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ENVIRONMENTAL DISASTERS AND THE QUEST FOR SOCIAL JUSTICE IN UTTARAKHAND, INDIA

Geography

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Abstract:

On 16 and 17 June 2013, heavy rains together with moraine dammed Chorabari Lake burst caused flooding of all rivers in Uttarakhand. The flash flood and landslides killed more than 6000 people. It left approximately 84000 people stranded for several days. Indian Army and its Northern Command launched one of the largest and most extensive human rescue missions launched in its history. Spread over 40,000 square kilometres, 45 helicopters were deployed to rescue the stranded. Increasing human activities are augmenting the risk of natural disasters in the ecologically sensitive region of Uttarakhand. Everywhere development has been done without a care for regulations. The economic future of the Himalaya and its people can never be secured if the already vulnerable region is made more hazard-prone. This paper aims to find out the natural and manmade causes of this disaster and emphasizes upon the need to be alert about such events in future.

Key Words: Torrential rain**,** flash flood, deforestation, landslides, hydro-power projects, haphazard construction, death and damage.

Introduction

The Kedarnath town is situated on the outwash plane of Chorabari and Companion glaciers. The channels of Mandakini and Saraswati Rivers encircle this outwash plane and meet near the

Kedarnath town where the outwash plane ends. These streams cut their banks every year. The catchment area is situated in the glacier modified U-shaped valley; the altitude ranges from 2740 to 6578 metres above m.s.l. Such a variation in the altitude provides diverse landscape. The Kedarnath temple ($30^{O}44^{/}$ N, $79^{O}4^{/}$ E)-is one of the most revered shrines in Uttarakhand and is visited by millions every year. The temple is located at a height of 3,581 metres above m.s.l. in a valley of the Garwal Himalayan range near the Mandakini River. There were more than 13,000 people were at Kedarnath during the rain fury of 14-16th June, 2013. Heavier intensity rainfall was over the Chardham area of the State (viz. Kedarnath, Badrinath, Gangotri and Yamunotri) apart from Rudraprayag, Srinagar, Chamoli, Guarikund and many more places en route to these centers. The Kedarnath valley, along with other parts of the state of Uttarakhand, was hit with unprecedented flash floods and landslides.

Causes of Disaster

a. Natural Causes

The disaster was caused by a combination of factors, namely early rainfall and glacial melt, cloudburst, Glacial Lake Outburst Flood (GLOF), rupture of Kedar dome and landslides.

i. Early Rains and Glacial Melt

Uttarakhand received rain early this year. Usually, monsoon sets in by June 1, while this year it arrived in the last week of May. It is by July 15 that all parts of India receive rains. This year that day came as early as June 15 and more hefty downpours occurred following two weeks of the disaster. It moved fast towards the north, without taking its characteristic break before hitting one region after the other. Heavy rains lashed parts of north India from 1-15th June. The surface atmospheric pressure began to decrease on 15 June reaching a low (832.4mb) on 17 June.

An analysis of rainfall data for the past five years points to changes in rainfall trends in India, with a greater number of incidents of excess rain in Uttarakhand in June. The trends in rainfall do not indicate the kind of disastrous rainfall the state received this year, but it does point to the necessity for a robust disaster management programme, which as of now does not exist in the state. Last year, there was a rainfall deficit in June across the state. But data for the preceding five years indicates a trend towards excess rainfall in June. The quantum of rain flooded all the rivers of Uttarakhand beyond

comprehension.Records show that there was 300 mm rainfall between 15th & 18th June over the northern parts of the State. This is mainly the area covered by the Chardham Pilgrimage being 50% area of the Uttarakhand that covers 51125 sq. km. Very heavy rainfall occurred over an area of about 25000 square km in the hilliest terrains of the state within just two days (Map1).

Rivers in the region already have heavier flow in June than at other times of the year because of the seasonal melting of glaciers. When water falls on ice, it melts faster; and as it rained on the glaciers, the massive run-off began to swell the rivers. The heavy rainfall together with melting of snow in the surrounding Chorabari glacier washed off both the banks of the Mandakini River causing massive devastation to the Kedarnath town.

