022). With 5,1968 fires, Orissa led the list of states, while Uttarakhand ranked just sixth. However, Uttarakhand placed second only to Madhya Pradesh in 2021 in terms of the number of fires that were actively burning. For six months straight, fires ravaged the woods of Uttarakhand, setting a record of destruction from a single year. 71.5% of Uttarakhand's land area is forested, indicating great abundance in terms of biodiversity; woods also play a direct or indirect role in the state's economic development. All activities around the state will be impacted because of the effect on them.

According to studies conducted in 2021, the concentration of potentially hazardous air pollutants such as ozone, Sulphur dioxide, and nitrogen dioxide spiked dramatically over these months. The frequent landslides in Uttarakhand may be traced back in part to forest fires, which cause the ground to become open and its water holding ability to be damaged, leading to the loss of a great deal of soil during rain events. Forest fires are caused by an accumulation of heat (from things like global warming and the creation of concrete woods), an abundance of fuel (such as dry wood, leaves, and resin), and an absence of oxygen. Forest Fire increases the carbon in the and emit black carbon and black materials absorb lighter and give off infra-red radiation, which raises the temperature. So, when there is more black carbon in the high Himalayas, it will cause the glaciers there to

melt faster (Mansharamani, & Shrivastava, 2020).

The primary cause of forest fires is the irresponsible disposal of burning beedis, cigarettes, and other combustibles in natural environments. The second factor is human-caused fires, such as those started by locals in search of fresh grass and the like and which may quickly grow out of hand. As for the third, smugglers have been known to deliberately set fire to forests as part of their operations. It is also common knowledge that the forest service deliberately causes fires to cover up administrative wrongdoing. These occurrences are caused by a variety of factors, including tourists' carelessness, post-harvest fires in the fields (known as aada in the local language), common people's disregard for the forests, secret agreements between the Log mafia, saw mill owners, local touts, transport contractors, plantation contractors, government officials, and natural forces.

Rishikesh–Karnprayag Railway Project

It is an ambitious project of the government to connect “Yog Nagari Rishikesh” to the Char Dham pilgrimage routes. By 2024–2025, the route is anticipated to be finished, with 12 stations, 17 tunnels, and 35 bridges. Although railway connectivity will surely boost up tourism in the region but it is the environmental cost is much more than in making the railway line. Many villages have been forcefully displaced by the govt and many traditional sources of waters have been dried (Sharma, et al. 2021). The blasting for making tunnels in long term will certainly triggered disasters in an already fragile zone. Excessive and rapid development results into destruction. Time will tell how beneficial this project will be the development of Himalayan region.

Sustainable Development and the Way Forward

Uttarakhand is a state in the Himalayas that is renowned for its breathtaking landscapes, diverse wildlife, and exotic culture. Uttarakhand's hilly terrain is both its greatest asset and its greatest hindrance to economic growth; large-scale industrialization is prohibitively expensive in Uttarakhand because of the state's mountainous topography. Most of the agricultural sector in Uttarakhand lacks access to irrigation, making it entirely reliant on the state's unpredictable weather and climate. More organic farming should be promoted in the state.

Due to its diverse geographical and climatic circumstances, Uttarakhand is equipped with a variety of medicinal and aromatic plant species. Seven species of these plants located in Uttarakhand, Himalayas, are classified as critically endangered, eighteen as endangered, and twenty-three as at risk (Pandey et al. 2013). In order to prevent the extinction of more than 1,100 endangered plants, Uttarakhand has become the first state to publish a special report highlighting its conservation efforts.

Geologically and environmentally sound strategies are required for sustainable development. This development also increases disaster resilience and strengthens national security since climatic dangers to slope stability are becoming much more unexpected. Although Uttarakhand has performed better in the recently released SDGs Index by NITI AAYOG and ranked at 3rd place in the country (Jha, 2021). The state forest and tree cover has increased in the state and the use and production of nitrogenous fertilizers and hazardous products has decreased in the Himalayan State.

It is not only Uttarakhand it is the entire Himalayan Region where SUSTAINABLE DEVELOPMENT is the need of the hour. The Himalayan glaciers are melting at a quicker rate than any other in the world, and if the current rate of melting persists, the glaciers will likely to disappear by 2035, if not sooner. The main reason for the melting and shrinking of Himalayan glaciers is that more greenhouse gases are being released into the atmosphere by humans. Due to urbanization, there has been increase in population density which has led to deforestation near glaciers. According to research by the **Wadia Institute of Himalayan Geology**, the Gangotri glacier in the Uttarakhand Himalayas, where the Ganga River begins, receded by 1,700 meters between 1935 and 2022. Since the 1970s, the pace of retreat has been steadily rising, and at the current rate, the Gangotri glacier will completely melt in 1,500 years.

