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Oral Presentations

315. Trends in flood exposure and vulnerability: Europe 1870–2016

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ABSTRACT

Objectives

Since the beginning of the second industrial revolution in the second half of the 19th century, Europe's society and economy has been profoundly transformed. The population doubled in the last 150 years, together with more than fourfold increase in number of dwellings and 30-fold increase in production value in real terms. At the same time, rural population dropped, and share of agriculture in production declined from 30% to a mere 2%. Cities that once have been small and very densely populated evolved into less cramped, but quickly sprawling metropolitan areas. All those trends were not without effect on flood exposure and vulnerability, two crucial components of flood risk. The study aims to reevaluate reported flood losses (population killed or affected, monetary value of losses, inundated area) so that for each flood event that occurred since 1870, flood losses relative to potential damage given the size of the flood event could be calculated.

Methods

In order to be able to calculate potential losses during any flood event within the study's timeframe, a set of high-resolution maps of land use, population, production and assets distribution is needed. Firstly, such detailed maps of population and land use at 100 m resolution was compiled for year 2011/2012. From this 'baseline' other maps for other time points (decennially 1870–1970 and five-yearly 1975–2020) could be calculated. However, for those other time points we only know the total population and land use at regional level. Hence, for each time step, the population and the different land use classes had to be redistributed inside each region in order to match the regional totals. Several methodologies were used in order to provide the best approximation for each land use class and population. Most effort was put to estimate past and future residential urban areas (where most population lives) and lands used by agriculture and infrastructure. A database of population, land use and economy at NUTS 3 regions was compiled for this study. Estimates of production and assets were disaggregated from regional or national level to a 100 m grid based on population and land use. Information on flood events, each with a flood extent defined using NUTS 3 regions, was also collected. Finally, the exposure maps were intersected with flood zones taken from pan-European flood hazard models.

Results

The study will present results of trends in exposure and vulnerability. Most important are the relative losses, showing changes in flood vulnerability. A sensitivity analysis will also be carried out. A statistical analysis of factors influencing the changes in vulnerability: demographic, economic, political will be presented.