

A Comparative Study of Uttarakhand and Kashmir Flood in the plight of Natural Disaster

Shahnaz Akhtar¹, Mir Insha Farooq²

¹Assistant Professor, Department of Tourism Studies, Central University of Kashmir-Srinagar, INDIA

²Assistant Professor, Department of Management Studies, Central University of Kashmir-Srinagar, INDIA

ABSTRACT

Disaster are on the rise all the way through the world and may strike any destination without any warning. Almost all the nations of the world witness such disasters. So many deaths, diseases, economic and social loss are a few results of disaster. Flooding being a part of natural environment is a threat only when it impends harm to humans, their activities and their properties. This being one of the many aspect that hamper a destinations image and the locals as well as tourist sense of safety. Any disaster be it is manmade or natural, always leads to loss of life and property. India which has different types of vegetation, geography and ever growing population witnesses almost all the kinds of disasters most common among them all being floods. In light of the disaster that occurred in Uttarakhand and in Kashmir, that swept the both state, resulting in massive damage, loss of valuable lives, properties and left thousands of tourist trapped and millions of people homeless. Therefore planning and organizing of rapid forces which can work during such mishaps have been developed by all the nations in the form of natural disaster management. For this reason, community should be more conscious about disaster prevention culture and mitigation. They should be involved in post disaster recovery and reconstruction process for facing the future disasters and mitigate it. So to avoid raising any such concerns, in a given situation any destination must be well equipped with preventive measures to fight any kind of disaster. This paper discusses Uttarakhand and Kashmir in the dilemma of the disaster through a comparative study and recommends several measures to be taken for disaster management, and touches upon how to re-establish a destination back to normalcy. Further this study also throws light into the various loop holes which was responsible to the extreme disastrous impact both in terms of lives and property. After critically analyzing all the stated objectives, it is concluded that a strong and effective collaborative management system and active participation of community is a must for prevention and control of such disasters in future.

Keywords--- Disaster risk, Disaster, Natural Disaster management, Uttarakhand, Kashmir, Tourist Destination

Report on National Disaster Management of India verified that India has been traditionally vulnerable to natural disasters on account of its unique geo climatic conditions. According to Disaster Mitigation Institute (DMI), India suffers considerably due to disasters, as about two per cent of its gross domestic product (GDP) is lost due to natural disaster. The year 2013 and 2014 witnessed two major disaster events- the Uttarakhand flash flood and the Kashmir flood. The Himalayan states are more prone to these natural hazards and similar other hazards like floods, avalanches, landslides, earthquake etc. Nevertheless, more recently urban India is facing major crisis with the increasing incidences of manmade disasters and natural disaster. Either a series of those may create a change in the perceptions towards a destination. These can question the safety and security image of tourist destinations and result in a destination crisis. These events can also cause massive aftermaths, individually or in combination, to create a negative image on the safety, security or desirability of tourist destinations. As per the report of Jammu and Kashmir state disaster policy, floods have also devastated the life and economy of the state quite frequently. And the other Himalayan state-Uttarakhand quite vulnerable to these natural disaster which later on coupled with human-induced disaster.

This paper covered in detail the causes and impact of natural disaster -flood in both the cases and also discusses the various characteristics on a similar ground which was responsible for that disaster. All the data showed in this paper are mainly taken from the official reports published by the respective state authority, national institute of disaster management, research papers, news papers, press releases and web sources. The main aim of this paper is to conceptualize all the data and lay down the comparison between both the Himalayan states with regards to the flood.

Therefore, this study envisages on the percussions of Uttarakhand and Kashmir as a tourist destination in the plight of a natural disaster. Further this study also throws light into the various loop holes which was responsible to the extreme disastrous impact both in terms of lives and property. This paper also goes a step

I. INTRODUCTION

ahead in discussing the suggestion and future recommendation so as to minimize the impact of natural disaster likelihood in nearby future and finally recommends the importance of local community involvement in rescue operations.

