Deforestation of small catchment and impact on water regime - project introduction

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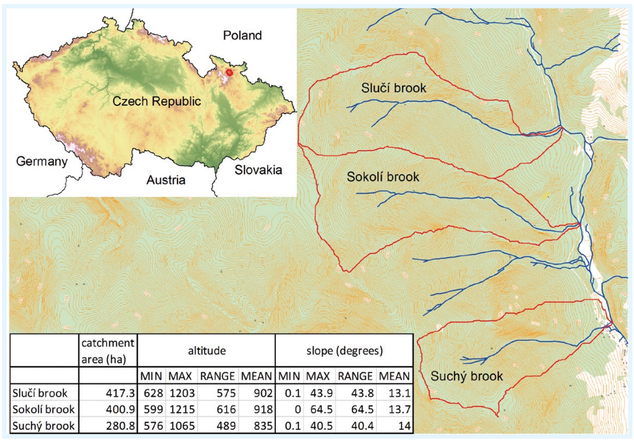
Introduction

The ongoing bark beetle calamity is bringing rapid deforestation at a scale that can have serious consequences for hydrological conditions in forest catchments. It also gives researchers the opportunity to monitor the impact of this process on forest hydric functions and the quality and quantity of runoff water.

In the catchment areas of the Suchý, Sokolí and Slučí in the Hrubý Jeseník Mountains (3S; Fig. 1), which are acutely threatened by bark beetle calamity, the hydrological balance measurements were started in 2020.

We expect over the next few years the progression of the calamity (Fig. 2) in all three catchments, but with different intensity and with different forest management approaches.

Between 2022 and 2025, a project **"Deforestation of small catchment and impact on water regime"** is being implemented in the 3S catchments.



	catchment area (ha)	altitude				slope (degrees)			
		MIN	MAX	RANGE	MEAN	MIN	MAX	RANGE	MEAN
Slučí brook	417.3	628	1203	575	902	0.1	43.9	43.8	13.1
Sokolí brook	400.9	599	1215	616	918	0	64.5	64.5	13.7
Suchý brook	280.8	576	1065	489	835	0.1	40.5	40.4	14

Fig. 1 Location of 3S catchments in the Hrubý Jeseník Mts.

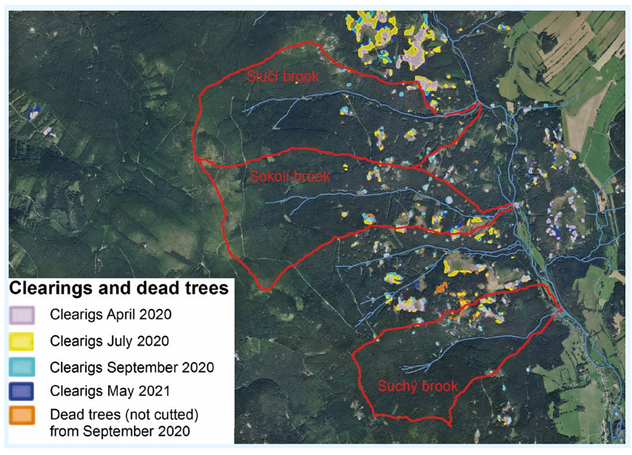


Fig. 2 Progress of bark beetle logging in the 3S catchments in 2020 (source: The Forest Management Institute).

Objectives

- To quantify changes in the water regime of small forest catchments in the context of ongoing deforestation - a consequence of the bark beetle calamity.
- To identify the risks in terms of reduced infiltration and retention, increased erosion, reduced ability to buffer rainfall and changes in runoff water quality, including as a result of forest management practices in dealing with the calamity.
- To propose measures to minimise these risks.

Methodology

1. Data collection, validation, and preliminary elaboration (Fig. 3).
2. Geomorphological analysis of micro-relief (Fig. 4), parameterization of hydrological models for catchment.
3. Spatial interpolation of the collected data (mainly precipitation and soil moisture).
4. Climate and ecological risk modelling for catchments.
5. The recommendation of appropriate management practices to minimize risks.

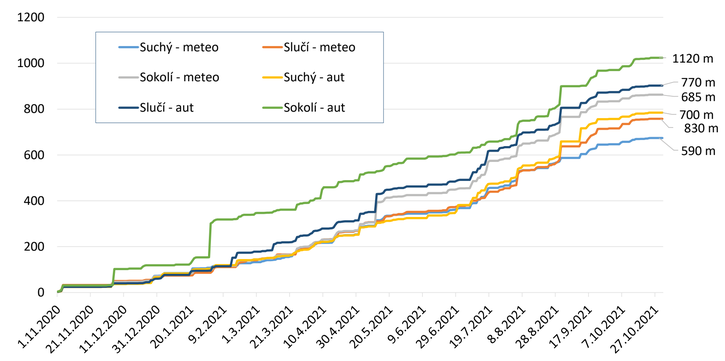


Fig. 3 Cumulative precipitation (mm) at measuring points (meteo - meteorological station, aut - automatic rain gauge). The difference in annual precipitation between the lowest and highest point in the catchments is almost 350 mm. However, the amount of precipitation is not directly proportional to the altitude, it also corresponds to the exposure and micro-relief of the individual measuring points.

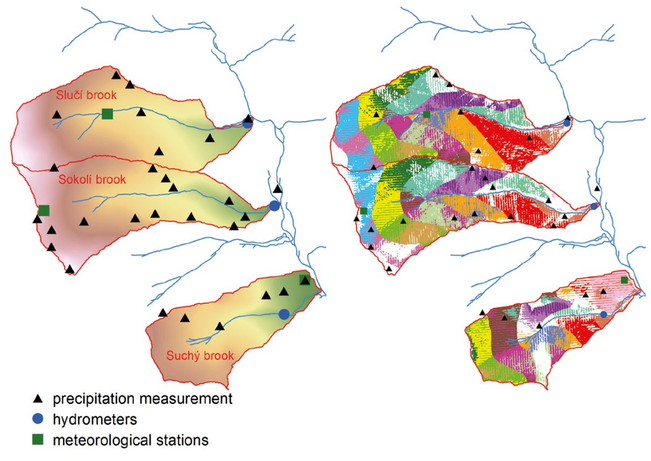


Fig. 4 Geomorphological analysis: Spatial data (local DEM)--> GIS tools--> subdivision of the area of interest in the elementary units (based on elevation and exposition) where the precipitation and soil moisture modelling takes place.

Acknowledgement:

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