

Water Induced Hazard In Nepal

Prem Roka [2nd year]

Department of hydropower, MWU

premroka8990@gmail.com

Introduction

Nepal is a landlocked country having total area of 1,47,181 sq.km. It is a mountainous country occupying 86.9 percent of total area by mountains and hills where as 23.1 percent by terai. About 51% population are in mountains and hills where as 49% are in terai region. Nepal has high topographical variation with altitude ranging from 60 m to 8848 m. The country has very complex topographic structure with active tectonic process. It has very diverse and rugged topography, weak mountain and wide variation in climate.

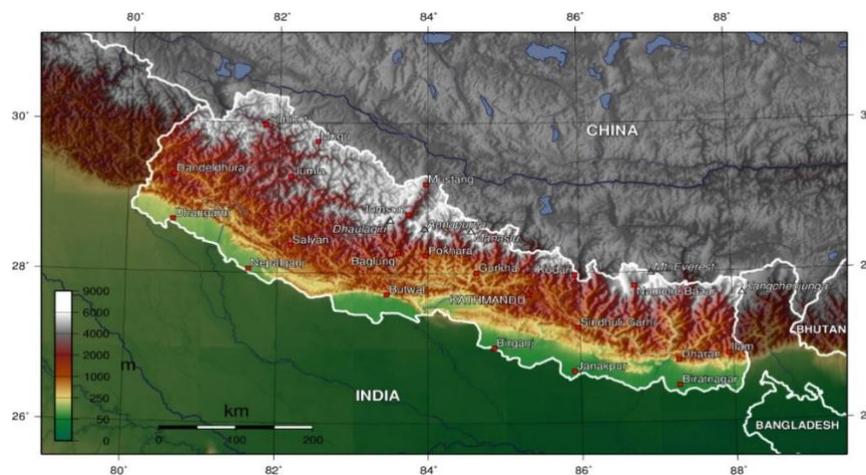


Fig. Map of Nepal (source: vivaanadventure.com)

Nepal has plenty of water resources as there are about 6,000 rivers and rivulets. Major sources of water are glaciers, rivers, lake, rainfall, pond, groundwater etc. Perennial source of water originates from mountain by melting of snow and ice. So many problems arise frequently from various water induced disaster like flood, landslide, erosion, debris flows, glacier lake outburst etc. Natural phenomenon including relatively steep river gradient and active tectonic activities make the mountain highly susceptible to erosion, landslide and flooding. Such disasters which often cause human casualties, economic loss and social losses, devastation of infrastructure and degradation of environment.



Fig: Devastation of infrastructure by flood at prithivi highway, Mauwa khola

(Source : MGK TV)

Water Induced Disaster

As we know that flood, landslides and debris flow, avalanches and glacier lake outburst disaster (GLOF) are the main water induced disaster in the context of Nepal. Even we can say that flood, landslide and debris flow are interrelated. During the monsoon season, land has become weak and large mass of floods flow along the rivers and rivulets. Continuous heavy rainfall may lead the landslides, erosion in the areas of adjoining riverbanks. Flash floods in the hilly region may also be caused by an avalanche, snowstorm or cloudburst due to heavy rainfall.

Although we are facing world wide spread out epidemic virus named COVID-19, human casualties have taken place in Nepal due to the water induced disaster. Flood and landslide have turned into a epidemic problem in these days. As per data shared by media Jana Boli, 51 people have died, one hundred and seventeen people are unaccounted for and 33 are sustained injuries in the incidents of disaster that occurred in various district of the country in this year till date. Further, more than 600 families have become homeless and about 4 crores and 70 lakhs properties have damaged. According to the Home Minister Ram Bahadur Thapa, flood and landslide incidents have increased due to the haphazard construction of roads, poor management of water sources, the land has become weak by the earthquake and heavy rainfall occurring at a single area. He added, monsoon induced disasters have taken place in altogether 33 districts of the country so far and out of these districts, human casualties have taken place in 18 districts. More than

125 incidents of a disaster have taken place till now and the works related to rescue, relief distribution, search for the missing persons and rehabilitation are going on at present.



