



## Impact of Environmental Hazards in Munsyari Block: Kumaun Himalaya

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### Abstract:

An environmental hazard is any condition, process or state adversely affecting the environment; it can cause widespread harm to humans and the physical environment in the fragile system like the Himalaya. An environmentally sensitive area suffering from extreme events such as – landslides, cloudbursts, earthquakes etc from degradation processes, is selected for the present study. The study area is tectonically active and prone to hazard and disaster very often. A detailed field investigation was conducted in the study area to find out the impact of processes causing environmental degradation. In the recent past these processes are rapidly increasing due to increasing phase of human activities; causing damage to life and property in the Munsyari block specifically and the Himalayan region in general. Madkot, Walthi, Kwiti, Kultham, La, Jhekala, Alam, TallaBainskot, Nachani, Kota, Dor and many more villages were severally affected due to the extreme events in the past 5 years. Therefore detailed field investigations in the area are required, so that measures regarding the same can be implemented to mitigate the impact of hazards and disasters in the region. Regional planning through government departments and co-ordination of government officials with the local communities can be helpful in this regard.

**Keywords:** Hazards, Degradation, Tectonic, Extreme Events

### 1.0 Introduction:

The Himalaya, one of the youngest mountains, present a dynamic geo- environment with varied rock types, seismically active tectonic zones, rugged topography, steep slopes and intense monsoon rainfall. The weak and fragile rocks along with thick overburden deposits on steep slopes are further subjected to severe weathering and toe erosion by a number of streams. In the recent past, different type of disasters has played a significant role in changing the landforms in the Himalayan region. Environmental hazards may be defined as those extreme events either natural or anthropogenic which exceed the tolerable magnitude within or beyond certain time limits, make adjustment difficult, resulting catastrophic losses of property and lives. Hazards are the processes which cause an accident or extreme event or danger whereas disaster is a sudden adverse or unfortunate extreme event which cause great damage to human being as

well as plants and animals, i.e. disaster occur rapidly (Kumar, 2000). On the basis of main causative factors the environmental hazards and disasters are of two types: natural hazards and disasters and anthropogenic hazards and disasters. The damage to the ecological balance (of the Himalaya) is mostly man made or is caused by human negligence and cities three main causes: road construction, overgrazing and reckless deforestation (Valdia, 1985).

Hill slopes in the Himalaya are known for their instability due to ongoing tectonic activity (Sati et al., 2011). The Indian Himalayan belt is highly prone to all kinds of natural hazards including landslides, earthquakes, avalanches, flash floods, outbursts. In the recent past different type of disasters have played a significant role in changing the landforms in the Himalayan region. Few of the geomorphic processes presently acting in the mountain landscape are restricted to that environment; most

of them are found in other environments as well. The Himalaya constitutes the highest mountain system of the world. In recent years, mountains specially the Himalayas have become the focal point of ecological concern (Chadha, 1990). For the Himalayan slope surfaces to be established vegetation cover must be restored. There is a need to evolve standard plant culture practices particularly in adverse environmental zones and to develop these practices into an economically viable activity. Man's relationship with his environment has always changed with time, depending on his understanding and knowledge of the physical environment. However, the natural environment is generally endowed with variable quantity and quality of resources within the space (Simmons, 1981). Anthropogenic activities such as building activity and eventual urbanization, construction of bridges, barrages, agricultural practices, deforestation, land use channels etc. by man invite several hazards in mountainous region, which pose a serious threat to human society.

Storage and transfer of water and sediment down the slopes vary according to local and regional environmental condition (Kale and Gupta, 2001). Some environment hazards and disasters in Uttarakhand Himalaya in the recent past have been particularly devastating. One of the most sever instances of this phenomenon is the recent flash flood along with debris flow at Kedarnath on 16<sup>th</sup> June 2013, which has claimed more than a thousand casualties. All 13 district in Uttarakhand have been

affected by the flood directly of which four districts (Uttarkashi, Rudraprayag, Chamoli and Pithoragarh) are worst affected. Both local inhabitants in the remote villages and pilgrims areas are affected. In Pithoragarh district total of 121 villages are reportedly affected. Munsyari and Dharchula block are most affected because of cloudbursts, flashflood, landslides and earthquakes. (Das, 2013)

### 2.0 Study Area:

Munsyari block lies in the north and west of the Pithoragarh district. Pithoragarh district is the eastern most Himalayan district of Uttarakhand. This area is within the Kumaun Himalaya. The geodynamical complexity in Kumaun Himalayan region is manifested in several major thrust areas such as the Main Central Thrust (MCT), MCT is an imaginary line which separates greater and Lesser Himalaya and from earthquakes/ seismic standpoints, it lies in zone V. lying along the MCT the whole region is highly prone to environmental hazards.