Table: 1 Rainfall Data of Uttarakhand Districts

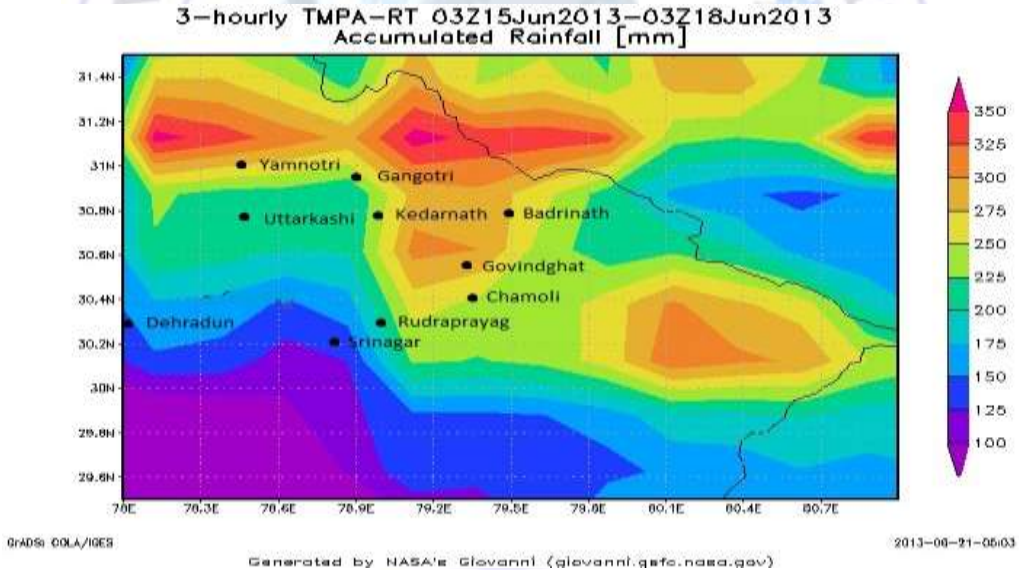
Districts	Total Amount of Rainfall (mm) from 01.06.2013 to 19.6.2013			
	Actual	Normal	Departure (%)	Category
1. Almora	234.4	67.1	249	E
2. Bageshwar	455.7	67.1	579	E
3. Chamoli	375.6	52.5	615	E
4. Champawat	427.0	85.7	398	E
5. Dehradun	644.5	75.0	759	E
6. Garwal Pauri	205.1	43.9	367	E
7. Garwal Tehri	356.9	61.0	485	E
8. Hardwar	342.7	47.9	615	E
9. Nainital	586.2	89.8	553	E
10. Pithoragarh	320.3	154.2	108	E
11. Rudraprayag	479.5	102.8	366	E
12. U S Nagar	206.5	70.9	191	E
13. Uttarkashi	475.9	66.1	620	E

Source of Data: India Meteorological Department, July, 2013 [Note: E=Excess (+ 20% or more)]

ii. Cloud Burst: On June 15, 2013 a cloudburst was reported in Kedarnath and Rambada region of Uttarakhand State. The Wadia Institute of Himalayan Geology (WIHG) meteorological observatory at Chorabari Glacier camp (3820 masl) recorded 210 mm rainfall in 12 hours between 15th June (5:00 p.m.) and 16th June (5:00a.m.) 2013. On 16th June 2013 alone (from 5:00a.m.to 5:00p.m.), 115 mm rainfall was recorded, causing 325 mm rain in 24 hours. This caused flash floods in the evening of 16th June and brought debris down from the landslides and glaciers to the Kedarnath town all the way up to village Rambada.

Over 300 mm of rainfall has been recorded in the last 24 hours on June 18 in Almora. Kosi began to swell after a sudden cloud burst in Almora. From one lakh 15 thousand cusecs early morning on June 18, the water level rose to one and a half lakh cusecs by evening. Cloudburst was reported from Sunali village of Uttarakhand's Chamoli district on 24th June. On June 25, three people were killed and many were injured in a similar cloudburst in Devprayag in Tehri.

