



A global scale comparison of multi-hazard exposure in cities

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Many large cities around the world are at risk of more than one type of natural hazard, but in practice, hazards are often considered in isolation. Yet often, cities are faced with difficult trade-offs in mitigating different hazards. For example, building a reservoir dam to control floods and droughts in earthquake prone areas introduces a risk of dam break flooding. Similarly, land use planning to move construction away from the floodplains and on slopes might reduce flooding but can increase landslide risk. Such decisions have a long-term impact on the level of hazard risk in a city.

In this work we attempt to find out: a) which cities face risks from the same types of hazards and therefore the same challenges and trade-offs? b) Which combinations of hazards often affect the same areas and therefore require better integrated solutions?

We use existing global hazard datasets and apply fuzzy clustering to identify groups of cities according to their multi-hazard environment. The results are evaluated against data from the Rockefeller Foundation network of resilient cities, case studies found in the literature, and databases of historical occurrences.

The results show, among other things, that similar multi-hazard conditions occur in cities on different continents, while cities in the same country may vary significantly in the hazards they face. As such, this work can inform new collaboration between cities facing the same hazards, and help to co-develop multi-hazard solutions.