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Reducing peri-urban flood hazard using a holistic catchment approach to reduce hydrological connectivity

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Continuing rise in urban population is resulting in expansion of urban land into peri-urban areas. Impacts of urbanization in increasing overland flow, streamflow and the magnitude- frequency of floods are well documented. From 2000 to 2012, annual estimated costs of losses due to floods in European Union averaged €4.9 billion, but these costs may increase to €23.5 billion by 2050 due to climate change (Jongman *et al.*, 2014).

Traditional flood protection measures based on grey infrastructures (e.g. dikes and dams) have proven to be not sufficient and effective. Nature-based green solutions, however, have recently been proposed as a promising complement to mitigate flood risk. This paper stresses the relevance of a holistic overview to mitigate flood hazard based on a catchment-based approach, in which

hydrological connectivity between mosaics of distinct land-uses should be clearly articulated. This approach is based on the findings of a study developed in Ribeira dos Covões peri-urban catchment, in central Portugal. Hydrological field measurements include temporal variations on soil properties in different land-uses (i.e. soil moisture, hydrophobicity and infiltration), runoff measurements in distinct woodland types (plot scale) and rainfall-runoff responses in sub-catchments with distinct urban patterns and land-uses. This work also presents and incorporates provisional outcomes of the COST Action “Natural Flood Retention on Private Land” (LAND4FLOOD), addressing topics related to (i) potential synergies between different land-uses and the provision of flood storage; (ii) the adaptation of land-uses to increase water retention capacity; and (iii) engagement of public and private stakeholders in urban and rural areas to reduce flood damage through the implementation of retention and resilience measures throughout the catchment.

Keywords

Land-use mosaics, floods, nature-based solutions, hydrological connectivity, catchment-based approach, LAND4FLOOD.

Reference

Jongman, B., Hochrainer-Stigler, S., Feyen, L. et al. (2014). Increasing stress on disaster-risk finance due to large floods. *Nature Climate Change* 4, 264–268.