



Geomorphic activity and natural hazards during monsoonal precipitation in 2018 in Kali Gandaki valley, Nepal Himalaya

Rainer Bell (1), Monique Fort (2), and Eva Posch (1)

(1) University of Innsbruck, Institute of Geography, Innsbruck, Austria (rainer.bell@uibk.ac.at), (2) Université Paris-Diderot, 75205 Paris Cedex 13, France

High mountain areas are very dynamic in terms of erosion and sedimentation. Highest geomorphic activity in central Nepal Himalaya is driven by monsoonal precipitation. Floods and landslides not only are relevant processes regarding landscape evolution but pose serious threats to local population and infrastructure. However, often infrastructure development increases geomorphic activity and natural risks.

The Kali Gandaki valley is the deepest valley on earth, showing height differences of more than 5500m from valley bottom to the highest peaks of Dhaulagiri and Annapurna (>8000m). Currently, the Kali Gandaki road is extended to a two lane road, which leads to numerous undercut and instable slopes.

Geomorphic activity and natural hazards were assessed between Tukuiche and Dana based on the interpretation of high resolution Pleiades satellite images of March and October 2018 and field visits in April, September and November 2018.

The analysis of the satellite images shows that during monsoonal precipitation at least one severe rainstorm occurred which led to a major flood and triggered numerous small and some bigger landslides. Especially north of Ghasa almost all tributary channels show significant erosional features and some also sedimentation. Also debris flows occurred. Not all events in the tributaries were connected to the Kali Gandaki river.

North of Ghasa a steep section of the Dhampu rockslide was undercut by the major Kali Gandaki flood, triggering a 700m wide and 350m high slide which removed almost all regrown vegetation on this slope. It transported lots of sediments to the Kali Gandaki, increasing its erosive power. In addition, severe wind erosion has started at this site to blow large amounts of sediments towards Lete and Kalopani, impacting local population and the tourism industry there. Local residents stated that they did not have such dust problems before.

The major flood caused severe erosion and sedimentation along the Kali Gandaki floodplain until south of Dana. In Bandarjung retrogressive erosion in the lower part of the steep tributary caused a road blockage for eleven days in August, which is supposed to be a good indication for the timing of the whole event. Further south, parts of the Talbagar landslide were reactivated, its crown getting close to the houses of PahiroThapla. Another landslide along the river bank destroyed three houses. Talus slopes along the road started to react upon the undercutting due to construction works. Current slope stabilization measures are not sufficient to stabilize these slopes. Without further stabilization measures the undercut talus slopes and landslides will provide a source for increased geomorphic activity and natural hazards for a long time.