Among the most affected areas, due to environmental hazards eight villages are selected for the field study from the Munsyari block. The selected areas are very sensitive towards hazards (i.e. earthquakes, landslide, cloudbursts, and mass movements) and caused damage during few years. The selected villages and their locations are given in the table-1 and their basic information in table-2.

Table 1: Location of Selected Villages in Munsyari Block

Village name	Latitude	Longitude	Elevation(ft.)
Bhandarigaw	30°02'12" N	80°09'35" E	6125
Laa- Jhekla	30°01'28" N	80°09'11" E	4685
Girgaw	30°00'18" N	80°08'53" E	6571
Bansbagadh	29°55'34.52" N	80°13'54.41" E	3580
Timtiya	29°56'20.58" N	80°08'37.53" E	3208
TallaBainskot	29°55'11.90" N	80°13'21.27" E	3627
Gini	30°01'19.46" N	80°10'13.96" E	5821
Ruisapata	30°00'49.22" N	80°09'25.38" E	4641

Table 2: Basic Information of Selected Villages in Munsyari Block

Village name	Total Population	Transport Medium	Agriculture	Hazards
Bhandarigaon	175	Footpath	Paddy, Wheat, Maduva	Landslide, Earthquake, Flash Flood
Laa- Jhekla	86	Bus, jeeps	Paddy, Wheat, Maduva	Landslide, Earthquake, Flash Flood
Girgaon	349	Bus, Jeeps	Paddy, Wheat	Landslide, Earthquake, Flash Flood
Bansbagadh	141	Bus, Jeeps	Paddy, Wheat,	Landslide, Earthquake, Flash Flood
Timtiya	134	Bus, Jeeps	Wheat, Paddy, Maduva, Maize	Landslide, Flash Flood
Talla-Bhainskot	138	Footpath	Wheat	Landslide, Earthquake, Flash Flood
Gini	512	Footpath	Maduva	Landslide, Earthquake, Flash Flood
Ruisapat	128	Footpath	Maduva, Maize,	Landslide, Earthquake, Flash Flood

