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“Sponge land(scape)”: An interdisciplinary approach for the transition to resilient communities

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Data on natural disasters shows that cities worldwide are increasingly exposed to the risk of negative consequences. Storms and floods are among the main causes of casualties and economic losses. Moreover climatic and anthropogenic changes, urbanization and other land use transformation may contribute to increase hydrogeological hazard and risk, both in mountain valleys and in floodplain areas. On the other hand well managed soil may offer many water—regulating ecosystem services. Given that the hydrological and hydraulic dynamics commonly involve a great area, which is also upstream and surrounding the city, therefore a paradigm shift both in urban and land planning is needed, in order to integrate hazard perception and risk culture in plans. This integration also requires practices of soil conservation.

Literature underlines that, in order to achieve the transition to resilient communities, it is necessary (a) to reduce soil sealing, (b) to improve the benefits of ecosystem services as part of the plan strategies, (c) to enhance the key role that landscape planning can play in environmental protection. However, in most of the current urban and spatial plans in Italy these strategic guidelines are still ignored.

In order to address these critical issues we propose a method to classify rural areas which considers both landscape and hydrological peculiarities, in order to identify, at the regional scale, the most suitable areas to plan and design the landscape. We therefore propose to identify such a kind of landscape with the definition of a “sponge land(scape)”, which aims at extending the affirmed concept of “sponge cities” to rural areas. This approach to land management may contribute to the mitigation of hydrogeological hazard and risk, by means of preserving the regulating soil ecosystem services. At the same time it will improve both the resilience level of urban areas and the ecosystems living conditions.

The method is tested in Italy, where, according to the “Report on hazard and risk indicators about landslides and floods in Italy” (ISPRA, 2018) more than ninety percent of Italian municipalities are exposed to the hydrogeological risk. The collaboration between researchers belonging to the disciplines of spatial planning (i.e. town and regional planning) and soil hydrology was considered strategic. In particular, it allows to take advantage of specialized hydrology geo-datasets into spatial planning, which are usually not taken into account. As a first step, Hydrological Soil Groups were considered in the planning procedure. Data integration in GIS made it possible to create new

maps which allow priority area to emerge for "sponge landscaping actions", such as the adoption of Nature Based Solution or Natural Water Retention Measures. These contribute both to the mitigation of hydraulic risk and to the maximization of other complementary ecosystem services (e.g. biodiversity preservation, climate change adaptation and mitigation, erosion/sediment control).