II. IN CASE OF UTTARAKHAND:

The State of Uttarakhand, being part of the Himalayan region, is extremely vulnerable to natural disasters. Natural hazards, like earthquakes, landslides, avalanches, cloudbursts, hailstorms, Glacial Lake Outburst Floods (GLOFs), flash floods, lightning, and forest fires, etc. have been a cause of major disasters in the State. At the peak of the monsoon season, the northern state of Uttarakhand was face to face with floods caused due to the cloud burst that hit three of the four famous Char Dham pilgrimage sites, leaving tens thousands of inhabitants as well as pilgrims stranded or swept away due to the floods, and caused damage to the life, property and business.

The flash floods triggered by very heavy rainfall and cloudburst in Uttarakhand on 16-17 June 2013, affected 12 out of the 13 districts in Uttarakhand. The four districts that was worst affected were Rudraprayag, Chamoli, Uttarkashi and Pithoragarh. Though all the thirteen districts of the State were hit, five districts, namely Bageshwar, Chamoli, Pithoragarh, Rudraprayag and Uttarkashi were the worst affected. The disaster coincided with the peak tourist and pilgrimage season, significantly enhancing the number of the casualties and adversely affecting the rescue and relief operations. The impact of disaster was most pronounced in the Mandakini valley of the Rudraprayag district. Torrential rains, coupled with the probable collapse of the Chorabari Lake, led to flooding at the Kedarnath Shrine and the adjacent areas of Rambara, Agastyamuni, Tilwara, and Guptkashi.

Other pilgrimage centers in the region, including Gangotri, Yamunotri and Badrinath, which are

visited by thousands of devotees during the summer season, were also affected. People in important locations, such as the Harsil, Roopkund and Hemkund Sahib, were stranded for days together. Over one lakh people were stuck in various regions of the State due to damaged roads, landslides and flash flood-induced debris. As per the latest report made available by the State Government on 09 May 2014, a total of 169 people died and 4021 people were reported missing (presumed to be dead). (Source: *India Disaster Report, 2013*).

III. CAUSES OF THE DISASTER

The disaster essentially occurred due to wide spread heavy rains during the period 14-18 June, which resulted in flash floods in all the major river valleys in the State.

As per the Indian Meteorological Department (IMD), the rainfall in the State between 15 June and 18 June 2013 was measured at 385.1 mm, against the normal rainfall of 71.3 mm, which was in excess by 440%. Thus, it can be inferred that the disaster was the result of extra precipitation in a very short duration of time, which resulted in heavy water discharge in various rivers and streams.

The worst impact of the disaster on human settlements was in the Kedarnath shrine area (Gaurikund to Kedarnath), the Mandakini valley, the Alaknanda valley (at Gobindghat and upstream), the Pindar valley, and along the banks of the river Kali in Dharchula area.

The Kedarnath area in particular was impacted the most as it suffered unprecedented devastation with very heavy loss of life and property. Kedarnath Dham township is located at an altitude of 3583m on the banks of the river Mandakini, which originates from the Chaurabari glacier - about 4 kilometres upstream. It is connected by a motorable road from Rudraprayag up to Gaurikund (40 kms) and thereafter through a mule track (14 kms), running along the Mandakini river.

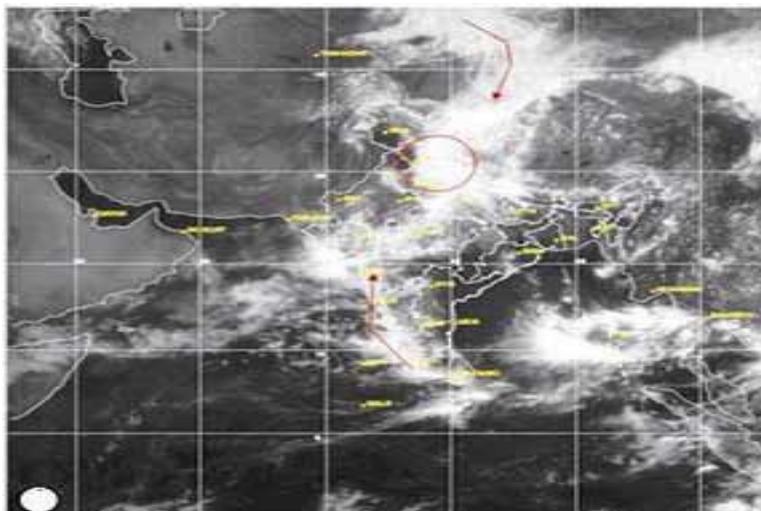


Figure: The Indian Meteorological Department image (17th June 2013) suggested heavy rainfall on the higher reaches of Uttarakhand, Himachal and Nepal Himalaya

