

FACTSHEET RISK ASSESSMENT AND MAPPING ACTIVITIES

Statistical assessment of pluvial flood risk for rural areas in Upper Austria

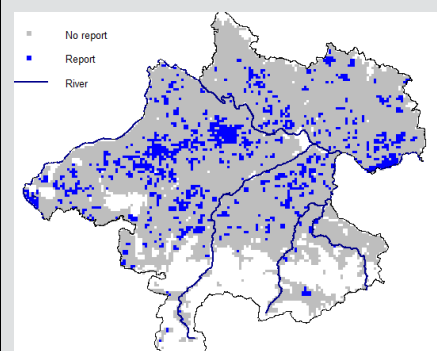
Where was it implemented?

Upper Austria, Austria

Problem / background

Heavy rain hazard and risk is getting increased attention in Austria, because the number of damaging heavy rain events seems to increase, and the European Commission requested the Member States to set a focus on pluvial flood risk in the second cycle of the floods directive implementation.

From a methodological point of view, currently GIS terrain analyses and hydrodynamic simulations prevail in Austria for assessing potential pluvial flood hazards. However, GIS terrain analyses provide only rough indications for pluvial hazards, and deterministic simulations are comparably cost- and work-intensive methods.



Description and aim

The aim of this study was to evaluate the value of statistical methods for pluvial flood risk estimation. One objective was to assess if statistical methods can deliver significant relationships between meteorological events, soil and land use parameters and agricultural damage events. Additionally, it was an objective to find out if for agricultural areas the statistical methods could be a cost-efficient alternative to deterministic surface run-off models.

The data investigated were damage event locations from the Austrian hail insurance for Upper Austria for the years between 2007 and 2013, precipitation data, terrain data, soil and land use data, summing up to 16 location parameters investigated. The data was checked for plausibility and applicability to the required spatial and temporal resolution.

A location analysis revealed that in Upper Austria, in the years between 2007 and 2013, the most severe agricultural damages were triggered by intense rain events, and only in one case the damage was caused by longer lasting low intense rain. By means of logistic regression models and random forests the relationships between the location parameters and damage events were investigated. A specific focus was laid on comparing the skills of continuous versus classified parameters, and on methods for dealing with collinearity. Both models delivered results with acceptable reliability. However, the results strongly depend upon the quality of the input data and the length of the observation period.

Area characterisation

Area type: Rural areas, agricultural areas

Landscape type: Hilly

Specifications of method / measure

Level of complexity

High

Method

Statistical analysis

DESCRIPTION OF IMPLEMENTATION

Implementation

- 03/2018 - 06/2019

Effect horizon

- medium

Initiator / responsible

- Umweltbundesamt GmbH

Involved stakeholders

- Ministry for Sustainability and Tourism
- Austrian Hail Insurance
- Central Institute for Meteorology and Geodynamics

Lessons-learned	
Main success factor: <ul style="list-style-type: none"> • Good data and good expert knowledge 	Main challenge: <ul style="list-style-type: none"> • Data availability and data quality (spatial and temporal resolution)
Key message to others starting with a similar task	Contact
<p>It is important which data is available for the region of interest and to assess its applicability to the planned statistical analysis. Available time series have to be sufficiently long, in order to make sure that the possible results have the required reliability.</p>	<p>Dr. Yvonne Spira Oberflächengewässer Umweltbundesamt (AT) Assoc. Prof. Gregor Laaha Institut für Statistik Universität für Bodenkultur Wien</p>