

## UNISDR Scientific, Technical and Advisory Group Case Studies – 2013 Impacts of precipitation episodes in Campinas, Brazil

### The problem

In Brazil, heavy precipitation episodes cause overwhelming catastrophes that affect a considerable part of the population<sup>1</sup>. Impacts include damaged, flooded, and collapsed properties and roads. This is the reality of Campinas - an urban centre in São Paulo State, with 1,080,999 inhabitants (2010 census) and an active diverse economy of industry, agriculture and services. Notwithstanding, the area has undergone rapid social, economic and environmental transformations and the unplanned growth of the city has led to an increasing inability to house the growing population and to provide adequate infrastructure: for instance, in 2009 ca. 7,527 families lived in risk-prone areas<sup>2</sup>.



Figure 1: Flooding in Campinas, on 29 March 2011.<sup>3</sup>

### The science

There has been a greater than 10-fold increase in the number of impacts observed as a direct result of extreme precipitation events over the 50 year period between 1958 and 2007<sup>4</sup>. During the same period, population growth was five-fold. In addition, over the last two decades, there has also been an increase in the annual number of extreme precipitation events and in the frequency of daily events above 50 mm rainfall<sup>5</sup>. The increase in impacts triggered by precipitation is disproportionate to the relatively small changes in precipitation distribution, implying that the extreme rainfall consequences were associated not only with the magnitude of the total rainfall, but also with the increased exposure of the affected group.

Impacts promoted by precipitation have increased in number and types along the last five decades in Campinas and have affected all social classes<sup>4</sup>. To combat and reverse this trend, measures based on knowledge, community values and focused approach have been taken. In addition to improved weather forecasting by Campinas Civil Defense, efforts have been made to identify the factors that can lead to a real change in attitudes, values and decision making about flood risks and adaptation strategies in Campinas.

### The application to policy and practice

In February 2003 severe rains in Campinas have left as a result 12% of the city flooded and claimed six lives. This dramatic episode served as the starting point for several measures towards a safer and more resilient environment. A comprehensive and effective network to assure best practices towards a more secure environment and some important initiatives were taken, including: studies to evaluate current threats considering long-term trend; annual update of areas under risk of flooding, landslide and erosion;

preventive and corrective actions in the drainage system to improve the flow of waters and prevent flooding during the period of heavy rains; removal of families of risk areas; preventive inspections (Civil Defense and IPT - Technological Research Institute) and educational activities such as visits of the Civil Defense to municipal schools, distribution of printed educational material to the community and simulations of situations of risk, performed at annual basis. Campinas also has the TerraMA2 system, developed by the Civil Defense and INPE - National Institute for Space Research - which permits to identify and incorporate, in real-time, information into the alert system.

Campinas local government has established a cooperation agreement with the Brazilian federal government via CEMADEN (National Centre for Alert and Monitoring Natural Disaster), joining efforts towards a safer and more resilient environment. The city is also promoting efforts to reduce the impacts based on the Hyogo Framework, involving members of the municipal staff and the community. The local government has recently joined the campaign for making cities resilient: 'My City is getting ready!' and other actions, innovations and initiatives are under way towards a safer environment.<sup>6</sup>

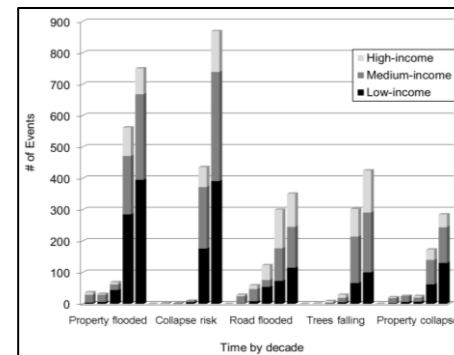


Figure 2: Quantity of records per social-economic level (flooding of property, risk of collapse, flooding of roads, falling of trees and collapse of property).<sup>4</sup>

### Did it make a difference?

An integrative approach linking federal and local government, the civil society and scientists has strengthened Campina's status of resilient city. The efficiency of the measures taken can be attested by a decrease in 60% in the number of at-risk areas (from 75 to 30) and of residences located in risk areas (7,500 in 2009 to 2,668 in 2013, a decrease of 64.4%) as well as a sharp decrease in the death tolls. In addition, the successful results in Campinas have led other 26 towns to adopt the same procedures towards a better resilience<sup>7</sup>. Because the impacts of floods include economic losses associated with human health, transportation infrastructure and housing prices, reducing the city growth and the residents welfare, the increase of resilience to floods in Campinas also contributes to reduce financial losses due to floods.

### References

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