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REVIEW OF FLOOD MITIGATION FOR HILLY REGIONS

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Abstract: In India Flash Flood occurs only in monsoon season. This phenomenon contributes to thousands of deaths and loss of property. The main cause of this phenomena in hilly regions are heavy rainfall, cloudburst, snow melting, failure of watershed and landslide. In India it is observed mainly due to heavy rainfall and cloudburst. This present study we have evaluated the Flood Mitigation measures by reviewing different literatures which can be applicable for hilly regions in India with regard to Flash Flood.

Keywords: Flash Flood, mitigation, measures, hilly regions

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INTRODUCTION

In environmental engineering, the flood mitigation involves the management and management of flood water movement, like redirecting flood run-off through the utilization of floodwalls and flood gates, instead of trying to prevent floods altogether. [1]

Flash floods are caused by heavy rain or the sudden release of water over a short period of time. The name "flash" refers to their fast occurrence (typically within minutes to hours after the heavy rain event) and also to their raging torrents of water that move with great speed[2].The flash floods mainly occurs due to heavy rainfalls caused by cloudburst in mountainous areas. Flash floods are not predicted in short time. Flash floods normally encourage landslides and debris flow leading to severe damage to property and casualties in hilly areas. Flash flood prevention is a great challenge and many countries are working for flash flood control measures.

Flash Floods repeatedly occur in hilly regions of India and causes loss of lives and huge damage of infrastructure in the hilly areas due to cloudburst and rainfall. Every year flash flood causes the loss of a countless number of lives as well as abundant damage to public property and infrastructure. This affects a larger economic impact. The main impact of flash flood is undercutting of check dams, the collapse of river banks, debris, debris flows, debris deposits, river damming by debris, river bank erosion, and channel displacement, clogging bridges, scour and inundations. [3]

Past scenario of India:

- Assam has been suffering floods regularly since 1998.
- Flooding in Mumbai in July 2005 left over 700 dead. Some areas went under 5 m of water.
- The 2008 Indian floods affected most of India throughout 2008.
- In October 2009, flooding occurred across many parts of South India. It was one every of the worst come the realm within the last 100 years, killing at least 299 people and making 500,000 homeless.
- The Leh floods occurred on 6 August, 2010 in Leh. The largest city in Ladakh, a region of the northernmost Indian state of Jammu and Kashmir. At least 193 individuals or rumoured to own died, five of whom were foreign tourists, after a cloudburst and heavy overnight rains triggered flash floods and mudslides. A further 200 people were described missing and thousands more were rendered homeless after the flooding caused intensive injury to property and infrastructure.
- The 2013 North India floods in Uttarakhand which destroyed many things and landslides caused by heavy rainfall.

The 2014 South India floods in Visakhapatnam which destroyed several things and landslides caused by heavy rainfall and thousands more were rendered homeless after the flooding caused extensive damage to property and infrastructure.

Present Scenario of India:

- 2017 Gujarat flood: Following heavy rain in July 2017, Gujarat state of India was affected by the severe flood resulting in more than 200 deaths.
- August 2017 Nepal and India floods
- August 2018 Kerala Flood: Following high rain in late July 2018 and heavy Monsoon rainfall from August 8, 2018, severe flooding affected the Indian state of Kerala causing over 445 deaths.

Flood early warning systems is important in mountainous regions which include a chain of activities: understanding and mapping flood vulnerability, monitoring rainfall and water levels, forecasting future events, processing, and distributing and communicating understandable warnings to decision makers and the inhabitants so that they can take appropriate and timely actions in response. [4]

Flood is unpredictable and unexpected event which not only damages the natural resources, lives and environment but also causes loss of health and economy. So, it is important to control floods, so that the damage does not exceed an acceptable limit.

2. Literature Review

Karamat A. et al (2016), In this paper, they reviewed and synthesized concepts and techniques of flood hazard, vulnerability and risk assessment into a coherent piece and give an overview of recent literature related to flood risk assessment.[4]

Km Vandana & Dr. SriRam (2014), in this paper, they found that the main causes of flash flood in hilly areas of Uttrakhand, Himachal Pradesh and Jammu & Kashmir are snow melting, due to climate change, sudden and frequent heavy rainfall, due to cloudburst in monsoon by which flash flood is occurred. And concluded that Non-structural measures of flood mitigation need to be effectively consolidated and implemented within a legal framework so that such strategies can be sustainable for the future.[3]

Qinghua L. et al (2017), concluded that LID measures have not significant effects on the peak and runoff reduction. However, LID measures have obvious effects on the peak reduction and peak time lagging in other areas, especially in plain areas; this is not similar with the results of this study.[5]

Linying Lv. et al (2014), in this paper they worked on the distribution hydrologic model of stored-full runoff and runoff under excess infiltration model, and simulated the runoff of Luhun Catchment. In combination with the result and ArcGIS software technology, Luhun construction

is split into 13 sub-catchments. Based on this, they analysed spatial distribution characteristics of rain runoff in the catchment and its flood process.[6]