There have been more increases in temperature in higher Himalayas than the global average. It has changed the precipitation, snowfall, and rainfall patterns in the region. 'Kedarnath' and 'Rishi Ganga' Floods are examples of these climate changes.

There are around 9575 glaciers in the Himalayan region, out of which 968 glaciers are in Uttarakhand. The Uttarakhand govt. is currently monitoring only around a dozen glaciers which includes 'Gangotri,' 'Chorabari', 'Dunagiri', 'Dokriyani' and 'Pindari'.

Scientists from the Wadia Institute of Earth Sciences in Uttarakhand, who have been watching the Himalayas and their glaciers for a long time, think that carbon is spreading on the snow-covered peaks of the Himalayas. The amount of carbon in the Himalayas has increased two and a half times, to 11800 nanograms/cubic meter, and is helping melt glaciers.

The Himalayan region provides Eco-System services and provide supports to millions of lives in the form of shelter, food etc. The economy is nearly entirely dependent on natural resources such as water, forests, agriculture, and so on.

Some of the major steps in the direction of Sustainable Development are:

(i) Introduction of Organic Farming: Agriculture supports local livelihoods in the Himalayan uplands despite its small geographical scope. Uttarakhand state has passed its own **Organic Agriculture Bill**. In hill areas, the use of agricultural policies that are based on contemporary agriculture that requires a lot of inputs is very limited due to the physical, topographical, and environmental factors that come into play. The hilly terrain offered various advantages in organic product production due to lack of agrochemical and poor response to chemical fertilizers in a rainfed area is one of them (Semwal, et al. 2004). Also, in Uttarakhand pesticide usage was limited to a few farmers, unlike in neighboring Himalayan states like Himachal Pradesh and Jammu & Kashmir, where it has been in use since the 1970s (Maikhuri, et al. 2015).

Also, there is demand of organic crop in export market. Uttarakhand is rich in Wild edibles and medicinal plants which need organic manure. There is abundance of organic manure in hilly region. Agricultural production in more than 80% of Uttarakhand is dependent on rain. Its success is founded on its

natural agronomy methods and rich biodiversity. Uttarakhand has 23% of its land certified for organic farming, but the government plans to increase that to 31% by 2021 (Jagdish. 2021).

Using Organic Farming in long run will also be Sustainable for the Environment. Some of the Agricultural Product of Uttarakhand even got GI tags like Indian Bay Leaf mainly found in the Himalayan region, Munsiyari Rajma, Kumaon Chyura Oil etc.

(ii) Scope of Renewable Energy in Uttarakhand: Being a Himalayan State Uttarakhand has abundance number of Natural Resources. On one side it has mountain and on other side it has tarai region. Although there has been several hydropower projects running in the state due to abundance of rivers in the state but the state also offers the opportunity for renewable energy in the form of solar energy, wind energy etc. Due to barren land in the state, it will be useful for solar energy. The state govt has already started a scheme **Mukhyamantri Saur Swarojgar Yojana (Khami, 2020)** in this direction. This Scheme provide chances for self-employment for small and marginal farmers and jobless state citizens by installing solar power plants on land unsuitable for agricultural use and selling the energy produced to UPCL. Uttarakhand state has formed its own Solar Policy in 2013.

(iii) Sustainable Development in Uttarakhand through Tourism: The tourist industry is crucial to the economy of Uttarakhand. Approximately half of Uttarakhand is directly or indirectly involved in the tourist sector. The influx of tourists in large number in hilly state makes the region even more fragile. Uttarakhand is most well-known for the Char Dham Yatra and other religious tourism; however, the massive number of visitors currently has led to poor waste management, a lack of parking, unsanitary cuisine, and a general disregard for local laws. Sustainable Tourism relies on economic, financial, cultural, and communal growth.

(a) Economic Long-term profitability comes from sustainability. When we discuss economic sustainability, we are referring to acts that foster economic growth over time without negatively affecting the group integration, the environment, or cultural norms of the community.

(b) Ecological sustainability in simple terms means responsible travel to natural areas that conserve the environment and sustain the well-being of local people. Ecotourism is also an effective strategy to conserve biodiversity. Ecotourism aims to educate visitors about the ways in which their actions affect the natural world and to encourage them to value these places more highly Promoting recycling, saving energy and water, and providing people in the area more opportunities for employment are all important parts of ecotourism (Devlal, & Singh, 2018).

