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## Floods in the Toledo River Basin

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### ABSTRACT

Preventive strategies involving preparedness, warning, and recovery to meteorological hazardous events such as floods, are essential to correctly assist the population at risk. However, effective plans must be based upon the knowledge of the area, considering both the physical and the socioeconomic attributes, evaluated in a historical perspective.

This study aims to contribute to the design of preventive plans to flood hazards in the city of Santa Barbara d'Oeste, located in Sao Paulo State, Southeastern Brazil. As a first step it evaluates the physical conditions and the spatial distribution of the population in the territory, with special emphasis on recent trends. Because more and more people are living on floodplains, the impacts related to floods are increasing considerably, constantly affecting particular social groups more severely than others, evidencing the distinct degrees of vulnerability of the population.

The register of flood events in the area is intrinsically connected to its physical attributes such as the characteristics of precipitation (highly concentrated during summer and spring, with regular and strong convective events), the landscape's geomorphology, and the settlement patterns in the territory. The latter have recently been characterized by a fast spread of the city onto the floodplains, mostly occupied by the poor sectors of the city's population. As a consequence, the municipality has been witnessing an increasing frequency of intense floodings of poor residential areas in the Toledo River basin, a small river that crosses Santa Barbara's downtown.

The analyses undertaken so far, evaluating both the physical and the socioeconomic conditionings of floods in the area, show that there has been an increase in the annual rainfall amounts of about 15% between the periods 1950/1969 (annual average of 1230mm) and 1980/1999 (1423mm). This change could be induced naturally or anthropogenically, and must be investigated. Initial analyses of the daily distribution pattern of both periods reveal new trends of rainfall distribution. Notably, precipitation events are becoming more concentrated in shorter periods (an increase of extreme rainfall events was also verified in the neighbour city of Campinas (Vicente 2005)). A survey of floods registered in Santa Barbara d'Oeste shows an increase of events in recent years as well, which might be at least partly connected to the augment and concentration of rainfall totals. As examples of the concentration of rainfall episodes, one can quote: 120mm on 01 and 02 January 1990; 208 mm on 21 and 22 December 1994; 127 mm from 26 to 28 January 1997; and 131 mm on 15 February 1998. These totals used to be quite unusual and rare in the area, as verified by an historical evaluation of rainfall distribution in the city.

Next steps of the study must evaluate in depth the elements under analyses and establish cooperative links with the municipality, especially the Civil Defense agency. The goal should be to design an effective prevention plan, which provides for different steps of action according to the atmospheric conditions and the settlement characteristics in the different sectors of the Toledo River basin.