



## **Mapping geological at risk areas in the city of São Paulo: issues and results from the largest risk survey in Brazil**

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In the City of São Paulo, the first reports of accidents resulting from landslides are directly related to urban expansion that has been recorded since the 30s. Areas of major environmental fragility, such as slopes and stream-banks, have also ended up being occupied without proper planning. The increased number of deaths due to landslides in the 80s already indicated the need for intervention at these sites by the public authorities. It was important to act to prevent these disasters, not only emergency assistance to victimized families. Therefore, in 1989 the first systematic and official survey on the City's at-risk areas was made. At the time, the at-risk sites had been still unknown, except for the occurrence records and press reports. While some areas were evaluated by experts, others appeared or expanded without any control. The surveys pace could not definitely follow the growth and the density of favelas, and some communities started to trigger the first records of accidents in areas hitherto stable. Considering the universe to be studied and the detail level of the work, it was necessary to use specific methodology to enable evaluation of the entire City in a relatively short period of time. For that purpose, mapping activities were carried out in five phases and involved about 80 professionals in the fields of geology, engineering, architecture, geography, civil defense, and housing, who participated directly or indirectly in all stages of work. Thus, the mapping that has recently been completed by the Municipality of São Paulo and by the Institute for Technological Research of São Paulo State is today the largest geological-risk database in the country. Besides technical information, the survey also shows the types of intervention to be implemented according to the degree of risk and the type of verified occupation, vital data to prioritizing the public-authorities actions. Currently, among the 1,602 favelas and informal settlements in the city, 407 (25%) occupy areas with some occurrence probability of mass-movement processes (landslides, erosion, and fall of stone blocks). Together, the assessed areas cover about 13.5 km<sup>2</sup>, which corresponds to about 1% of the City's territory, although they all are located in the outskirts regions. 105,816 homes were analyzed and, currently, 8% of this total is located in the most critical areas, classified as very high risk, which require immediate actions in order to stabilize them; 19% were classified as high risk and the rest - 73% - show more stable situation. Currently, about 115,000 people live in landslide-risk areas in the capital. The results, now complete and current, have been making possible reassessment and adjustment of the low-income intervention projects by the government, prioritizing housing, social-educational infrastructure, and basic-sanitation actions in areas of greatest susceptibility. The program of slum upgrading, the relocation of 5.000 families to safe places and actions participatory monitoring with communities deserves mention and were only possible after the correct diagnosis of risk situations in the city that, despite the large population, has no record deaths from landslides for more than two years.