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Simplification approach to detect urban areas vulnerable to flash floods using GIS: a case study Warsaw

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The aim of this study is to develop a consistent methodology to determine urban areas that are particularly vulnerable to the effects of torrential rains. They are, as a result of climate change, more and more prevalent in the temperate climate, usually spring - summer from mid-May to late August - and involve the risk of flash floods. In recent years, the increase in the incidence of such phenomena is noticeable throughout the whole Europe. It is assumed that through the analysis of environmental and infrastructural conditions, using the developed methodology, it is possible to determine areas vulnerable to flooding due to torrential rains. This may lead to a better management, quicker response in case of a phenomenon, and even to take measures to prevent the occurrence of adverse effects of torrential rains (for instance modernization of the urban drainage system and development of methods to get rid of rapidly collected water). Designation of areas particularly vulnerable to the effects of heavy rains can be achieved by adapting hydrological models, but they require an appropriate adjustment and highly accurate input data: (based on spot or radar measurements of precipitation, land cover, soil type, humidity, wind speed, vegetation species in a given area, growing season, the roughness and porosity of the cover and soil moisture) but such detailed data are generally hard to obtain or not available for less developed areas. It could also be achieved by performing spatial analysis in GIS, which is a more simplified form of modelling, but it gives results more quickly and the methodology can be adapted to the commonly available data. A case study of Warsaw's district Powiśle has been undertaken for three epochs – from 2008 to 2010 and areas, that are particularly vulnerable to the effects of flash floods and heavy rains, have been designated.