Dewan A. et al (2006) , author have worked that the comprehensive flood hazard management strategies for land use planning decision were proposed for the efficient management of future flood disasters in Greater Dhaka.[7]

Tripathi P. (2015) , in this paper the author suggested to set up alarming system at the bank of rivers which can alert neighbouring dwellers about rising water level can also be an affective measure to minimise the damage. Analysis of flood trend and harm caused by it counsel that there is a desire for effective pre-and post-disaster mechanism because the nature cannot be checked however disaster will be reduced.[8]

Musa J. et al (2016) , their research was focused on flooding analysis and in particular on the mapping of floodable areas of Gusoro, downstream of Shiroro dam. However, the result shows that there is a general increase in Dam, which is characterized with high annual rainfall of about 1659.7 mm recorded during this period. The Landsat imagery was classified to show the land use in the study area and to show flood prone areas. They also discovered that human activities by the river side also contribute to flooding in the area. That's why they recommended that buffer zone should be created by the riverside, to restrict people from erecting structures or practicing Fadama activities along the river banks and also the Niger State Urban Development Environmental Protection Agency must ensure full compliance with development guidelines for Niger State as regards the encroachment of flood plains especially at Gusoro.[9]

Prasad A. (2014) , research mainly focused on the managing floods through specific structural measures such as reservoirs, embankments, channel improvement, town protection, river turning works, watershed management, inter-basin transfer, bank protection and anti-erosion work. Non-structural way to manage the floods and wearing away ought to be through flood prediction, flood plain partitioning, ever-changing cropping pattern and public participation in management works.[10]

Z F Ng et al (2017), in this research investigation was done for the suitability of ASTER GDEM to apply in 1D-2D and flood inundation map was generated which predicts flood level and flood areas. This information was useful for water authorities to make decision such as evacuation during flood event and selecting flood mitigation options. [11]

Zainudini MZ* and Sardarzaei A (2015), they analysed that for all flood conditions especially on the lower Sarbaz river, have systematically risen for monthly maximum discharge volumes over the period of record. They also researched that Existing flood risk models are inadequate, and predicted changes in the climate show that there may be much more water in the system in the

near future. New models are being built to test how the river-floodplain systems will respond to large increases in the discharge in the future. [12]

CONCLUSION

From this paper, we concluded that the main causes of flash flood in hilly regions are excess rainfall and cloudburst in India. So, there is need to manage and predict the flood risk in hilly regions. This can be done by structural and non-structural measures of flood mitigation, preparing pre & post disaster measures, strategies for future flood disaster, zoning flood prone areas and predicting flood by various flood models. All this measures should be used for flood management in hilly regions.

REFERENCES

1. https://www.google.co.in/search?q=flood+mitigation&source=lnms&sa=X&ved=0ahUKEwjVm_aXo6jdAhXSfX0KHZJIBTMQ_AUICSgA&biw=1500&bih=660&dpr=0.9
2. https://www.thoughtco.com/the-types-of-flood-events-4059251
3. Km Vandana, Dr. SriRam.” Flash flood and its Preventive Measures in Hilly Areas.” International Journal for Scientific Research & Development, vol-2,(2014).
4. Ali, Karamat, Roshan M. Bajracharya, and Hriday Lal Koirala. "A Review of Flood Risk Assessment." International Journal of Environment, Agriculture and Biotechnology 1.4 (2016).
5. Luan, Qinghua, et al. "Analysis and Comparison on the Flood Simulation in Typical Hilly & Semi-mountainous Region." IOP Conference Series: Earth and Environmental Science. Vol. 100. No. 1. IOP Publishing, 2017.
6. Lv, Linying, et al. "Research of Flood Control Regulation Based on Distributed Model in Luhun Reservoir, China." Earth Science Research 4.1 (2014): 21.
7. Dewan, Ashraf M., et al. "Evaluating flood hazard for land-use planning in Greater Dhaka of Bangladesh using remote sensing and GIS techniques." Water resources management21.9 (2007): 1601-1612.
8. Tripathi, Prakash. "Flood disaster in India: an analysis of trend and preparedness." Interdiscip J Contemp Res 2.4 (2015): 91-98
9. Musa, J., et al. "Flood risk analysis and hazard assessment in Gusoro community downstream of Shiroro dam using geospatial approach." Ethiopian Journal of Environmental Studies and Management 9.5 (2016): 534-544.
10. Abhay Shankar Prasad.” Flood Mitigation through Integrated River Basin Management in Lower Brahmaputra River Basin, Assam.” International journal of social science. Vol-2,(2014).
11. Ng, Z. F., J. I. Gisen, and A. Akbari. "Flood Inundation Modelling in the Kuantan River Basin using 1D-2D Flood Modeller coupled with ASTER-GDEM." IOP Conference Series: Materials Science and Engineering. Vol. 318. No. 1. IOP Publishing, 2018.
12. Zainudini, M. A. "Flood Control and Flood Management of Sarbaz and Kajo Rivers in Makoran“.