Map 1: Accumulated Rainfall over Chardham Area from 15.6.13 to 18.6.13



Experimental Real-Time TRMM Multi-Satellite Precipitation Analysis (TMPA-RT): 3B42RT

Source of Data: The image used in this study was acquired using the GES-DISC Interactive Online Visualization and Analysis Infrastructure (Giovanni) as part of the NASA's Goddard Earth Sciences (GES) Data and Information Services Center (DISC).

The Ganga River in Haridwar was in full spate and many highways linking Delhi and Haridwar, Rishikesh and Yamunotri and Gangotri and the Badrinath National Highway were flooded. The Ganga was flowing two metres above the danger mark and an alert has been sounded and people have been asked to desist from bathing in the river.

iii. Rupture of Kedar Dome: Heavy rainfall caused crumbling of the Kedar Dome (6824 metres), a glacier-like body of rock and ice. According to eyewitnesses huge rocks broke away from Kedar Dome after the flash flood. These rocks got stuck some distance away from the Kedarnath temple, saving the holy shrine's main structure from being demolished. The rocks, the frothy raging waters and the miles of mud from the area that was washed out from the river almost submerged Kedarnath, killing many people.

iv. Glacial Lake Outburst Flood: The Chorabari Lake (3960 masl) also known as Gandhi Sarovar Lake is a snow melt and rain fed lake, located about 2 km upstream the Alakananda from Kedarnath temple which is approximately 400m long, 200m wide having a depth of 15–20m. Due to heavy rainfall the right lateral basin of the glacier, which is thickly covered by snow (>2 metres thick near the upper part of lake) rapidly melted due to rain-water allowing large amount of water accumulation in the lake. There were no outlets in it. As the lake is a quicksand the water was simply released through narrow passages at the bottom of the lake. Suddenly 10 million litre of water (normal capacity 1.4 million litre) accumulated in the moraine dammed lake within 3 days, which increased the potential energy and reduced the shear strength of the dam. The loose moraine dam breached in the evening of 16th June and caused enormous devastation in Kedarnath valley.

b. Manmade Causes

While the administration insists that it was a natural calamity, environmentalists opine that this was a man-made disaster waiting to happen. The widespread and almost unregulated deforestation, expansion of giant hydro-electric projects in the region, the incessant construction of roads to serve the

burgeoning tourist population and the adverse effect on the fragile ecosystem in the region due to growing human presence and pollution are the major causes for the devastation in Uttarakhand.

i. Deforestation: The worst affected districts of Chamoli, Pithoragarh, Rudraprayag and Uttarkashi are the areas where maximum forestland has been diverted for development activities. Since 1980, 44,868 hectare of forestland in Uttarakhand has been diverted to non-forest use. Under the Forest (Conservation) Act, 1980, a project developer is supposed to plant trees in a non forest area equal to the forest area it is clearing, or on degraded forest land which is double the project area, to compensate for forest loss. However, compensatory afforestation seems to be ineffective in the state. In lieu of all the forest cleared in the state so far, compensatory afforestation in 32,174 hectare land has been stipulated. Only 12 per cent of this has been achieved.

The plantation is done at a different location, sometime even in a different state (Uttar Pradesh in case of Uttarakhand), which hardly makes up for the ecological disturbances at the place from where vegetation has been removed. Another important factor is that the state has a poor record of plantation under catchments area treatment plan.

Forests that have been removed from these districts have native Himalayan vegetation. In Kedarnath Valley there have been very few landslides in the past, as the

Table 2: Districtwise Details of Forest Area in Uttarakhand

Districts	Geographical Area (sq. km)	Forest Cover (2005)		Forest Diverted * (sq. km) 2000-2010
		Sq. km	In percentage	
1. Almora	3139	1557	49.6	5.984
2. Bageshwar	2246	1380	61.44	4.783
3. Chamoli	8030	2698	33.6	17.667
4. Champawat	1766	1622	91.85	3.085
5. Dehradun	3088	1593	51.59	12.031

