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Review Article

Deluge, disaster and development in Uttarakhand Himalayan region of India: Challenges and lessons for disaster management



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ABSTRACT

The Himalaya has been venerated by communities since antiquity and hence visited by a large number of pilgrims for paying tribute, annually. Uttarakhand state in the Indian Himalaya being the place of major Hindu shrines like Badrinath, Kedarnath, Gangotri and Yamunotri and also the place of origin of many sacred rivers including the Ganges, at present, is best known for the religious tourism. Though, the state population is about 10 million, over 25 million tourists visited here in 2011 despite the fact that the state remains under frequent natural hazards in the forms of landslides, earthquakes and flash floods mainly during monsoon. Recently, on 16 and 17 June 2013, the torrential downpour and subsequent flooding had wreaked havoc that not only swallowed vast swathes of Uttarakhand but also took life of thousands of pilgrims and tourists. The cloudburst, heavy rainfall and subsequent landslides are the natural disasters but this disaster in Uttarakhand is mainly attributed by masses as a man-made disaster due to unregulated tourism and unplanned construction. In this background, the major aim of this study is to explore and review the factors responsible for increased intensity and scale of disaster due to flash floods in the Uttarakhand state of India. The paper also reviews and discusses various options for disaster risk reductions in the sensitive ecosystem such as the Himalaya.

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1. Introduction

The highest mountain region in the world, the Himalaya, being structurally unstable and young is still geologically active, fragile and vulnerable to both natural and man-made processes [1,2]. In the era of globalization and so that the industrialization and so-called modernization, people have overlooked the natural ecosystems and carrying capacity of the Himalaya, besides the traditional beliefs and norms of nature conservation [3,4]. The seers and saints who found the Himalaya as the source of sacred thoughts and peace were subsequently followed by the large number of pilgrims. Over the centuries, the numbers of pilgrims have increased exponentially at major pilgrim centers across the Himalaya [5,6]. Uttarakhand state of India is one such centers of pilgrim activities in the Himalaya, which is visited by millions of pilgrims, as it has four major Hindu and one Sikh shrines – the Badrinath, Kedarnath, Gangotri, Yamunotri and Hemkund [7,8]. In order to fulfill the need of such a huge number of pilgrims an intricate network of roads, hotels, lodges and related support systems has built into the remote mountainous areas of the Himalaya.

The sensitive natural features of Uttarakhand such as fragile ecosystem, tectonic set-up and high precipitation are being made more precarious by the vested interests of people in real estate, haphazard tourism and plundering of natural resources as well as construction of mega hydro power projects [9]. Like any mountainous region of the world, historically, Uttarakhand Himalayan region of India has suffered from frequent natural hazards in the forms of landslides, flash floods during monsoon and earthquakes [10–13]. These incidences result in the loss of humans, agriculture lands, infrastructure, and further instability of mountain slopes and ecosystems. Recently, on 16 and 17 June 2013, the torrential downpour and subsequent flooding had wreaked havoc and swallowed vast swathes of Uttarakhand state. The cloudburst, heavy rainfall and subsequent landslides are the natural disasters but this disaster in the Alaknanda river basin of Uttarakhand is mainly attributed by masses as a man-made disaster that attracts special attention, worldwide. In this background the major aim of this paper is to explore and review the factors responsible for high human deaths and loss of resources due to flash floods in the Uttarakhand state of India. The paper also looks at and discusses various options for disaster risk reductions in the sensitive ecosystem such as the Himalaya.

2. Pilgrimage, deluge and disaster in Alaknanda river basin of Uttarakhand

The Uttarakhand state of India lies between 28°43' and 31°27'N and 77°34' to 81°2'E. It comprises of two regions –

Garhwal and Kumaon – which together form 13 districts. Of the total 13 districts, four districts (e.g., Nainital, Haridwar, Dehradun and Udham Singh Nagar) have large areas in the plains, whereas the other nine districts comprise the hill region of the state [14]. The total geographical area of the state is 53,485 km², elevation ranges from 210 m to 7817 m, and the average rainfall ranges from 1000 to 2500 mm per year, of which 50–80% comes down during the monsoon. Though, the land holdings are small, fragmented and mostly rain-fed, over three-fourth of the state population mainly depends on agriculture for livelihood [15].

Uttarakhand being a devbhumi (the land of Gods) has been well known for pilgrimage to its historical shrines such as Badrinath, Kedarnath, Gangotri and Yamunotri, popularly known as 'chardham'. Earlier, pilgrims had to walk to these holy spots, all located in the high altitudes of the Himalaya. The paths were not wider and those who were hard and tough had privilege to visit these places. Like 'chardham' the lakes and rivers of Uttarakhand are respected and considered sacred by the pilgrims. The most sacred river of India – the Ganges – originates from the Gaumukh glacier of Uttarakhand. The Alaknanda and Bhagirathi are the major tributaries of the Ganges, of which the Alaknanda drains a large catchment. At the first stretch from Alkapuri to Vishnuprayag it meets with Dhauri Ganga. Further down, the Alaknanda meets several tributaries namely, Patalganga, Birahiganga, Nandakini, Pindar, and Mandakini, before being called as Ganges after meeting with Bhagirathi at Devprayag. Since all these major tributaries of the Ganges flow down through a fragile ecosystem that is prone to landslides, the small amount of rainfall slides down the mountain slopes which block the river flow and create havoc thereafter.

The historical records reveal instances of deluge in Alaknanda on many occasions [16]. In 1893, a landslide – the largest known in central Himalaya – blocked the Birahiganga and formed a lake, a part of which was toppled after about ten months. The massive outburst of water sent a tidal wave down the valley and washed away the vast swathes of land along with human settlements in the Alaknanda river basin. In 1968, a landslide dam burst and caused much damage. In September 1969, a huge landslide blocked nearly three-fourth of the width of Alaknanda at Kaliator [17].

One of the worst floods in the Alaknanda took place in 20th July 1970 that had triggered off numerous landslides. The 1970 flood brought down an estimated 9.1 mcum of silt and rock into the Alaknanda which buried a part of Srinagar town under several feet of silt [17]. Three years later, the people of Garhwal came forward aggressively to protect the fragile ecosystem of the Himalaya which gave birth to the world famous Chipko movement. The deluges and landslides have been persistent threats to the pilgrims

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