(iv) Traditional Knowledge: Time has come when we need to follow our traditional knowledge. Our ancestor used to worship the nature and as a precaution against overexploitation, communities would traditionally organize activities like loping, grazing, and the usage of forest goods like medicinal herbs and bamboos (raw material for handicrafts) at certain times of the year (Poudel, 2009). The long-term future of humanity depends on keeping the gap between scientific progress and traditional ecological wisdom to a minimum. Many traditional technologies were quite advanced by contemporary standards and better suited to the specific local circumstances, dispelling the myth that they are inherently backwards or outdated.

(v) Afforestation: India has been a global leader in implementing afforestation programs. The deforestation brought on by recent developments in the Himalayan region has a negative effect on the local inhabitants. Forest Degradation is the result of forest fires, deforestation in the name of development. Maiti Andolan is a major environmental movement in the direction of Afforestation. Initiatives like these will surely help the environment and the Agro-economy of the local people. Under the CAMPA Fund (Compensatory Afforestation Fund Act) the Centre Govt. has allocated Rs 2,675 crore to Uttarakhand for afforestation and other green activities in 2019. The CAMPA funds are also diverted to construct other utilities. These forms of development are just a reminder that events leading to catastrophic proportions will undoubtedly rise (Moneycontrol, 2019 August 30). The only way is to ensure that adaptive, resilient strategies are adopted to minimize the loss.

Conclusion

Over the next 30 years, climate change in Uttarakhand will force farmers at high altitudes to shift to the plains. Extreme weather events including flash floods, GLOFs, landslides, and other similar calamities are becoming more often as a result of the rapid warming of the Himalayas. Green Road Building "Road building must take into consideration the environmental sensitivity of the area in its whole. It must be noted that on one hand construction of big project like Char Dham Highway, Rishikesh-Karnprayag Rail Project will be beneficial for the economy of the State whereas its environment impact cannot be neglected. There has already been a lot of Hydro Power Projects in Uttarakhand. These human activities make the region more fragile. It is important that we understand the coping capacity of the region. For such a fragile region public insolvent in decision making with the government becomes important.

Recently the people of a village in the Chamoli district of Uttarakhand have won a crucial long-running struggle against the building of a dam in their area. The World Bank's "Vishnugad Pipalkoti Hydroelectric Project" (VPHEP) on the Alaknanda River is causing concern for the environment, therefore the bank convened an independent team to investigate. The committee agreed with the plight of 83 communities who said the project will lead to the demolition of the historic Laxmi Narayan Temple in Haat village (Mishra, 2022). The community relies on the

temple as both a place of worship and a means of economic support.

During the Char Dham Yatra season, the government should explore adopting CNG or electric vehicles also. Time has come where we as a human must understand the value of the majestic Himalayas. As Gandhiji has said "Earth has enough for everyone's need but not for everyone's greed." Disaster and development are dynamic, and their effects, whether good or bad, rely on local communities' particular social and cultural characteristics and their disaster and development management capabilities. It is not that the people of Uttarakhand that did not make efforts to protect this environment. Uttarakhand is also motherland of renowned environmentalist like Gaura Devi, Sunder Lal Bahuguna, Chandi Prasad Bhatt, Kalyan Singh Rawat etc. The Chipko Andolan has completed 50 years and still we failed to preserve the nature and our assault on Himalayas in the name of development is going on. Environment-damaging development is dangerous for humanity. Every year in Uttarakhand a large part of the state GDP is gone in disaster affected activities. On one hand its rapid development and on other hand it is the disaster.

As Mahatma Gandhi has said "Mother Earth has enough for everyone's need but not for everyone's greed." The Earth has provided us humans more than everything we needed to live a healthy life but have we returned the earth in the same way; we only have deteriorated this planet. The three E's Environment, Ecology and Economy is necessary for the sustainable development in such a sensitive region.

References

Aggarwal, M. (2019, April 10). This stairway to heaven is breaking: religious tourism in Uttarakhand. Mongabay-India.https://india.mongabay.com/2018/07/this-stairway-to-heaven-is-breaking-religious-tourism-in-uttarakhand/

Aggarwal, M. (2021, August 2). [Commentary] The role of hydropower projects in development and disasters in Uttarakhand. Mongabay-India. https://india.mongabay.com/2021/08/commentary-the-role-of-hydropower-projects-in-development-and-disasters-in-uttarakhand/

Azad, S. (2022, August 21). 'Highest forest fire alerts across India after ease in Covid curbs.' The Times of India. https://timesofindia.indiatimes.com/city/dehradun/highest-forest-fire-alerts-after-ease-in-covid-curbs/articleshow/93686261.cms

Das K. (2021, May 23). Climate change is already forcing farmers in Uttarakhand to migrate. https://scroll.in/article/995283/climate-change-is-already-forcing-farmers-in-uttarakhand-to-migrate

Devlal V and Singh U. (2018). Sustainable Development in Uttarakhand through Tourism. Journal of Advances and Scholarly Researches in Allied Education, 15(5). http://ignited.in/I/a/293122

Govt. of Uttarakhand. (2014). Uttarakhand Action Plan on Climate Change. Uttarakhand Action Plan on Climate Change.