6. Garwal Pauri	5329	3271	61.38	6.107
7. Garwal Tehri	3642	2138	58.7	15.22
8. Hardwar	2360	634	26.86	51.76
9. Nainital	4251	3094	72.78	11.047
10. Pithoragarh	7090	2077	29.29	12.816
11. Rudraprayag	1984	1120	56.45	2.99
12. U S Nagar	2542	577	22.7	1.451
13. Uttarkashi	8016	3144	39.22	5.775

*Source of Data: State of Forest Report, 2005; * Uttarakhand Jal Vidyut Nigam Limited, July, 2013*

Imagery 1: Flood and Landslide Areas in and around Kedarnath Valley

Source of Data: Indian Space Research Organization, June, 2013

Native forests of the region have great soil-binding capacity and water retention power. At 1800-2000m in the Himalayas in the banj-oak-pine belt, there is considerable evidence of deterioration in forest quality and extent (Table 2). In the last decade, 15072 hectare forestland was diverted for roads, irrigation, power transmission and hydroelectric projects. There are 90 major landslides on the Rishikesh-Badrinath and Joshimath-Malari roads that regularly give trouble to the BRO (Border Roads Organization). ISRO believes that the disaster in Uttarakhand was aggravated by the large number of landslides in the area between June16 and 17 (Imagery 1). Though a landslide inventory is still being

prepared, preliminary data shows that a total of 110 landslides occurred along the river valleys of Mandakini, Saraswati, Mandani, Kali and Madhyamaheshwar. The debris created by these landslides was carried along with the flood water and added to the destruction.

ii. Profit Maximization, Big Loss: Tourism in the state has increased by 213 per cent (according to the Uttarakhand Tourism Department) over the past 12 years. The shortage of dwelling units to meet the ever-increasing numbers of tourists visiting the state led to the mushrooming of illegal structures, some of which were constructed right on the riverbanks.

According to estimates from the Uttarakhand Hotel and Restaurant Association, the recent floods washed away over 100 small hotels which had been constructed right on the riverbanks.

Table: 3 Increase of Tourist Flow in Chardham (Four Pilgrimages), Uttarakhand

Place	Increase of Tourists (%) from 2001-2012	Pilgrims in 2013 till 20th June
Kedarnath	378	323867
Badrinath	136	489924
Gangotri	250	252783
Yamunotri	240	209753

Source of Data: Uttarakhand Hotel and Restaurant Association, 02.08.2013

The tourist flow was interrupted in peak season with five more months to go before temple authorities closed the four shrines in November before the harsh winter months. As a result of this disaster, the entire state's tourism sector has been affected. Even areas where there has been no damage such as some hill stations, tourists are not coming in this year.

iii. Hydropower Projects: While dams are needed to meet energy requirements, building them is a construction-intensive activity. It involves blasting, excavation, debris dumping, movement of heavy machinery, diversion of forests and rivers. This can cumulatively impact Himalayan ecology. The

districts where maximum devastation has taken are also the districts with maximum number of operational, under construction or proposed hydropower projects.

The Central Electricity Authority and the Uttarakhand Power Department have estimated the hydroelectric potential of the River Ganga is about 9,000 MW and have planned 70-odd projects on its tributaries. In building these projects the key tributaries would be modified - through diversion to tunnels or reservoirs—to such an extent that 80 per cent of the Bhagirathi and 65 per cent of the Alaknanda could be affected. As much as 90 per cent of the other smaller tributaries could be affected the same way.

