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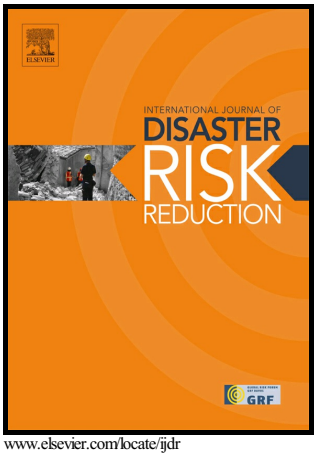

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Assessment of 2010 Flash Flood Causes and Associated Damages in Dir Valley, Khyber Pakhtunkhwa Pakistan

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Abstract

This paper identifies the underlying causes and damages caused by 2010 flash flood, which is considered one of the worst hydrological disasters in the country (Pakistan). Questionnaire based survey and structured interviews were conducted to investigate physical and economic damages in the selected case study Dir Valley. Global Positioning System (GPS) survey was also conducted to acquire location of damages and Geographical Information System (GIS) is used to visualize land use, land cover and damage data. Buffer analysis is used to delineate the effected strata on both sides of Panjkora River to assess the flood damages. Climate change phenomenon along with peculiar topography of the region are considered as the underlying causes as monsoon winds interacted with the jet stream abnormally causing unprecedented high intensity rainfall in the valley. The steep topography of the area caused rain water to accumulate rapidly in the Panjkora River, overpowering the withholding capacity of the river. The phenomenon resulted in severe flash flood which annihilated whatever came in its way. Upper zone in the target area is badly affected by flood with maximum damaged houses and human causalities followed by lower zone with high number of damaged bridges. This study will bring the attention of disaster management and other relevant authorities to focus on flood risk reduction by enhancing the retention capability of watershed in upstream areas that will reduce the risk in low lying areas.

Key Words: Flash Flood; Causes; Damages; Risk Reduction; GPS; GIS.

1 Introduction

For quite some time, disasters around the World are on the rise, not so much due to shorter recurrence of natural extreme events, but more so due to spatial concomitant of hazards with rising human vulnerabilities across the globe. Disasters rising trends, especially those of flash floods can be commonly witnessed in most recent disaster related literature. Natural disasters are increasing tremendously over the earth surface disrupting physical and cultural environment (Fendler, 2008). Floods are the serious socio-natural disaster (Zhang et al., 2002; Krausmann and Mushtaq, 2008) affecting social and economic aspects of life (Wang et al., 1995). Changes in meteorological conditions and land-use pattern have increased floods frequency in many parts of the World (Lehner et al., 2006). Flash flood is hydro-meteorological hazard (Pande, 2010) and occurs after five or six hours of heavy rain in any watershed with high level of destructive discharge (Zhou et al., 2000; Korutny and Kichigina, 2006; Ruin et al., 2008). Its occurrence often associated with orographic effect augmenting violent weather conditions and steep gradient promoting rapid collection of stream flow (Rossa et al., 2010; Gaurav, 2011). Pande (2010) has investigated that cloudburst, breaching of landslides dams, and glacial lakes outburst are factors of flash floods genesis. It has potential to transports large mass of