



Urban flood scenarios in arid environments: the case of Copiapó in the Atacama Desert (Northern Chile)

Tatiana Izquierdo, Manuel Abad, and Héctor Carvajal

Departamento de Geología, Universidad de Atacama, Copiapó, Chile (tatiana.izquierdo@uda.cl)

The city of Copiapó (420 m a.s.l.) is located in the southern Atacama Desert (<20 mm/year) at the junction between the Copiapó River and its main tributary, the ephemeral stream Quebrada Paipote. The valley that goes SE-NW in this sector is limited by hills (1,100 m a.s.l.) with alluvial fans systems orientated towards the river. The city is located in an alluvial plain cut by the river active channel. During flood events this plain receives both the discharge of Quebrada Paipote before its disemboquing in the river and the overbank flood of the river in the NW sector. We reconstruct the last 3 floods in Copiapó after meteorological events, June 1997, March 2015 and May 2017 in order to identify the factors controlling the city most affected areas and the different alluvial and/or fluvial processes involved during these events. The June 1997 flood occurred after intense rainfall (>70 mm/24 h) in Copiapó that generated sheet floods in the alluvial fans surrounding the city that arrived to the streets flooding 3 different sectors. In addition, the river discharge increased, and an overbank flood occurred in the NW sector of the city. The maximum flood depths reached 80 cm in this last sector. In March 2015, an extraordinary precipitation event occurred in the Andes Cordillera (> 80 mm/96 h) causing a discharge increase of both Copiapó river and Quebrada Paipote (> 100 m³/s in both systems). As a result, a total area of 12.2 km² of the city was flooded (72% of the urban area). Four sectors of the city had flood depths higher than 2 m with a maximum measurement of 3.8 m close to the confluence of Quebrada Paipote and a mean flood height of 45 cm across the city. Finally, in May 2017 another hydrometeorological event occurred, although not as important as in 2015 (30-50 mm) overbank flood occurred in 2 sectors of the city, near the confluence of Quebrada Paipote and in the NW sector of the city. These sectors were affected by < 1m flood depths. The analysis of the different flood events and the geomorphic features of the valley concludes that the NW sector of the city is the most hazardous as independently of the meteorological scenario always gets flood depths >50 cm.