

Building a Multi-Hazard Exposure Database for Urban Risk Assessment: the Case of Genoa

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Keywords: Multi-Risk Assessment, Urban Exposure Data, Impact Chains, Urban Vulnerability, Resilient Cities

Abstract This contribution presents an integrated approach for the collection, classification, and spatial harmonization of exposure data in support of multi-hazard urban risk assessment, with the city of Genoa as a case study. Genoa is a complex urban setting affected by multiple hazards and characterized by densely built-up areas, steep orography, ageing infrastructure, and growing socio-demographic fragility. The work is part of the Extended Partnership RETURN initiative, which promotes multi-risk science for resilient urban communities in a changing climate. In the context of complex and overlapping urban hazards – such as heatwaves, floods, landslides, and earthquakes – comprehensive exposure datasets are critical to inform risk modeling, decision-making, and planning.

The methodology is guided by a multi-hazard impact chain framework, which structures the interdependencies between hazard, exposure, and vulnerability components. Data sources include national and municipal geoportals, open statistical datasets, satellite imagery, cartographic material, historical archive data, specialized publications and more. Special attention is given to the spatial resolution and thematic completeness of the data, ensuring compatibility with census sections and municipal planning layers. A key element of the ongoing effort is the extension of this dataset to the full territory of the municipality of Genoa. This allows a consistent citywide baseline for assessing both current and future risk scenarios. The resulting geodatabase, built upon open and interoperable formats, aims to become a tool for spatial risk analyses, adaptation and mitigation planning, and social vulnerability mapping. The process and structure of this work are replicable and can serve as a reference for other urban contexts facing similar multi-risk challenges.