Fig: water induced disaster 2077 BS. (Source : ACM Television)

Additional, Glacier lake outburst flood (GLOF) is also another critical problem among water induced disaster. It is the sudden, fast flowing releases of glacial lake water that move downslope as a result of dam failures. Glacial lakes are either moraine-dammed or ice marginal-dammed. GLOFs are triggered by the buildup of water pressure, ice and rock avalanches, earthquakes, erosion, and other natural disruptions. As water rushes downslope, it picks up rock, mud, and debris, endangering people, infrastructure, fields and livestock in its path. The destructive GLOF occurred on 20 April 2017 in the Upper Barun Valley, Nepal. Although GLOFs often take place in secluded mountain regions, local people are also affected. Fortunately, no one was injured or killed in the Langmale GLOF, but the researchers report that four community buildings and six bridges were demolished. In addition, agricultural land was completely covered and tourism to the Upper Barun Valley suffered. According to the research published in Cryosphere, hundreds of glacial lakes have formed in the Nepal Himalayas in recent decades due to the rapid glacial recession caused by the warming climate. An increase in glacial lakes could lead to increase frequency of GLOFs.

Due to projected temperature increases, GLOF frequency is only expected to increase in upcoming decades.



Fig: Barun valley GLOF April 20, 2017 (*Source: glacierhub.org*)

Historical event of Water Induced Disaster in Nepal

The 2017 Monsoon flood

Beginning 11 August 2017 Nepal experienced its worst rains in 15 years, resulting in large scale impact on life, livelihood and infrastructure across 35 districts. The districts hit hard by the 2017 flood are Panchthar, Illam, Jhapa, Morang, Sunsari, Saptari, Siraha, Dhanusa, Mahottari, Sarlahi, Rautahat, Bara, Parsa, Chitwan, Makwanpur, Lalitpur, Sindhuli, Nawalparasi, Palpa, Kapilvastu, Dang, Banke, Bardiya, Kailali, Surkhet, Salyan and Kalikot. The Department of Hydrology and Meteorology (DHM) recorded the highest ever mean rainfall of 1,800 mm, substantially exceeding the average of 1,200 mm in the recent past. This triggered flash floods the across all terai districts.

This emergency came at a time when Nepal was already struggling to recover from the 2015 earth-quake, with much reconstruction and recovery work still to be done. Five of the current flood affected districts were also the earthquake affected districts, while four of the current flood affected districts were hit by large scale floods in 2014 also, and were yet to fully recover.

The death toll from floods and landslides across the country during the monsoon reached 134. At least 29 people went missing and 22 were injured. According to MoHA, 43,400 houses were destroyed, 191,700

houses were partially damaged and further 20,900 families were temporarily displaced. According to NPC, as many as 1,688,474 persons were affected by this flood. Around 80 percent of the land in flood-affected Terai districts was inundated.

The Government deployed over 26,000 human resources, including security personnel, for search and rescue operations. Seven choppers of the Nepal Army and six helicopters of private companies along with rubber boats and motor boats were mobilized in the flood-hit areas. The government distributed NRs. 2,00,000 each to the next of kin of those deceased by the flood and NRs. 10,000 to each family whose house had been destroyed. On 23 October 2017, the Cabinet decided to form a Flood Reconstruction and Rehabilitation Project and placed it under the NRA.

The 2014 Monsoon landslide

Jure village of Sindhupalchok District, situated 70 km away from the capital city, was hit by a massive landslide in August 2014, causing the loss of more than 150 lives, loss of more than 115 households, and 436 displaced people. The landslide disrupted 2 km of Araniko Highway, the only road that connects Nepal to the Chinese border. Infrastructure that was damaged by the landslide produced an artificial lake included a hydropower plant, transmission lines, a poultry farm, a high school, a resort, a community building, school buses, public vehicles, shops and a cement block factory. A total of Rs 130.4 million in physical property damage was observed. Moreover, The floods and landslides of 13 and 14 August swept various parts of Banke, Bardia, Surkhet and Dang. This disaster killed 211 people and affected 35,989 families causing enormous loss to other physical properties. In such a way, floods and landslides accounted for a majority of the disasters in Nepal in 2014.

