

Natural hazards in mountain regions of Uzbekistan: A review of mass movement processes in Tashkent province

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Abstract— this paper represents a short review from different scientific sources on mass movement processes in Tashkent Province. We can see that Tashkent Province is one of the most areas, which is prone to all of the natural disasters (earthquakes, landslides, debris flows, rockfalls, and avalanches). The considered region located in high mountainous area and presence of a considerable quantity of precipitation leads sectors covered with loess rocks to be more vulnerable to mass movements. Most effective triggering factors of mass movement processes in this area mainly rainfall and seismic activities. Sometimes the synchronous development of these two factors can create the huge losses. The presence of a big water reservoir, settlements and recreational zones in this area increase the efficiency of the region in terms of prevention of natural hazards. Nowadays the main attention paid to Mingchukur landslide and its impact to a water reservoir. Therefore, for obtaining accurate data for inaccessible areas and for analyzing datasets reasonable is the using of Remote Sensing technology.

Index Terms— Landslides, triggering factors, earthquakes, remote sensing, climate, Tashkent Province, Uzbekistan.

1 INTRODUCTION

Central Asia countries have a long history of disasters that have brought out economic and human losses. In this territory, we can observe all types of natural and technological hazards, including earthquakes, floods, landslides, mudslides, debris flows, avalanches, droughts [5]. Earthquakes are the prevailing hazard in Uzbekistan. It lies in a region with low to very high seismic hazard zone [5]. Since 1955, Uzbekistan has experienced 81 earthquakes above five in magnitude, of which 11 were above six. An earthquake struck Tashkent on 26 April 1966 that killed 10 people, affected 100,000 others and caused economic losses of \$300 million [30], [18]. Landslides are the second natural hazard in terms of a number of victims and damages. However, most of the earlier publications were in Russian and, thus, remained practically unknown in the Western World [13]. In Central Asia, landslides often occur in the loess zone of contact with other rocks, on clay interlayers of the Mesozoic and Cenozoic age, reaching a volume from tens of thousands up to 15-40 million m³, characterized by the duration of preparedness and relatively rapid and catastrophic displacement of the masses [24]. During the last years, a large number of projects and studies conducted in the mountainous regions of Uzbekistan to prevent landslide processes. In Uzbekistan, 90000 km² area covered by mountains, where about 3.0 million people are living, 17%

mountainous area vulnerable to landslides, 10-12% of the total damage caused by natural disasters falls on landslides. Formation of landslide processes is a natural relief forming processes which, due to changes in climatic conditions and the development of mountain slopes increasing year by year. Mountain region of Uzbekistan is most prone to geohazards in Central Asia region. Landslide processes are often associated with the impact of three factors: climatic, seismic and man-made or technogenic.

Landslides triggered by snow melting, precipitation, and underground waters consist 65-70%, by old and recent earthquakes - 25-20% and by technogenic factors - 15-20%. Last years the great attention paid to building new and reconstruction of old transport communication and transport movement on mountain highways has increased in ten times that can trigger the formation of new landslide sites. In mountain zones still operating existing economic constructions and mines where throughout 30-40 years large landslides developed. Their main feature is that, despite the long period of development, they continue to move year after year and become less predictable [25].

Remote sensing technologies became a powerful tool in natural sciences. During the last decades that this technology has also extended to landslides [3],[15],[32],[17],[31]. Nowadays, new techniques of Remote sensing finding their application more effective for landslide detection, mapping, monitoring and hazard analysis. Landslide detection and mapping can be done by optical and radar imagery. A new generation of high-resolution satellites, such as World-View, Geo-eye can be very useful for creating inventory maps of landslides in regional and local scales [4],[16].

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