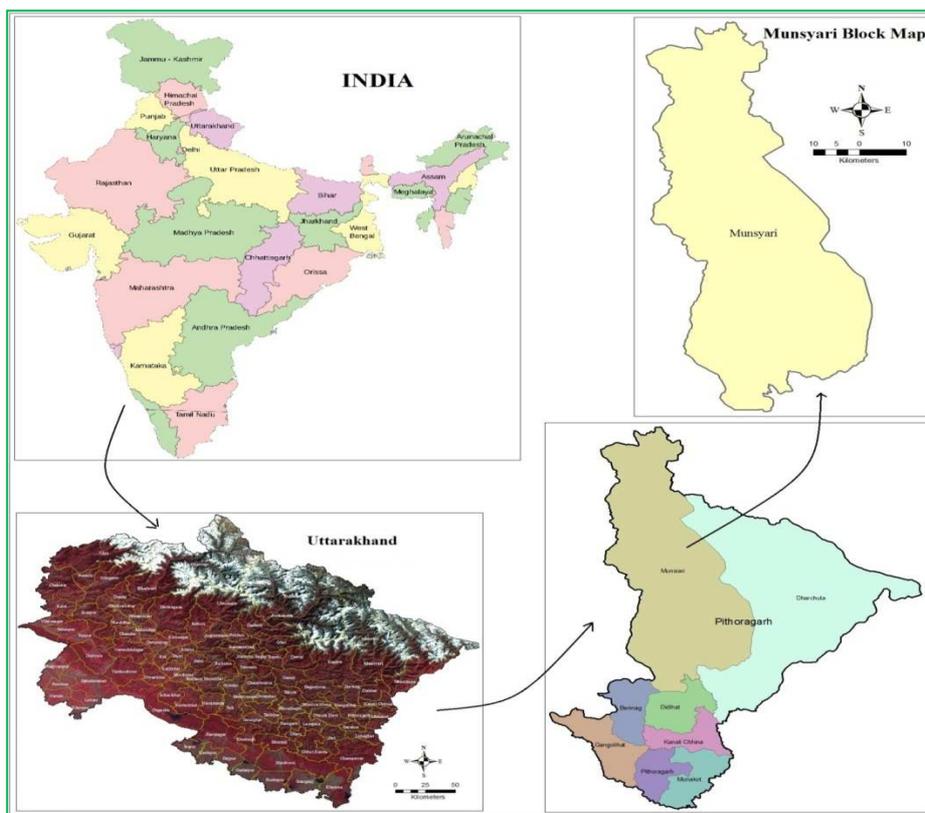


Fig. 1: Location Map of Munsyari

The aim of present study is to analysis the impact of environmental hazards in the landforms and human beings. Identification of places with major affected areas by environmental hazards, and to find out the causes of hazards. To find out the role of topography, vegetation, cover precipitation etc and their combined effects. With the help of identification, prevention, measures and warning systems, mitigate the impact of these hazards.

**2.1 Methodology:**

The study has included both primary and secondary data collection. Detailed information has been collected through different sources (govt., non- govt. and personal contacts) and detailed field study. Preparation of the base map, with the help of Survey of India topographical sheet. Severely affected villages in Munsyari block are selected for the study. Preliminary data collection was completed through

field survey and personal interviews by using schedule method. Secondary data collected from block development office and tehsil headquarter books, websites and articles etc.

**3.0 Result and Discussion:**

Environment can influence the socioeconomic setting in the Himalaya in a number of ways. Specific knowledge and data on human wellbeing in the Himalaya is limited, but the effects of environmental change will be felt by people in their livelihoods (Sharma et al. 2009). In the recent past different types of environmental hazards have played a significant role in changing the landforms and landscapes in the Himalayan region. Pithoragarh

district is very sensitive towards extreme events as it lies in a tectonically active zone of the Himalayan terrain. Occurrence of high intensity rainfall or seismic activities can lead towards hazards in the area. The geo morphological conditions are major factors responsible for environmental hazards which cause major havoc every year in the area. In the study area, total geographical land of All the selected villages (Bhandarigaon, Laa-Jhekla, Girgaon, Bansbagadh, Timtiya, TallaBhainskot, Gini, Ruisapata) was 1694.5 hectare including forest land (515.258 hec.), agricultural land (256.303 hec.) and NAP (non-agricultural purpose) land (922.939 hec.)(Table-3) and total damaged land was 9.34 %.

**Table 3: Land Distributions of Selected Villages in Munsyari Block**

Village name	Total geographical Land (hec.)	Forest Land (hec.)	Agricultural Land	NAP(hec)
Bhandarigaon	64.734	11.151	22.747	30.836
Laa- Jhekla	48.218	8.849	10.822	28.547
Girgaoan	526.024	217.841	57.061	251.122
Bansbagadh	238.683	54.067	25.783	158.833
Timtiya	123.125	12.000	7.715	103.410
Talla-Bhainskot	195.895	64.800	14.034	117.061
Gini	200.158	86.550	51.119	62.489
Ruisapata	297.663	60.000	67.022	170.641

Source: Block Development Office (Munsyari)

Bhandarigaon is located on the slopes above the Jakula river bed and is sliding towards the river. 31.92% of the forested land, 26.37 % of the agricultural land and 17.41 % of the NAP land has been damaged in the disasters during 2013 and 2014. More than fifty percent of the families of the villages have been rehabilitated after the disasters. Laa- Jhekla villages are located along Thal Munsyari road. Cloudburst in the Laa- Jhekla village in 2009 was responsible for the untimely death of 38 villagers (26 people of Laa village and 12 of Jhekla village) who were buried alive in the debris. Laa

village was totally demolished due to the disasters. Houses and agricultural land of the villages were converted in the barren land as seen in Fig.-2. 15.14 % of the forested land, 19.12 % of the agricultural land and 21.82 % of NAP land was again devastated in the year 2013-2014. In Jhekla village several debris channels flowed down slopes, changing a large part of the village area into ruins (Fig. 3) and damaged mainly agricultural land.