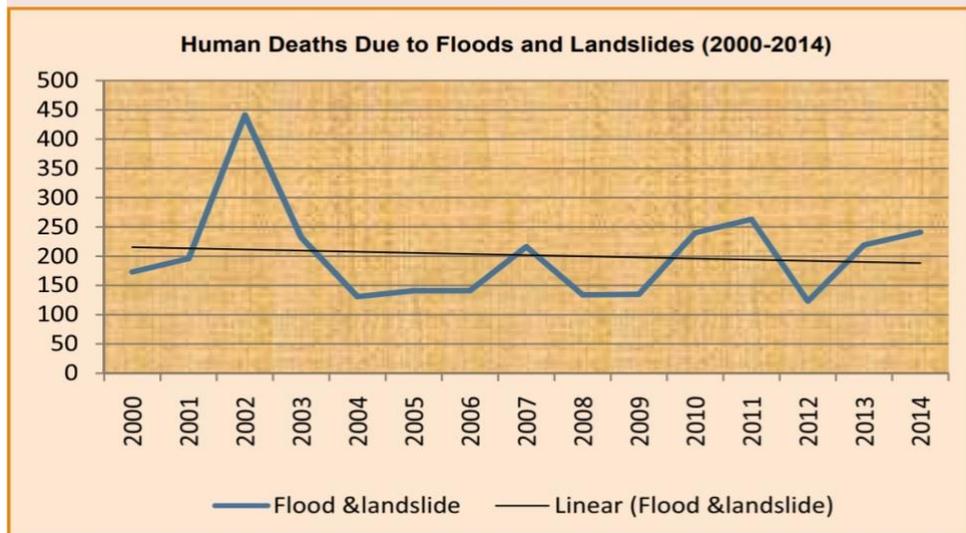
The 2013 Monsoon flood

In 2013, it was recorded that Morang, Sinduli, Rautahat, Darchula and Mahottari are the districts that were extremely affected by floods and landslides. In such disaster, 79 people lost their lives, 42 were found missing and about 850 households were affected. The floods had also inundated sixty thousand ha of agricultural land in the Terai and washed way 67 irrigation systems. The number of injured people were 66 and property lost worth about NRs 5.6 lakhs.

Overall in the history of Nepal, thousands of events have happened till date. More than millions people have fallen in such disaster. Some people lost their life, some people lost their family and some people lost their properties. Lost of infrastructure like road, bridge, electric power project, tunnel and sewage etc. have damaged.

Here is a graph noticeably shows that human death which occurred between 2000-2014:

Figure 23



(source : Ministry of home affairs)

Law and Politics for Addressing Water Induced Disaster

To mitigate the water induced disaster, many acts and policies have been set up in Nepal. The first act formulated by government of Nepal was *Natural Calamity Relief Act, 1982*. It has implemented as relief work against earthquake, fire, flood, landslide, heavy rainfall, drought, famine and epidemic as disaster. Also, this act works as to rehabilitate the victims of the natural disaster, to control and prevent the natural disaster in order to prevent loss of life and property etc. Home Minister of Nepal had organized a network of disaster relief committee. Its main functions are formulation of national policies and their implementation, mitigation of disaster, immediate rescue and relief works, data collection and distribution of funds and resources.

Some other policies formulated for addressing disasters are :Natural Calamity Relief Act 1982; Water Resources Act 1992; Environmental Protection Act 1996; National Action Plan for Disaster Risk Management (1996); Local self governance act (LSGA, 1999); Forestry Sector Policy (2000); National Water Plan (2005); Water Induced Disaster Management Policy (2006); Tenth Plan (2002-2007); Three Year Interim Plan (2007/08-2009/10); National Strategy for Disaster Risk Management in Nepal (NSDRM) (2009); The Nepal Risk Reduction Consortium (NRRC) (2009); National Adaptation Plan of Action (NAPA) (2010); Twelfth Three Year Plan (2010/11-2012/13); Local Adaptation Plan of Action (LAPA) (2011); National Climate Change Policy (2011); National Strategic Action Plan on Search and Rescue (2013); Thirteen Plan (2013/14-2015/16); Fourteenth Plan (2016/17-2018/19); Hyogo Framework for Action (HFA) (2005–2015); Sendai Framework (2015-2030).

Hazard Reduction Practice

Water induced disasters are the natural process. We cannot control it permanently. But some how it can be reduced by conducting education and public awareness campaign through seminar and training. Preparation of water induced hazard maps of the watershed and people's participation in disaster mitigation also help to reduce the hazard. Effective information technology like surveying, loss estimation, institutional set up etc. should be developed for emergency rehabilitation of victims.

Conclusion

Nepal has been suffering from different types of water induced disasters. Hazards like landslide, rock fall, avalanches and GLOFs occur on hilly and mountain region whereas flood and scouring are common in Terai. Sometimes, disaster occurs in Nepal due to conflict for boundary and lack of proper co-ordination with neighbour country, India. Koshi flood disaster occurred on 18th August 2008 at 12:45 PM is the one of the examples of such disaster. In order to minimize the problem, government has to formulate and implement the policy which develop bilateral coordination and co-operation with India. Additionally, programme activities and institutional arrangements from national level to local level have been formulated and implemented. Government has to plan for long-term reconstruction to restore not only lost assets but also to rebuild livelihoods.