Table: 4 Hydropower Projects, Power Generation Capacity and Riverbed Mining in Uttarakhand

Districts	Hydropower Projects				Riverbed Mining (Hectare)
	Operational		Under Construction and Proposed		
	Number	Capacity (MW)	Number	Capacity (MW)	
1. Pithoragarh	10	290.55	52	3994.805	34.08
2. Chamoli	9	430.25	42	3056.35	115.8
3. Dehradun	6	477.75	5	1021.2	63.51
4. Uttarkashi	5	401.40	37	2250	141.84
5. Tehri	3	1025.5	20	1703.35	29.56
6. Pauri	2	342	11	1210	67.91
7. Haridwar	2	29.7	0	0	0
8. Rudraprayag	2	0.7	17	1075	51.38
9. Champawat	2	0.5	0	0	182.8
10. Nainital	2	120.2	2	12.6	123.83
11. US Nagar	1	41.4	0	0	724.69
12. Bageswar	1	4.8	12	72.48	13.87
13. Almora	0	0	1	0.1	59.6

Source of Data: Uttarakhand Jal Vidyut Nigam Limited, July, 2013

According to the Uttarakhand Jal Vidyut Nigam Limited, 45 hydropower projects with a total capacity of 3,164 MW are operational in Uttarakhand, and around 199 big and small projects, with total capacity of 17,559 MW are proposed or under way in the state.

In terms of capacity addition, the districts which experienced maximum impact of floods- Uttarkashi, Chamoli, Rudraprayag, Tehri and Pithoragarh-will see maximum power capacity addition. For example, Rudraprayag which has only two small projects with capacity of total 0.7 MW will see a capacity addition of as much as 1,075 MW (Table 4).

Poorly planned dams in Uttarakhand which were constructed without paying heed to their environmental impact is seen as one of the reasons why floods turned so devastating in the state this June. Many Dam authorities opened the flood gates from 17th June, without warning, which caused huge damage to the houses downstream. Experts say that there is an urgency to reassess the need of hydropower in the state and make hydro energy sustainable.

iv. Road to development: Road construction in the state has caused deforestation and soil erosion, leading to uprooting of large trees; disturbance in geological strata, disturbances in water resources, impacted biodiversity, caused pollution and destroyed medicinal wealth.

v. Riverbed Mining: Unscientific mining helped rivers to increase their width and change course this time. As per mining guidelines, not more than 0.9 metre should be dug, but private mining companies go as far down as 9 metres. During monsoon, when the river swells, it tilts towards the dug up area, not only changing its course but also putting roads and houses along the riverbank at a high risk.

vi. Poor Coordination: India has an elaborate multi-tier and multi-agency natural disaster and flood Early Warning (EW) system, both at the Central and the State levels. Federal nodal agencies responsible for providing EW are:

1. Floods -Central Water Commission

2. Landslide Hazard – Geological Survey of India (GSI)

3. Avalanche – Defence Research Development Organization (DRDO)

4. Disaster Management Support (DMS) – Indian Space Research Organization (ISRO)

5. Weather - India Meteorological Department (IMD).

None of these agencies except the India Meteorological Department is known to have provided EW of the Himalayan disaster that struck Uttarakhand in June 2013. The Central Water Commission, under the Union Ministry of Water Resources, made its first flood forecast for this year for Uttarakhand after the event on 18 June for Rishikesh and Haridwar. Even the warning by the IMD of very heavy rain and snow in the upper reaches of the Himalayas, the impending floods, and the recommendation to move people to safer places, had little effect.

Death and Damage

At 7.18 pm on June 16, the people at Kedarnath heard an extreme loud crack. Within seconds, a massive wall of water gushed towards Kedarnath Temple. Huge boulders flung into the sky like an explosion. In less than 15 minutes, thousands of people were swept away. Although the temple withstood the severity of the floods, the temple complex and surrounding area were destroyed, resulting in the death of thousands of pilgrims and local people. Houses, shops and hotels in Kedarnath were destroyed and all roads were broken.

The second event occurred on 17 June 2013 at 6.45 a.m., after overflow and collapse of the moraine dammed Chorabari Lake which released large volume of water that caused another flash flood in the Kedarnath town leading to heavy devastation downstream (Gaurikund, Sonprayag, Phata, etc.). More than 84,000 tourists and pilgrims stranded on different Chardham (four pilgrimages) routes of the Garhwal hills. The Kedarnath temple, 110 km northeast of Dehradun, is cut off because the bridge on the Mandakini at Gaurikund was washed away on 16th June, leaving tourists and pilgrims

stranded. On June 18, 2013, debris carried by floodwaters of the river Alaknanda crashed against a Hindu Temple in Chamoli district. Torrential rains and flash floods washed away homes and roads.