As per the Geological Survey of India (GSI), heavy rainfall, which was about 375 per cent more than the benchmark rainfall during normal monsoon, caused the melting of Chorabari Glacier at the height of 3800 metres. This resulted into eruption of the Mandakini River causing heavy floods in the Rudraprayag district and adjacent areas. It was also observed that the heavy rains between 15 and 17 June resulted in exceptionally high rise in the river discharges. The rise in the river level was of the order of 5 - 7m, where the valley was wide and 10 – 12m where the valley was narrow. In the upper stretches of the Mandakini river the stream gradient is high and valley profile is mostly narrow. The gush of water running down from Kedarnath and Rambara areas brought mammoth sediment load which consisted of huge rock boulders with diameter ranging from 3 - 10m. The heavy sediment load along with big boulders acted as a tool of destruction and obliterated everything that came in its way. The enormous volume of water also induced to erosion along all the river valleys, which in turn, triggered landslides at a number of places. (Source: *India Disaster Report, 2013*)

IV. IMPACT OF THE DISASTER

Heavy rains triggered major landslide at numerous locations causing severe disruption in surface communications. The disaster caused heavy loss of precious lives and extensive damage to private properties and public infrastructure. More than nine million people were affected by the flash floods. The five districts namely, Bageshwar, Chamoli, Pithoragarh, Rudraprayag and Uttarkashi were the worst affected. As far as casualty to human lives is concerned, as informed by the State Government on 09 May 2014, a total of 169 people died and over 4,021 people were reported missing (presumed to be dead).

Out of total missing persons, 846 people were from the State of Uttarakhand and 3,175 from the other states. The highest number of people reported missing were largely from Uttar Pradesh followed by Uttarakhand and Madhya Pradesh, accounting for more

than half of the total number of people reported missing. After this, the famous Char Dham pilgrimage discontinued for next three years for repair and restoration. (Source: *India Disaster Report, 2013*)

V. IN CASE OF KASHMIR.

Owing to a unique geo political and geographical setting, the State of Jammu & Kashmir has witnessed a multitude of disasters. Ranging from the local incidents of fires upto catastrophic earthquakes, the State has always paid heavily in terms of loss of life and property. Most of the regions of the state are fed by rivers like Jhelum, Indus and Chenab. Low-lying areas of the Kashmir Valley, especially Srinagar, along with parts of Jammu, are prone to floods that occur due to heavy rainfall in upper catchment areas.

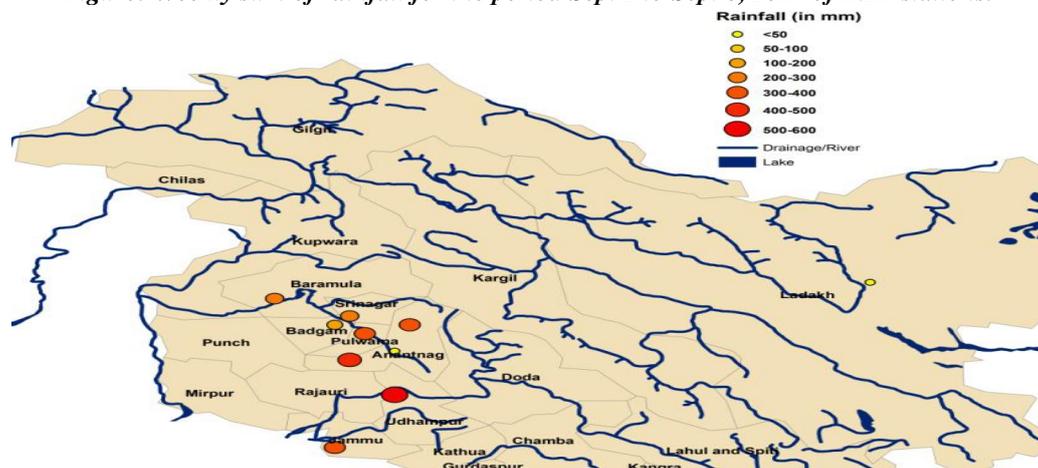
In September 2014, the Kashmir region witnessed disastrous floods across many of its districts caused by torrential rainfall which led to devastating floods that claimed 300 people died and 25 suffered injuries and stranded hundreds of thousands of residents. (Source: *Press Trust of India, 2015*)

