FACTSHEET RISK ASSESSMENT AND MAPPING ACTIVITIES

Flash flood hazard and vulnerability maps for Lower Silesia

Where was it implemented?	Map example:
Poland, Lower Silesia, Nysa Łużycka catchment	

Problem/background

Heavy rain events resulting in flash floods are one of the main natural hazards in Lower Silesia. In recent years, a serious event of intensive rainfall resulting in flash flood in the Nysa Łużycka catchment took place on 6-7 August 2010. Heavy rainfall caused rapid surface runoff and triggered destruction of the Niedów dam at the Witka river (tributary of Nysa Łużycka). Locally, the highest intensity of rainfall reached almost 60 mm/hour. The material losses exceeded 225 million PLN in Bogatynia community only.

Legend
Type
A
B
C
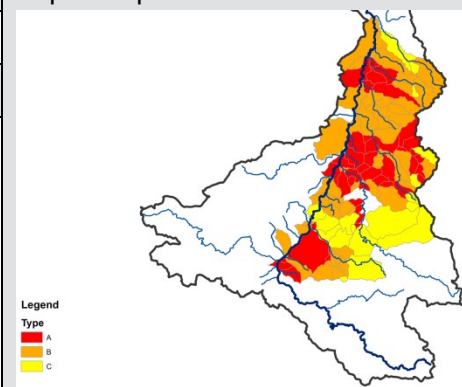
Description of methodological background and outcomes

The geographical features of catchments and land use strongly influence the potential flash floods occurrence caused by heavy rainfall.

The applied method focuses on physiographic and hydrological parameters as well as retention and land use conditions of the catchments affected by flash floods. It consists of the following main steps: selection of catchments where flash floods have occurred (1), evaluation of the catchment parameters based on GIS modelling and SCS-CN model (2), statistical analysis of calculated parameters and development of catchment models (types: A, B and C) prone to flash flood (3), identification of elementary catchments vulnerable to flash floods based on the developed models: A, B and C (4).

Finally, the elementary catchments vulnerable to flash flood have been identified and mapped in the Nysa Łużycka basin.

Area and event characterisation

Area type	Topography
Rural	Hilly, lowland
Land cover/land use distribution	**Event**
diverse	Not event-based
Receptors	**Flood type**
Buildings, technical infrastructure, agricultural land	Flash flood, pluvial flood

Specifications of method/measure and data demands and outputs

Level of complexity	2
Addressed SPRC element	Pathway, receptor, consequence
Method group	Empirical/statistical approach
Spatial scale(s) of application	Regional
Time scale/resolution	No temporal resolution

Input datasets (type and scale/resolution)	Digital Elevation Model (raster, 25 m)
	Hydraulically relevant structures (buildings, trenches, ditches) (vector: line/polygon)
	Land use data (vector: polygon)
	Soil data (vector: polygon)
	Physiographic, hydrological parameters of catchments (vector: polygon)
	Inhabitants (database of Central Statistical Office) (vector: polygon)
	Buildings (residential and non-residential buildings) (vector: polygon)
	Technical infrastructures (vector: point, line, polygon)
	Agricultural lands (arable land, crops) (vector: polygon)
Output datasets (type and scale/resolution)	Erosion hazard (raster, 25 m)
	Flow pathways (raster, 25 m)
	Affected receptors with vulnerability categorisation (vector)

Description of implementation	
Implementation	**Users (reported/designated)**
• 02/2018 to 06/2019	• Regional and local spatial planning departments
Initiator/responsible	**Involved stakeholders**
• IMGW-PIB/RAINMAN project	• Regional Water Management Authority

Lessons-learned	
Main success factor:	**Main challenge:**
• The applied method allows the identification and mapping of the elementary catchments that are vulnerable to flash flood generation.	• An open question is how to quantify and communicate uncertainties related to the mapping process.
Synergies/beneficial aspects:	**Conflicts/Constraints:**
• The spatial distribution of the catchments prone to flash floods is valuable and important for local spatial development plans and for flood prevention and protection.	• The method does not provide the direct information about resulting water levels and flow velocities.

Key message to others starting with a similar task	Contact
The documentation of previous events of flash flood caused by heavy rain is an important basis for the identification and assessment of catchment features prone to flash flood occurrence.	Institute of Meteorology and Water Management-National Research Institute (IMGW-PIB) Mariusz Adynkiewicz-Piragas, Irena Otop (imgw@imgw.pl)

References

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Bryndal, T. (2014) A method for identification of small Carpathian catchments more prone to flash flood generation. Based on the example of south-eastern part of the Polish Carpathians. *Carpathian Journal of Earth and Environmental Sciences,* 9(3), 109–122.

Bryndal, T. (2014) Identyfikacja małych zlewni podatnych na formowanie gwałtownych wezbrań w Karpatach Polskich (Identification of small catchments prone to flash flood generation in the Polish Carpathians). Kraków: Wydawnictwo Naukowe Uniwersytetu Pedagogicznego.