



## **Integrating Statistics and Geography to climate change vulnerability studies**

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### **Abstract**

We are all aware that the impacts of climate change on human populations are more and more frequent and potentially devastating, therefore we need more effective actions to understand our vulnerability to extreme climatic events. The deep comprehension of the phenomena is the key to deal with them and its consequences.

There are clearly two dimensions within this discussion which need to be integrated from a spatial perspective: the social and the environmental dimensions. In a broad way, the social dimension could be represented by statistics, particularly census data, and the environmental dimension could be represented by susceptibility maps. The exploitation of demographic data could provide a wealthy analysis in which can guide more effective approaches, particularly, when it is applied to the geography of climate related hazards.

First of all, there are some methodological challenges to be overcome.

Historically, statistics has been released to administrative boundaries (country, states, provinces, municipalities) and, in a few cases, to some operational boundaries (enumeration areas, blocks, output areas). The climate hazards, however, operate cutting across these boundaries. So, statistics need to be processed in reference to the geography of climate hazards. In most of the cases, the statistical granularity level data is quite low and it is also necessary a size reduction of the aggregation units. Nowadays, these tasks are not hard to perform in light of the technological advances in GIS and its growing use in National Statistical Offices.

We show a study case in Brazil which uses census microdata aggregate in small and regular geographical units that are used to characterize the population settled in susceptible areas to geological hazards and flooding at the northern coast of São Paulo.

We could conclude that census data integrated to geography of climate change and connected processes can significantly improve the understanding of hazards and vulnerability. Until this result can be reached, there are many steps ahead. The presence of geo-referenced data is not enough, neither statistical nor geographical data. Thus, it is necessary a common spatial basis for both, so that the data integration can be simple, quick, and efficient.

**Keywords:** geography; census; data integration; gridded data.