Outbreak of water-borne diseases in some areas aggravated the situation. The bodies buried under the mound of debris in Kedarnath Valley started decomposing, leading to an epidemic. The dead bodies have not been fully cremated because of lack of connectivity to places like Rambada and Kedarnath.

The Supreme Court described Kedarnath as a "ghost town", with scores of bodies buried under the earth brought by rain and floods; the government has begun disbursing compensation to those killed or "missing beyond hopes of coming back". As on 13 July, officially the number of people dead is 580. Figures of people missing were given as 5772 including 924 local persons. According to the survivors this is only 10 per cent of the real picture. The temple town was stinking of rotting bodies. The ground level had risen by about two metres and bodies could be seen stuck in the debris at about every 10 metres. The number of houses wiped out is 2052, damaged is 4207, 1307 roads destroyed, 9 bridges collapsed, livestock lost is about 9519 and 649 cattle sheds damaged. The rescue operation was complete on 2nd July. As of July 2, the total number of persons evacuated was 108653. The state government prepared a list of missing persons who were declared 'presumed dead' as they did not return home or called their relatives by July 15. Under normal circumstances, people who have gone missing are declared dead only if they have not been heard of for 7 years.

Quest for Social Justice

Uttarakhand was demarcated in 2000 as a separate state in order to address the issues specific and unique to the hill state, one of which was that of environment and development. Thirteen years after its formation, many of the residents, especially those in the hill area, complain that their concerns about life and livelihood in the hills have been neglected by the government.

Local inhabitants noted that environmental disasters are occurring at a greater frequency over the last few decades even though they have been of regular occurrence in general. The hill slopes at

Badrinath, near the source of the river Alaknanda, have witnessed numerous avalanches which have damaged houses in Badrinath in 1948, 1952 and 1975. Rock falls are also common. In September 1968, a huge rock fell on a bus full of pilgrims a few km before Joshimath. The passengers were killed instantaneously. In September 1969, a huge landslide took place some three km upstream of the small market place of Kaliasor, located around the 147 km post of the Hardwar-Badrinath road and blocked nearly three-fourth of the width of the river Alaknanda. The hillside was reported to have kept slipping for four days. In 1991, a major earthquake hit Uttarkashi. In 1998, a landslide in the village of Malpa in the Pithoragarh district claimed over 250 lives including pilgrims on their way to Kailash Mansarovar. The area suffered an earthquake on 29 March 1999 (M-6.8) which caused loosening of rock masses, ground cracks and landslides etc., besides killing more than a hundred people due to collapse of buildings. In 2008 and 2009, the state experienced severe drought conditions. In 2010, people had to grapple with floods, flash floods, landslides and cloud bursts. The estimate of loss of lives due to natural calamity during 2010-11 stands at 46 for the district of Almora including over 4000 affected households. Almora and its surrounding areas were hit by a cloudburst in 2010 leading to swelling of the waters of the Kosi and landslides, causing an estimated 60 casualties in total, 28 in Almora alone; it also incurred heavy damage to the Khairna-Almora road. Some villages in the Ukhimath and Jakholi block suffered from a cloudburst in 2012, leading to a loss of an estimated 58 lives; more than 300 families were affected and the villagers are yet to be rehabilitated.

The main economy of this area has been faith and temple-based. For hundreds of people who live on earnings from small and big hotels and even smaller shops all along the routes, this season is gone and one can't predict a flourishing season next year. In many regions, at least the next two years are going to be tough. Ordinarily it is in this peak season when people earn their money and store grains and provisions for the harsh winter. So relief workers wonder why survivors were putting away relief materials instead of using them. They know that the outsiders' short-term memory will not keep them warm in the winter.

Livelihoods have been badly impacted in affected villages, requiring the development of strategies for short, medium and long term support for recovery of livelihoods, services and

rehabilitation of infrastructure. Hotel owners and shopkeepers say their only revenue these days is from aid workers, government officials, journalists and service personnel deployed after the disaster.