VI. CAUSES OF THE DISASTER

The fact is that unseasonable and extreme rainfall began in the region on the night of 2 September 2014 onwards, during last stage of monsoon in India. The Indian Meteorological Department (IMD) had issued a warning about the possibility of heavy to very heavy rainfall. It would seem that the flood came unexpectedly; that the waters of Jhelum river that flows through Srinagar rose without warning.

The flood in Kashmir state was unprecedented in nature, where the most part of the Southern District of Kashmir region had received very high rainfall. Weekly total rainfall for most of the stations for the period Sept 2 to Sept 8, 2014 was more than 200 mm. This is very high as compared to the normal rainfall for a terrain like Jammu and Kashmir.

Figure: Weekly sum of rainfall for the period Sept 2 to Sept 8, 2014 of IMD stations.



(Data source: *IMD Automatic Weather Stations data for Jammu and Kashmir*).

There were incessant rains on September 4. For continuous 30 hours and in three days the rainfall touched 450mm which was very unusual. Normally, rains take place in J&K from July to mid-September. On September 3 there was a rainfall deficit of 32 percent but on September 8 it showed excess of 18 percent i.e. a change of 50 percent in five days. (Source: *Dept. of Ecology Environment and Remote Sensing, J&K*).

On 5 September, the Jhelum River in Srinagar was reported to be flowing at 22.40 feet (6.83 m) which was 4.40 feet (1.34 m) above the danger mark and at 33 feet (10 m) at Sangam in Anantnag district of Kashmir above the danger mark. The discharge rate in the river was recorded as 70000 m³/s against the normal discharge of 25000 m³/s. These rivers were flow above danger mark and flooded into the streets causing heavy casualties and loss of property

On September 8, in many parts of Srinagar's neighbourhood, the water was about 12 feet (3.7 m) deep, submerging entire houses. Stranded residents left their homes to move in with friends or relatives in safer areas. The death toll till September 10 had crossed 190 in Kashmir Valley and areas affected by the floods were mostly districts in South Kashmir.

Kashmir's unusually high rainfall was only part of the problem. The state does not have a flood forecasting system or capacity for disaster preparedness. Recently, Kashmir has been witnessing drastic decrease in the snowfall. This reduction in snowfall together with the fast receding glaciers has resulted in water scarcity for irrigation and hydropower generation in some seasons. The data shows that the magnitude and frequency of flooding has increased in the valley during the last few decades. Coupled with the unplanned urbanization and mismanagement of the Jhelum floodplains, the situation is going to be alarming in near future. One can well imagine the future scenario, with most of the wetlands that used to act as sponge during flooding, being urbanized and converted into concrete landscape. (Source: *J&K State Disaster Management Plan*).

VII. IMPACT OF THE DISASTER:

According to the Home Ministry of India, several thousand villages across the state had been hit and 390 villages had been completely submerged. In actual figures 2600 villages were reported to be affected in Jammu and Kashmir, out of which 390 villages in Kashmir were completely submerged. 1225 villages were partially affected and 1000 villages were affected in Jammu Division. According to the Minister for Relief and Rehabilitation, Basharat Bukhari (2015) said 300 people across the state had died and 25 suffered injuries in September, 2014 floods. Apart from that flood caused damaged to 26,1361 structures, farm sector of 3.27 lakh hectares of agriculture land and 3.96 lakh hectares of horticulture land also suffered damage. He further said under public sector, 6,910 km of road length, 559

bridges, 11,671 kms of electronic conductors. In Anantnag district in Kashmir, a total number of 14,489 houses had been damaged. (source: *Press trust of India, 2015*)

