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Flood damage curves for consistent global risk assessments

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Assessing potential damage of flood events is an important component in flood risk management. Determining direct flood damage is commonly done using depth-damage curves, which denote the flood damage that would occur at specific water depths per asset or land-use class. Many countries around the world have developed flood damage models using such curves which are based on analysis of past flood events and/or on expert judgement. However, such damage curves are not available for all regions, which hampers damage assessments in those regions. Moreover, due to different methodologies employed for various damage models in different countries, damage assessments cannot be directly compared with each other, obstructing also supra-national flood damage assessments.

To address these problems, a globally consistent dataset of depth-damage curves has been developed. This dataset contains damage curves depicting percent of damage as a function of water depth as well as maximum damage values for a variety of assets and land use classes (i.e. residential, commercial, agriculture). Based on an extensive literature survey concave damage curves have been developed for each continent, while differentiation in flood damage between countries is established by determining maximum damage values at the country scale. These maximum damage values are based on construction cost surveys from multinational construction companies, which provide a coherent set of detailed building cost data across dozens of countries. A consistent set of maximum flood damage values for all countries was computed using statistical regressions with socio-economic World Development Indicators from the World Bank. Further, based on insights from the literature survey, guidance is also given on how the damage curves and maximum damage values can be adjusted for specific local circumstances, such as urban vs. rural locations, use of specific building material, etc. This dataset can be used for consistent supra-national scale flood damage assessments, and guide assessment in countries where no damage model is currently available.