The Union Ministry of Tourism in the first press release on June 19 after the Uttarakhand floods announced a new campaign - '777 days of the Indian Himalayas' - to promote the Himalayas as a tourism destination to the world. On June 24 the Ministry issued a statement saying that it would pledge Rs 1 crore to the flood victims of Uttarakhand. On June 26, the Ministry sanctioned a special financial package of Rs 100 Crore to rebuild tourist infrastructure in Uttarakhand. The Ministry of Tourism is more concerned on promoting tourism than about the impact of the floods on life and property.

Post Devastation Planning

The biggest challenges are repair and relaying of thousands of kilometres of mountain roads ripped off in rains, rehauling the infrastructure and normalizing the tourism sector. In many places in Pithoragarh, Rudraprayag, Chamoli and Uttarkashi, small roads and footpaths are being rebuilt. Mule tracks being restored to enable ration and other supplies to reach. The National Institute of Mountaineering also found out walking tracks in the rain-ravaged region. Hundreds of schools which have one to three metres of sludge accumulated in the buildings have deferred reopening after the summer vacation and trying hard to rebuild and repair the structures. A massive road rehabilitation programme has been taken up by BRO in the entire Uttarakhand. In the entire state as per assessment made by BRO, a total of about 13 km length of road at 100 places has been breached. Slides have occurred at 110 places and nine bridges have either been washed out or damaged.

The government of the state verbally announced a new development policy which restricts buildings on the river banks and calls for a close monitoring of reckless construction in the hill state.

The rains that caused widespread devastation in Uttarakhand may help avert heavy loss of human lives in future. Data generated during the spell of heavy rains can be used by scientists to predict events of cloudburst. Scientists at the Space Applications Centre (SAC) in Ahmedabad that

functions under Indian Space Research Organisation (ISRO) will use the data to improve their experimental model for cloudburst forecast. The model is likely to be in use by next year's monsoon.

A very large amount of waste debris is disposed of every day on the banks of the Yamuna and other rivers particularly at night. Much of the city's construction and demolition debris is dumped in the river every day. A five-member bench of the National Green Tribunal has said that any person found dumping debris on the Yamuna river bank would have to pay a fine of Rs 5 lakh on the basis of "polluter pays" principle.

Suggestions

1. This Himalayan state should build a viable and sustainable forest-based economy. The eroded and landslide prone areas should be given first priority for afforestation programme. The affected areas need a different development strategy, which is based on the use of the region's important resource for development and local livelihood security.

2. An inventory of key pilgrimage sites in the state should be built, with an understanding of its ecological capacity based on location and fragility. The carrying capacity action plan should be used to create facilities for tourists, particular facilities for sanitation and for garbage disposal.

3. The number of visitors to important pilgrimage sites should be controlled immediately. These restrictions on the key and most important pilgrimage sites can be done immediately and can be further revised based on the carrying capacity estimates.

4. Any further construction of hotels, lodges and roads for the pilgrims and tourists within 10 km of the high-altitude pilgrimage areas should be banned in order to create an ecological and spiritual buffer. These areas, like national parks and sanctuaries, should be considered as special areas, which are maintained with minimal human interference to help people connect with nature.
5. It should be made mandatory for expeditions to remove and take back all non-degradable items. This can be enabled through a security deposit and check on the items being carried for the expedition. Local community interest should be created in management of these sites.

6. It will be best for the people affected if all the efforts are properly coordinated. After disasters of high magnitude Government and NGOs face a management crunch during the rehabilitation phase. The main responsibilities are to complete the distribution of relief work such as payment for the deceased people; payment for houses- destroyed or damaged clothing and utensils, distribution of food, sanitation facilities and drinking water supplies. These works should be completed at the earliest possible. Care should be taken to ensure that enumeration is done properly and wherever necessary cross – checking is done so that no eligible beneficiary is left out and no ineligible beneficiary should get the benefit. Next important things are to ensure future earnings of the affected people and restoration of the infrastructural facilities of the affected areas. Therefore the focus should be set on long-term rehabilitation rather than short-term relief measures.

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