Furthermore, 50 bridges were reported to have been damaged across the state. The flood caused the serious disruption to the telecommunication sector. The preliminary assessment of damages to property was estimated between INR 5000 cr to INR 6000 cr. There was a total estimated loss of 1 trillion to Kashmir division alone. (source: *J&K State Disaster Management Plan*)

VIII. WAS UTTARAKHAND AND KASHMIR FLOODING A MAN-MADE DISASTER OR NATURAL DISASTER?

Jacob (2013) during a live television interview on CNN-IBN stated that the number of 'pilgrims' has been steadily increasing, with people from the plains interested in a quick guided tour of the hills in a vehicle and the local authorities have ignored the carrying capacity and cumulative impact of dams and illegal construction on the fragile Himalayas. According to Bisht, (2013), considering the fragility of these mountains, Himalayas being the youngest of the mountain ranges in the world with very poor soil stability the roads would routinely cave in or get washed away during monsoons. The rising tourism industry lured the land sharks and they erected multi-storied hotels, without conducting the Environmental Impact Assessment. Thousands of such resorts and hotels have established in this eco-sensitive zone and on the banks of several small and big rivers just to give the tourist a bird's eye view of the pristine river flowing through the valley.

All the above factors has had a crucial role to play in the disaster, but as the report provisioned by the Comptroller and Auditor General (CAG), 2013, the state disaster management plan was under preparation and actionable programmes were not prepared for various disasters showed that not only was the disaster aggravated due to rise tourism but also blame lands in the faults of the State Disaster Management Authority which was formed in 2007, but never was a meeting convened nor were there any rules, regulations, policies or guidelines framed.

According to Jacob (2013), besides this there are also allegations against the government based on the construction of several dams along the river, which is as good as handing out an invitation to disasters, illegal construction of buildings and dams the government has sanctioned a number of hydro electric power projects that actually overlap with each other. All this only goes to show the state and in turn the nation's lack of competency, lack of planning and absences of political accountability is evidently seen through this extensive damage. The major factors that aggravated the disaster were unregulated tourist inflow; the absence of an early

warning mechanism (CAG Report, 2013). This report further mentions other critical factors which includes inadequate communication system, a lack of trained medical staff at hospitals; the changing climatic circumstances and continuous advance warnings predicting extreme weather conditions in Uttarakhand before the flash-floods by the India Meteorological Department (IMD) and though no appropriate action was taken and finally the fact that the state had no action plan in case a disaster struck.

It was barely a year ago that Uttarakhand, another Himalayan state, was devastated by floods. In Kashmir, the rainfall was unexpected and extremely high, and authorities had ignored warnings. A report prepared by Department of Environment, Ecology and Remote Sensing (DEERS) in collaboration with Hyderabad-based National Remote Sensing Centre, ISRO reveals that the floods in Jammu and Kashmir are a result of High rainfall in the catchments over short period of time, which were not less than cloud bursts and is a combine effect of the extreme event due to climate change and less capacity of our drainage system that failed to hold the quantum of water and it overflowed, which ultimately lead to floods. The human tragedy and property loss in both Uttarakhand and Kashmir was enormous. The fact behind the both Himalayan states is that there is evidence proving a change in global weather patterns and its natural variability, i.e., climate change, brought about by man-made carbon emissions is heating up the atmosphere faster than normal.

Scientists who study monsoons tell us that they are beginning to make the distinction between a "normal" monsoon and an extreme amount of rain. Remember that monsoons are generally confounding natural events that are hard to predict and even harder to pin down. Even then scientists are able to find a change in patterns. Climate models predict that heavy rain events will increase over the Indian subcontinent. The Inter-governmental Panel on Climate Change reports confirm that climate change will lead to an increase in frequency, intensity, spatial extent, duration, and timing of extreme weather events. This is further confirmed by Indian Scientists working at the Indian Institute of Tropical Meteorology, based in Pune, who had found that very heavy rainfall events over 150-100 mm/day - are on the increase while moderate events are decreasing over the Indian subcontinent.

