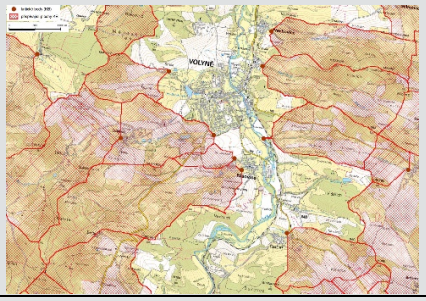
FACTSHEET RISK ASSESSMENT AND MAPPING ACTIVITIES

Critical points analysis

Where was it implemented?

Czech Republic, South Bohemia

Map example:



Problem/background

The pilot areas have been chosen on the basis of the computation of critical points over the entire country, also taking into consideration recommendations given by the Regional Office of South Bohemia.

Description of methodological background and outcomes

The methodology of critical points generally aims at the identification of urban (built-up) areas potentially endangered by concentrated surface runoff. The computation is carried out as follows:

- A digital elevation model (DEM) is used for the identification of the surface runoff direction.
- The accumulation of surface runoff is computed in order to delimit the pathways of concentrated surface runoff.
- The intersections of such pathways with the built-up areas are identified as preliminary critical points.
- Each intersection is an outlet of a contributing area of which basic parameters are analysed (mean slope, percentage of arable land). The contributing areas must not exceed 10 km^2.
- For each contributing area, a risk factor is calculated, based on statistical analyses of data from other experimental watersheds.
- The preliminary critical points of which the contributing areas exceed a given threshold of the risk factor, are finally selected as priority points.

Area and event characterisation

Area type Semi-urban, rural	**Topography** Hilly
Land cover/land use distribution Arable land 40 % at least (may be less in case of steep terrain)	**Event** Not event-based
Receptors Urban areas	**Flood type** Flash flood, pluvial flood

Specifications of method/measure and data demands and outputs

Level of complexity	2
Addressed SPRC element	Pathway, Receptor
Method group	Empirical/geostatistical approach
Spatial scale(s) of application	National, dependent on DEM raster resolution (usually 1 to 5 m), maximum contributing area 10 km^2
Time scale/resolution	No temporal resolution
Input datasets (type and scale/resolution)	Digital Elevation Model (raster, 1 or 5 m) Land use data (vector) Urban areas (vector/raster)
Output datasets (type and scale/resolution)	Critical point and its contributing area

<table>
<tr><th colspan="2">Description of implementation</th></tr>
<tr><td>Implementation
Created in 2009, used 09/2018-04/2019</td><td>Users (reported/designated)
Local communities, residents, municipalities, farmers, regional office</td></tr>
<tr><td>Initiator/responsible
VÚV (PP5)</td><td>Involved stakeholders
Municipalities, residents, land owners, farmers, spatial planners</td></tr>
<tr><th colspan="2">Lessons-learned</th></tr>
<tr><td>Main success factor:
In some cases, the identified critical points confirmed existing problems with flash floods.</td><td>Main challenge:
Accurate input data are required, especially in rapidly developing areas.
Delineation of flow direction is very sensitive to small elevation changes in the DEM.</td></tr>
<tr><td>Synergies/beneficial aspects:
Ease of application, relatively low demands regarding input data.</td><td>Conflicts/Constraints:
Verification/corrections required (especially in relation to the delineation of urban areas).</td></tr>
<tr><th>Key message to others starting with a similar task</th><th>Contact</th></tr>
<tr><td>Based on the previous experience, the most important factor influencing is the relevance of a critical point resides the accuracy of the delineation of the urban areas shapefile. Some cases have been recorded where the identification of critical points was not accurate due to too large areas classified as urban, and vice versa. Another factor that plays a role, is the resolution of the DEM raster, resulting in the accuracy of delineation of pathways of concentrated surface runoff.
One issue should also be emphasised here. A critical point is an indicator of flash/pluvial flood hazard. It expresses an entry spot into an urban area that could potentially be endangered by surface runoff from a contributing area of which the parameters show that a specific area is prone to flash flood generation. The aim of the methodology is not to model the surface runoff through urban areas. Thus, it does not allow to conduct a flash flood risk mapping.</td><td>T. G. Masaryk Water Research institute,
Mojmírovo nám. 16,
612 00 Brno, Czech Republic

Pavla Štěpánková
info@vuv.cz</td></tr>
<tr><th colspan="2">References</th></tr>
<tr><td colspan="2">Methodology of the identification of critical points:
http://www.povis.cz/mzp/KB_metodicky_navod_identifikace.pdf (in czech)
The assessment of level of flash floods threat of urbanised areas:
https://acta.mendelu.cz/media/pdf/actaun_2017065020519.pdf (in english)</td></tr>
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