**Fig. 2: Laa Village Devastated By Cloudburst**



**Fig. 3: Debris Channel Flow In Jhekla Village**



**Fig. 4: Girgaon**



**Fig. 5: Damaged Forested and Agricultural Land Of Gini**



**Fig. 6: Damaged forested land in Ruisapata**



**Fig. 7: Damaged Agricultural Land In Ruisapata**

**Table 4: Damaged Land in Selected villages in Munsyari Block**

Name of Villages	Forest land Land (hec.)	Agricultural Land (hec.)	NAP (hec.)
Bhandarigaon	3.56	6.000	5.37
Laa- Jhekla	1.34	2.07	6.23
Girgaon	22.00	3.12	23.17
Bansbagadh	2.02	1.09	6.11
Timtiya	0.86	1.01	13.06
TallaBhainskot	3.12	1.18	12.03
Gini	2.13	1.04	11.09
Ruisapata	4.14	7.35	19.12

Source: Block Development Office (Munsyari)

**Table 5: Percentage of Damaged Land in Selected Villages of Munsyari Block**

Village name	Forest land (%)	Agricultural land (%)	NAP (%)
Bhandarigaon	31.92	26.37	17.41
Laa- Jhekla	15.14	19.12	21.82
Girgaon	10.09	5.46	9.22
Bansbagadh	3.73	4.22	3.84
Timtiya	7.16	13.09	12.62
Talla-Bhainskot	4.81	8.40	10.27
Gini	2.46	2.03	17.74
Ruisapata	6.9	10.96	11.20

Source: Block Development Office (Munsyari)

Girgaon was also one of the villages which were devastated due to disasters in recent past 10.09 % of the total forested land, 5.46 % of the agriculture land and 9.22 % of the NAP land was damaged because of the disasters in the village. Forested and NAP land of Girgaon was damaged by debris flow as seen in Fig.-4. Similarly, 3.73 % forested land, 4.22 % agricultural land and 3,84 % NAP land of village Bansbagadh; 7.16 % forested, 13.09 % agricultural and 12.62 % NAP land of Timtiya village; 4.81 % forested, 8.40 % agricultural and 10.27 % NAP land of TallaBainskot village; 2.46 % forested land, 2.03 % agricultural land and 17.74 % NAP land of Gini village; 6.9 % forested land, 10.96 % agricultural land and 11.20 % NAP land was ruined due to disaster (Table-4 and Table-5).

Major agricultural land area of Bansbagadh village was damaged by road construction. Timtiya and TallaBhainskot were affected by river band erosion.

Most of the agricultural and forestland of Gini village affected by debris flow (Fig.-6). Ruisapata was totally damaged and the terraced agricultural fields were flattened (Plate- 7 and Plate-8).

Prevention and mitigation measures play an important role in minimizing the damage caused by disasters which can be implemented before the occurrence of disasters, during the disasters and after the disaster have been occurred. After disaster recovery and rehabilitation are time consuming, lengthy and costly process (Singh, 2014). Landslide vulnerability maps are also essential to assess damage potential (Bhandari, 2004).

## 6.0 Conclusion:

There are a large part of the forested land was damaged in Bhandarigaon and Girgaon where the rate of 31.92 % and 10.09 % in the forested area. In the village Laa- Jhekla, TallaBhainskot, Gini and Ruisapata the percentage of damage is higher in the agricultural area. The area including forested land and village area of Bhandarigaon and Girgaon is prone to landslide. Thus damage was caused due to landslides and cloudbursts both. Ramganga along with its tributaries has worked out the bed and banks along its path and worked away the agricultural terraces of Timtiya and Bansbagadh. All the selected villages (Bhandarigaon, Laa- Jhekla, Girgaon, Bansbagadh, Timtiya, TallaBhainskot, Gini, Ruisapata), 7.60 % of total forested land, 8.91 % of total agricultural land and 10.42 % of total NAP land damaged by environmental hazards. The hazards play their different role in different environmental conditions. The effect of these events in various landforms varies with the geological setting and anthropogenic activities in the area. If the people of the Himalayas were more aware of the geological vulnerability and ecological fragility, they would surely force more compliance of laws and regulations to protect it. We cannot stop these hazards but mitigate the harmful effect by identified the sensitive areas. So the study may help to environmentalists to analyze the impact of hazards in human being.

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