Cases of Flash Floods in Mexico

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Abstract

In this presentation some cases of flash floods in different parts of Mexico will be analyzed with their effects, as well as some recommendations to diminish the risk of these phenomena will be reported. In this matter one of the main problems in our country is that basins susceptible to produce flash floods are not yet identified. A lot of human settlements exist near or above rivers or creeks, what has caused a false impression of impossibility of such phenomena; nevertheless, the occurrence of huge storms, due to different kinds of weather systems hitting our country, such as tropical cyclones, cold fronts, and their interaction among them or with the intertropical convergence zone, can cause floods, in ancient creeks or rivers, and produce severe damages to population and their wealth, as was the case of Acapulco bay, in 1997, when this place suffered from flash floods, produced by heavy rain generated by hurricane Pauline and caused the death of 228 people and damages reckoned in $448 million dollars. On that event, 411 mm of rain was produced in 24 hours, with a maximum intensity of 120 mm/h, combined with the type of soil and the slopes in the high part of the basin caused debris flows. The force of the flow was such that devastated several blocks in the urban area, bringing to light old creeks and filling them with rocks of more than one meter of diameter. In time, a Sabo engineering solution, proposed by Japanese experts, consisted of solids retention works in the elevated parts of the basins; nevertheless, only partial works have been carried out, because of their high cost, as well as relocation of part of the population and a new redefinition of the river bed.

Although It's known that flash floods occur in basins with concentration times of a few hours, due to the insufficient weather stations and deficient communications with them, and to a low density of rain gauges, the floods originated with almost a day of anticipation become flash floods, and they produce important damages, as happened in Coahuila, in 2004, near the American border, a flood caused the death of 38 people, 7 disappeared and $ 13 million dollars in damages, in a basin of 2,624 km^2 area and a concentration time of 20 hours. On that event, the only weather station nearby, recorded a depth of 55 mm in 24 hours, unfortunately, in the lower part of the basin, what finally does not explain the flood, and hardly could have been useful to alert and to evacuate inhabitants; nevertheless, It's possible to estimate a depth of 285 mm in the highest part of the basin, thanks to the proximity of the basin with an American weather radar, which would explain much better this flood and underline the importance to operate radars for severe storms warning and the possible occurrence of flash floods, along with an acceptable rain-runoff model. Finally, there is a problem related to the abilities of our human resources in civil protection, a matter relatively new in Mexico (whose structure was designed due to the 1985's earthquakes), and, of course, to the insufficient budget assigned for equipment and training (It's not well understood the idea of investing in prevention). Also, we recognize a problem with informing the procedures that people should take, in order to decrease fatalities and losses.