

Paper Number: 1275

Causes and environmental impact of an erosion and flooding event on the El Rodeo Valley, Catamarca, Argentina.

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The town of El Rodeo is located in a tectonic depression in the eastern slopes of the Sierra Ambato-Manchao, Ambato Department in Catamarca Province. The Rio Ambato is one of the main tributaries of the Rio del Valle, which feeds the Dique las Pirquitas, a dammed lake that is the main source of drinking water for the City of Catamarca.

In January 2014, after several weeks of intense heat, unusual for the summits region, there was a violent and extreme rainstorm in the drainage area of the El Manchao hill in the upstream stretch of the of Ambato river, a major tributary which provides El Rodeo town with water. This caused a catastrophic flood.

The event was analyzed by dividing the basin of the Rio Ambato in three units of study: the high basin (upstream), middle basin and lower basin. The high basin drains an area of 98.18 km² around the Los Altos, Manchao and Pabellon hills where the homonymous rivers drain to a confluence that forms the Ambato River. The Ambato occupies an area of 98.18 km², defined in this study as middle basin. The lower basin (downstream) begins at the river mouth, where, due to the sharp decline of level, the energy of water decreases and sediments are deposited, creating an extensive alluvial fan on which is located a municipal camping site, where, in general, about 200 people camp. The event was also studied from the geomorphologic perspective before and after it took place and urbanization trends in the period 2003-2013 which increased vulnerability, the previous hydrological and weather conditions and the environmental impacts.

We concluded that, in the three sub-basins that jointly form the upper basin which included temporary reservoirs, suffered extensive erosion and channel scouring to depths of about 1.5 to 2m. At the river mouth, pressure relief caused the flood to split into two branches causing major destruction. The municipal camping site and a bridge downstream were destroyed and the site, river banks and neighboring streets were covered with mud. Also, bridges above the site and in the center of the urban area suffered base erosion. Due to increasing urbanization of about 40% in the floodplain of the Rio Ambato the vulnerability of the population had been increased leading to greater damage.

The environmental impact was also influenced by modification of the drainage and width of the major channel of the Rio Ambato, and the modification of the line of the river bank. The level of the low river terrace was eroded. Several housing and land areas were buried by deposition from the flood and the camping area was completely covered. The Dique Las Pirquitas lake also received a major influx of sediment adding to an existing problem of reservoir filling.

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