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Mapping resilience to natural hazards in urban systems: the case study of Ischia Island (southern Italy)

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The dissemination of resilience concept to citizens, politicians, entrepreneurs, territorial planners is the first and most important step to shelter urbanized areas from natural hazards.

In this frame we propose a procedure to draw resilience maps as tools to facilitate the communication of inherent resilience status of cities. The core of the research is the assessment of this status for the environmental component that deeply influences the livability and development of urban systems. The procedure, implemented in a Geographic Information System framework named "Resilience and Disaster Risk Management", defines and maps indices and indicators at the census district scale. It considers the different nature of data (attribute data, urban system components represented with primitive features, polygon, line and point) and for each of them indicates the necessary steps to draw the resilience indicator maps. Through their ranking into the same number of classes, the procedure makes the indicators fully comparable to each other and allows the definition of indices as aggregation of indicators.

The procedure was tested at Ischia Island (Southern Italy) exposed to volcanic, seismic, landslide, flood and coastal erosion hazards. The spatial variability of environmental resilience is shown into several maps that discretize the island into high, medium and low resilience classes.

From our analysis emerged that the historic centers of the towns, in general show the lower resilience, mostly due to poor quality and age of buildings. The lack of building surplus acts negatively on resilience making it difficult to redraw the urban structure during the preparedness phases, when several interventions could be carried out with the aim of lowering the number of people to put in safe from a possible disaster. Our analysis brought also to the consideration that the distribution of green areas on the island results unable to counterbalance the negative effects of urbanization and enhance the environmental resilience. In as much, no official program of fruition of green areas currently involves Ischia Island, although many geovolcanological and naturalistic valuables would deserve promotion and conservation, contributing to enhance the capability of the territory to cope with adverse events.

The mapping procedure can be applied to larger areas at risk keeping the censual districts as the minimum territorial reference units or using municipal, regional or national administrative units.

The expected integration of resilience assessment in territorial planning (e.g. Regional Territorial Plan, Provincial Territorial Plan, and Municipality Territorial Plan) could greatly benefit from the outcomes of the present research for overcoming sectoral approaches in territorial management.