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URBANIZATIONAL CHALLENGES IN UTTRAKHAND STATE: A CASE STUDY

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ABSTRACT

Advancement in technology is a tool to predict the response of structure against disaster (like earthquake, landslides, flood, tsunamis etc.). Development in technology and increasing living standards causes urbanization and developed country needs urbanization. Development in transportation, infrastructure and industrialization are basic terms to urbanize any country. Natural calamities may create hurdles if proper planning and design is not done. Take example of Uttarakhand state of India. Uttarakhand is a mountainous state of north India and its ecology is very fragile. Major industries are hydropower generation and religious tourism. Tourism is putting immense pressure on natural resources. Analysing a natural disaster is a complex task. Many a times, a natural disaster and its human impacts are result of multiple things occurring together. Uttarakhand state has to face natural disaster frequently. Due to unplanned urbanization, the effect of disaster was increased many folds. In this research paper case study of disaster in Uttarakhand (June 2013) is discussed. Various preventing majors for mitigation of disaster are given.

Keywords: Natural disaster, landslides, slope stability and urbanization challenges.

INTRODUCTION

Uttarakhand is a mountainous state of north India. The nature of Uttarakhand state is very fragile. Area of Uttarakhand state is 53,483 sq km. In which 86% area is covered by mountains. Northern part of the state is covered by high Himalayan peaks and glaciers. From nineteen century urbanization started, India is a developing country, as a developing country we need to improve/develop infrastructure, transportation and industrialization.

Ganga and Yamuna are the most important rivers originating from the glaciers of Uttarakhand. Uttarakhand region has a past history of heavy rainfall. In June 2013 a multi-day cloudburst centered on Uttarakhand, caused a devastating floods and landslides. It became country's worst natural disaster after the 2004 Tsunami. Prediction of the natural disaster is difficult. Lack of knowledge, improper planning and supervision of infrastructure, increases the severity of disaster. Figure1 shows the different damages occurred in Uttarakhand state in June 2013.

Figure 1: Uttarakhand Tragedy in June 2013 (www. Disasterphotos.com)

GEOPHYSICAL DYNAMICS OF UTTARAKHAND STATE:

As per geologists the Uttarakhand region is prone to landslides. This is also clear from early geological survey of India in 1882. The temple site of Kedarnath is located not far away from the snouts of two mountain glaciers. Experts of landslides at the department of geography had seen that due to the transportation of sediment and debris from the upper reaches makes the problems complex.

National Remote Sensing Centre (NRSC) scientist of ISRO analyzed that due to geophysical structure of this area, it is more prone to disaster. In Kedarnath temple region on 14 to 16 June 2013, large scale debris carried by the huge volume of water from upper reaches above the town. One of the compounding factors was that the glacial regions above the Kedarnath had received fresh and excess snowfall, when heavy rainfall hit the region, rainwater with higher temperature falling on the snow must have led to heavy snow melt and this runoff would have added to the rainwater runoff, resulting in huge water flow that carried with huge debris flow which struck the town with massive intensity. According to NRSC scientists, the detailed dynamics of water flow due to snow melt caused by rain, mostly when snowfall is in excess and the hydrology of it is not well understood. Figure 2 shows that the images before and after disaster. Landslide and flow of debris is visible.

Figure 2: Pre & Post Satellite Images of Kedarnath Area

URBANIZATION CHALLENGES IN UTTARAKHAND STATE:

In developing era urbanization is important for country and hence everyone move towards the urbanization at the same time urbanization carries many challenges. In this paper urbanization challenge of Uttarakhand state is reported. It is mainly regarding tragedy in June 2013. In this case study, the damages of structure like roads, building, bridges and hydro projects are reported. Various majors for mitigation of disaster are also given.

Details of damages in districts of Uttarakhand state

Rudraprayag, Uttarkashi, Chamoli, Pithoragharh, Tehri, Bageshwar, Almora, Haridwar and Dehradun districts were affected in disaster. In which Rudraprayag, Chamoli, Uttarkashi and Pithoragarh districts are severely affected.

Rudraprayag:

1. Two hotels were washed away i.e. Bedubagad, Augustmuni
2. Silli and Chandrapuri region which are situated on Kedarnath national highway 140 houses were washed away and another 100 were badly damaged. Human causalities information is not available.
3. Kedarnath walk has got severely damaged. Approximately 25000 people were trapped in Kedarnath valley only.
4. In Kedarnath, unofficial reports are claiming that the entire infrastructure has got severely damaged. Even the Kedarnath temple has also been partially damaged.