There is also evidence that the Himalayan region will be the worst hit with extreme rain events. Given that this is the world's youngest and most fragile mountain region, it spells big trouble. In other words, the causes of devastation following extreme events, such as droughts or floods - are often complicated, and mismanagement of resources and poor planning also share the blame.

This also shares the blame as most of the natural drainage channels have been destroyed due to utter mismanagement. The traditional system of flood management was to channelize the water from the Himalayas into lakes and water channels. The Dal and Nageen lakes in Srinagar are not just its beauty spots but

also its sponges. The water from the massive catchment comes into the lakes, which are interconnected. More importantly, each lake has its flood discharge channel from where the water spills over for drainage. But over time, people have forgotten the art of drainage, they only see land for building, nothing for water. The community attitude is, it will rain for a few days and why should we "waste" land for this. This is what has happened in Srinagar. Residential buildings have come up in the low-lying areas and also in the dry wet land, flood channels have been encroached upon or simply neglected. Now, when the extreme and heavy rains come with greater frequency and intensity because of climate change, the water has nowhere to go.

Floods and devastation thereof are inevitable in case of both the Himalayan states. On the other hand, climate change is beginning to make the country even more vulnerable because of increased frequency of extreme weather events. That was the real tragedy of the floods that hit Kashmir and Uttarakhand. Besides the natural disaster various other factors have contributed to the downfall of the two states which are famous religious/tourist site. The uncontrolled rise of tourism inflow into the states of Uttarakhand and Kashmir, took a toll on the ecology of the states and goes beyond its carrying capacity. And only if we can learn the real lesson behind it can we find ways of dealing with it in the future.

IX. SUGGESTIONS:

After a thorough study it is inevitable that both the States had faced disasters which was a natural phenomenon greatly compounded by human interventions. "Disasters are not learning processes. The authorities will have to do all they can to ensure against such recurrences...the starting point is for the State Disaster Management Authority to put place a disaster management plan" (Plan ahead CAG, 2013). Thus, unforeseen disasters calls for having an effective disaster management plan in place and for the State Disaster Management Authority to prepare actionable programmes to deal with disasters. But this plan ought not function in isolation. There have been instances where despite repeated warnings by MDI, the State Flood and Irrigation department's response to these warnings was not even preventive which should otherwise be proactive. Consequently, there was a poor response from the Disaster management authority. In view of this, it is suggested that all the three departments ought to work in collaboration for a successfully managing a disaster. The recent trend of research has been focused on mega- floods and glacier lake outburst floods (GLOFs). Through studying freshwater mega-flood sedimentation, it can improve estimates of flood hydrograph behaviour and provide better understanding of the controlling hydraulics and models of flood deposition (Carling, 2013). The glacier lake outburst floods (GLOFs) have been studied the effect of climate change which provide a long-term perspective on

GLOFs hazard potential (Bennet al., 2012). The future flood management policies should take the information from the analysis of freshwater mega-flood sedimentation and GLOFs for the flood under the extreme events and climate change.

Also to make the State more responsive, a separate Ministry for Eco-sensitive zones be established for undertaking and issues pertaining to causing these disasters. The state governments in both J&K and Uttarakhand have not take any measures till date. The ministry should ensure flood mitigation using structural flood control methods such as dykes and canals and non-structural measures focussing on land use planning, welfare rules, moving people out of vulnerable areas and protecting the environment. The main objective of this ministry will be:

1. To identify and designate catchment areas and allow no construction in these areas;
2. No or minimum deforestation / clear felling of trees on mountain slopes and river catchments;
3. Prioritize afforestation / vegetation cover on barren and wastelands, hilly regions and flood prone areas;
4. For future preparedness plans of area flood mapping be done using GIS and Remote Sensing;
5. To ensure proper river bank protection by constructing embankments and anti-erosion measures on large scale;
6. In flood prone areas, evacuation capabilities should be enhanced;
7. Restoration of the Wetlands.
8. Construction of residential colonies on river banks and flood plains should not be allowed. Offenders should be punished;
9. Should assist people in making their buildings resistant to disasters by providing technical support and engineering know-how;
10. Conducting sensitization programmes for people living in vulnerable areas and spreading of awareness about safe construction procedures.
11. Review and formulation of laws relating to constructions and buildings to make it mandatory for observing building codes and disaster related safety measures. Efforts be made to ensure that all old buildings are made safe by retrofitting of safety measures in a phased manner. For making such retrofitting obligatory, necessary provision be incorporated in laws and rules. Encouraging incentives, subsidies, financial help or ensuring soft loans with marginal interest rates from banks and other financial institutions for people to enable them to retrofit existing buildings.
12. Building artificial lakes or reservoirs for effective channelization of flood water. The successful models from Japan may be utilized. As popular support for dam construction collapsed in the 1980s, 'Green dams' (forestry) became a popular option for flood management.

Takara et al. (2004) reported that green dams have eight important functions, including ecosystem services, nutrient cycling, earth environmental improvement, flood management, irrigation, local environmental improvement, recreation and production. There is some evidence that the flood management function of green dams can relieve floods in the short-term, but if rainfall continues for more than one week, their effectiveness is limited (Calder, 2007).

Lastly, adopting local communities plays a pivotal role in reducing the disaster risk. Community members play a vital role in reducing the impact of a disaster. Community plays a significant role in the continuum of disaster preparedness, response and recovery. People are most vulnerable to disaster and experience the greatest impacts for various reasons. Yet they are not passive victims. With knowledge of the local geology, the hazard context, and the livelihoods options available, local communities must be involved in disaster management programmes from the start, and supported by projects to develop the capacities and linkages that help overcome. The State disaster management should take these communities on board in mitigating flood.

X. CONCLUSION

Floods have been devastating the life and economy of the state of Jammu and Kashmir quite frequently. And the State of Uttarakhand, being part of the Himalayan region, is equally vulnerable. After critically studying flood scenarios in the State of Jammu and Kashmir as well as Uttarakhand and identifying the root-cause which including man-made over and above natural causes for these disasters. The two states share some common characteristics such as excessive tourist inflow, no check on carrying capacity of land, lack of Environment Impact Assessment, deforestation in catchments areas, no recovery post floods, dormant local authorities, excessive commercialization, lack of coordination among different departments, poor infrastructure, pitiable communication and lastly, inevitable global warming and abnormal changes in climate.

The prevalence of any disaster can't be stopped but if managed and coordinated properly its impact can be lessened. It may therefore be concluded that a strong and effective collaborative management system, sharing of expertise, monitoring and cooperation in issuance of warnings and active participation of community is necessary for prevention and control of pre as well as post flood situations in future. Both the States must take measures to restore some effective traditional ways of managing floods which by and large would mean restoring and safeguarding remaining wetlands and not allowing construction in low lying areas, putting a limit on tourist inflow. Developing Irrigation system plays an important role in flood management as well as environmental protection and agricultural development.

It is equally indispensable to build higher, stronger and multi-purpose flood management structures in the short term as well as to invest in non-structural measures (such as changing land use policies and flood plain restoration) for the long-term, while promoting cooperation between central government and local authorities.

Countries such as India should raise the importance of climate change action - the need for an ambitious and equitable agreement with the world community and its own citizens. As yet the world, particularly the rich and already developed world, is doing too little to cut its emissions that cause climate change. Secondly, it requires accepting that dealing with climate change impacts is urgent and imperative. Adaptation will require relearning the art and science of water management so that fragile regions such as Uttarakhand and Kashmir can cope with excess rain in the future. It also means increased capacity of forecasting and information dissemination so that people are aware of the dangers and lives are not lost. Community involvement should be encouraged and they should be trained and prepared for any disaster.

The occurrence of natural disaster can't be stopped but their impact can be reduced. For this purpose there is need to co-operate with each other at all the possible levels, i.e. sharing of expertise in the respective field, disseminating information regarding climate change, monitoring and sharing of the scientific data related to hazards, co-operation in issuance of early warnings about floods, avalanches, landslides, dam breaches etc. These initiatives have been taken in order to minimize damage to life and property due to natural disasters.

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