Hasanuzzaman, M and Prasad M N V (2020). Handbook of Bioremediation: Physiological, Molecular and

Biotechnological Interventions (1st ed.). Academic Press.

Jagdish. (2021, November 15). Organic Farming in Uttarakhand. Agri Farming.

Jha P (2021, June 4). Uttarakhand bags 3rd spot in Sustainable Development Goals Index but records worst child sex ratio in the country. The Times of India. https://timesofindia.indiatimes.com/city/dehradun/uttarakhand-bags-3rd-spot-in-sustainable-development-goals-index-but-records-worst-child-sex-ratio-in-thecountry/articleshow/83212941.cms

Khanduri S (2020). Cloudbursts Over Indian Sub-continent of Uttarakhand Himalaya: A Traditional Habitation Input from Bansoli, District-Chamoli, India. International Journal of Earth Sciences Knowledge and Applications, 2(2), 48–63.

Maikhuri R K, Rawar L S, Semwal R L, Rao KS, Saxena KG (2015). Organic Farming in Uttarakhand Himalaya, India. International Journal of Ecology and Environmental Sciences, 3–4(161–176).

Mansharamani,A and Shrivastava A (2020, December 7). Black carbon is a threat to Himalayan glaciers. https://www.downtoearth.org.in/blog/climate-change/black-carbon-is-a-threat-to-himalayan-glaciers-74542

Mishra,V (2022,August 29)World Bank agrees to investigate construction of Uttarakhand dam. (n.d.). https://www.downtoearth.org.in/news/environment/world-bank-agrees-to-look-into-construction-of-uttarakhand-dam-84595

Money control (2019, August 30). Centre allocates Rs 2,675 crore to Uttarakhand under CAMPA fund). https://www.moneycontrol.com/news/business/economy/centre-allocates-rs-2675-crore-to-uttarakhand-under-campa-fund-4389741.html

Pandey, S and Pandey, S. (2013). Status and Distribution Pattern of Native and Endemic Species in Uttarakhand Western Himalayan Region, India. International Journal of Scientific & Engineering Research, 4(11).

Pant B R and Chand R (2020). Characteristics of Urban Centres and Urbanization in Uttarakhand. Journal of Urban and Regional Studies on Contemporary India. 6 (2): 1-20

Panwar T S (2021, August 16). IPCC report: Climate change and unregulated construction in the Himalayas. Deccan Herald. https://www.deccanherald.com/opinion/ipcc-report-climate-change-and-unregulated-construction-in-the-himalayas-1020301.html

Poudel J M (2009) Cultural Understanding of Non-timber Forest Products among the Babuban Community People of Eastern Nepal | Occasional Papers in Sociology and Anthropology. https://www.nepjol.info/index.php/OPSA/article/view/3034

Sati V P. (2013). Trends of Urbanization and its implications on Environment and Economy in the Uttarakhand Himalaya: A Case Study of Dehradun Municipal Corporation. ENVIS Bulletin on Himalayan Ecology.

Semwal R L, Nautiyal S, Sen K K, Rana U, Maikhuri R K, Rao K S and Saxena K G (2004). Patterns and ecological implications of agricultural land use

changes: A case study from Central Himalaya, India. Agriculture, Ecosystems and Environment 102: 81-92.

Sharma R, Bhandari B, Kumari S, and Falswal A (2021). Impact of Rishikesh-Karnprayag railway line on the agroecosystem of Maletha village of Garhwal Himalaya. Environment Conservation Journal, 22(1 & 2), 6–11. https://doi.org/10.36953/ecj.2021.221202

The Hindu. (2022, February 11). Chairman of Supreme Court panel on Char Dham project Ravi Chopra resigns. https://www.thehindu.com/news/national/chairman-of-supreme-court-panel-on-char-dham-project-ravi-chopra resigns/article38412187.ece

The Week (2019, September 19). In a first Uttarakhand releases report on conservation of endemic threatened floras. https://www.theweek.in/wire-updates/national/2020/05/24/des21-floras-report.html

Vitamin T V F F 2 4. (2022, February 24). Climate Damage and the Role of Insurance. Fair Observer. https://www.fairobserver.com/region/central_south_asia/satya-prakash-negi-plastic-pollution-himalayas-tourism-environmental-news-world-news-67914/