Figure 3: Damages in Rudraprayag Uttarkashi:

1. Due to landslides and cloudburst, there were four deaths reported in Udri village. Joshiyara and Tiloth villages were also badly damaged. As per the record total 123 houses had been completely collapsed and 22 houses had been partially damaged.
2. In Didsari village, 35 families were affected by the disaster due to damage of houses.
3. Jadau village had come under the landslide zone and the villagers evacuated their houses and are living in the temporary shelter.

4. Road network connecting Uttarkashi to Gangotri, SBMA (Shri Bhuwaneshwari Mahila Ashram) – plan working area road connectivity between Malla to Lata and Uttarkashi to Dhunda had been damaged mostly.
5. Dingla power house to Sangamchatti was damaged. Agricultural land, bridges and other village path of Dhanari area were fully washed out due to heavy rainfall.
6. Forest Department Park was in danger zone. An electricity and communication connection was lost due to disaster in most of the region.

Figure 4: Damages in Uttarkashi District

Chamoli:

1. Four houses and Jhula Bridge was washed away in Narayan Bagar. In Tharali block around 100 m road and about 20 houses collapsed totally.
2. Bhyndar village in Badrinath valley was washed out completely. Many two wheelers and four wheelers were washed out due to disaster
3. Chamoli district was heavily damaged in June 2013 disaster.

Figure 5: Damages in Chamoli District

Tehri- Garhwal District:

1. The agricultural land of approximate 200 villages was severely damaged in Bhilgana bock along the river

A. Details of damaged Hydro projects in Uttarakhand State:

Large numbers of hydropower projects were damaged due to the flood disaster in Uttarakhand and Himachal Pradesh. Following are the some projects that have suffered damages.

1. According to the energylineindia.com update on June 27, 2013 the 520MW under construction Tapovan Vishnugad HEP had suffered damages by disaster.
2. Construction of diversion tunnel was completed in April 2013,it was washed out due to heavy rainfall.
3. 400 MW Vishnuprayag HEP of JP associates was suffered. 99 MW Singoli Bhatwari HEP of L&T and 76 MW, Phata Bhyung HEP of Lanco in Mandakini valley in Uttarakhand were severely damaged.
4. Kali Ganga-I and Kali Ganga-II and Madhyamaheswar HEP all in Mandakini valley were severely affected by disaster and likewise many hydropower projects were damaged due to disaster in Uttarakhand State.

Figure 6: Damages in Hydro Power Project

LESSONS LEARNED & VARIOUS PREVENTING MEASURES

The natural disasters cannot be prevented. Lessons must be learnt from it to improve standard for retrofitting the existing infrastructure.

1. Control on environmental degradation caused by the massive and unregulated influx of pilgrims

   Uttarakhand State is situated in fragile zone and geophysical dynamics state that it is a landslides prone area. There is no control over environmental degradation like landslides, rainfall/ cloudburst but it is important to develop proper management techniques while pilgrims visit this state. Construction quality for residence of pilgrims and all other structures must be improved.

2. Regulation on the haphazard development fuelled by tourist traffic.

   Uttarakhand state is one of the popular tourist places in India. Uttarakhand state economy is also depend on tourism and hence there is need to regulate haphazard development fuelled by tourist traffic.

3. Planned and proper construction of buildings, roads and dams.

Considering an environmental condition of Uttarakhand state, it is important to preplann construction related to building, bridges, roads, and dams by considering various codal provisions (National Building code of India 2016).

If the construction of dams or roads is not in a proper manner then it increases the severity of disaster. To minimize an intensity of disaster it is important to design dams, bridges, roads and hydropower project according to disaster resistance design. IS 1893-2002 is revised now in 2016, so it is important to consider new clauses in design and retrofitting of the existing structure according to revised code.

4. To plan and be ready with effective disaster management strategies.

It was seen that from tragedy of June 2013, we failed in first principle of disaster management hence there is a need to improve our Doppler and Radar system.

5. Proper coordination of Government Bodies

Proper coordination of government bodies is most essential. All codal provisions must be followed

6. Providing Proper Slope Protection to Roads and Providing Tunnels

Nowadays many advanced methods of slope protection are available, if implemented risk of landslide can be minimized. Tunnels can be provided at some critical locations.

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