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Keynote Address

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Methodological Approaches to Urban Hazard Analysis

Abstract

Disaster Risk Reduction is a multidisciplinary field, which needs a close cooperation between the technical and the social sciences. Consequently, many different types of spatial information are required to make useful predictions of disasters and to design disaster risk reduction plans. It is important to distinguish clearly between a Risk Reduction phase "between disasters" and a Relief phase during and immediately after disasters. This keynote will be mostly dealing with the first phase, the advances in technology and methodology, spatial data needed, and the implications for urban management.

The figure below illustrates well how we think about disaster risk reduction: on the one hand we have a hazard, such as a typhoon, a flood, an earthquake, or landslides, and often more a combination of these. Hazards may trigger each other and cause domino effects: e.g. the Wenchuan earthquake triggered more than 50000 landslides, of which some blocked rivers, forming temporary dams that added a flash flood risk downstream. Examples will be given of these hazards, the spatial dynamic models that we use to design hazard scenarios with given return periods and the data needs and uncertainties. A discussion about hazards cannot be held without a discussion on climate change. However, while many cities are in locations that are affected by a changing climate, this is not always the immediate problem. For instance an integrated flood management analysis for the city of Kampala illustrates that population growth is often the more immediate concern. Reducing the vulnerability of the so called "elements at risk", a rather impersonal term for property, infrastructure and people, is the main goal. Different types of spatial data are needed for this: while a good inventory of a building footprint and infrastructure can be made with high resolution imagery and LIDAR, where sub-meter levels of detail are achieved, we still need on the ground data to tie this to structural properties of buildings and socio-economic status of people.

Remote sensing data provide valuable indicators, but we need "on the ground" inventory type data to find out what they are an indicator of: both the structural properties and the

social and economic status of the inhabitants, including age, gender, education, family structure etc. This is highly dynamic, because the exposure of people to a hazard can change rapidly. We will show examples from Bangladesh which show for instance the difference in population density in a mixed district with houses, shops and offices. Patterns change between day and night, festival days and normal days, weekends and week days. Thinking about risk as a static one time “snapshot” that can be made for a city, ignores this fact. Nevertheless dealing with this is not easy. We could design scenarios of likely population density, or we could think in a very different direction and track people with their cell phones, as an example from the city of Tallinn will show. An “app” that people switch on during a disaster or in an early warning period and a dedicated system to track people could be a valuable alternative. Achieving risk reduction in cities is a complex mixture between urban planning, engineering measures and adaptation of people living there. Fortunately, “data scarcity” is more and more a thing of the past because of national efforts and international cooperation.