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The RiskChanges tool for multi-hazard risk-informed planning at local government level

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Local governments are faced with increasing levels of risk from extreme hydro-meteorological events such as (tropical) storms, flooding, landslides, drought, heatwaves, wildfires, etc. The frequency and interaction of these events, also in combination with other events that do not have a direct climate driver, makes that it is likely that many areas are faced with higher impacts from compounding events. Global trends such as population growth, urbanization, increased dependency on technology also contributed to larger exposure and vulnerability. In order to plan for future developments, and for reducing the increasing levels of risk, local governments require to plan ahead and evaluate the options available for reducing the risk under future scenarios. For this task Spatial Decision Support Systems are required that allow local governments to make informed decisions, considering the current and future levels of risk. RiskChanges is a Spatial Decision Support System for the analysis of current and future multi-hazard risk at a local level, in order to analyze optimal risk reduction alternatives. The system is developed by the University of Twente in collaboration with the Asian Institute of Technology, Geoinformatics Centre. RiskChanges (<http://www.riskchanges.org/>) is an Open-Source, web-based tool, based on a series of python scripts, which are integrated into a Graphical User Interface. The tool includes several major features: multi-hazard, multiple assets, a vulnerability curve database, multi-user approach, comparison of risk, and spatial analysis. Users can upload their own datasets (in the form of hazard maps, elements-at-risk maps, administrative unit maps, and vulnerability curves). The tool contains an open-source vulnerability curve database, allowing to sharing of physical vulnerability curves among users. Multiple users can collaborate on the same project, and provide different input data. The multi-hazard feature allows performing the risk assessment for multiple natural and manmade hazard interactions. Exposure and vulnerability are combined in a loss calculation for each combination of element-at-risk and hazard. Loss maps are integrated into a risk map, where the user indicates the interaction between the hazard types. The system allows to analyze the risk of multiple asset types with different spatial characteristics. Users can compare the risk for the current situation and future scenarios and/or planning alternatives.