SETOF Soil Erosion and TOrrential Flood Prevention: Curriculum Development at the Universities of Western Balkan Countries

The method of critical points as a tool for identifying flood risks in the Czech Republic

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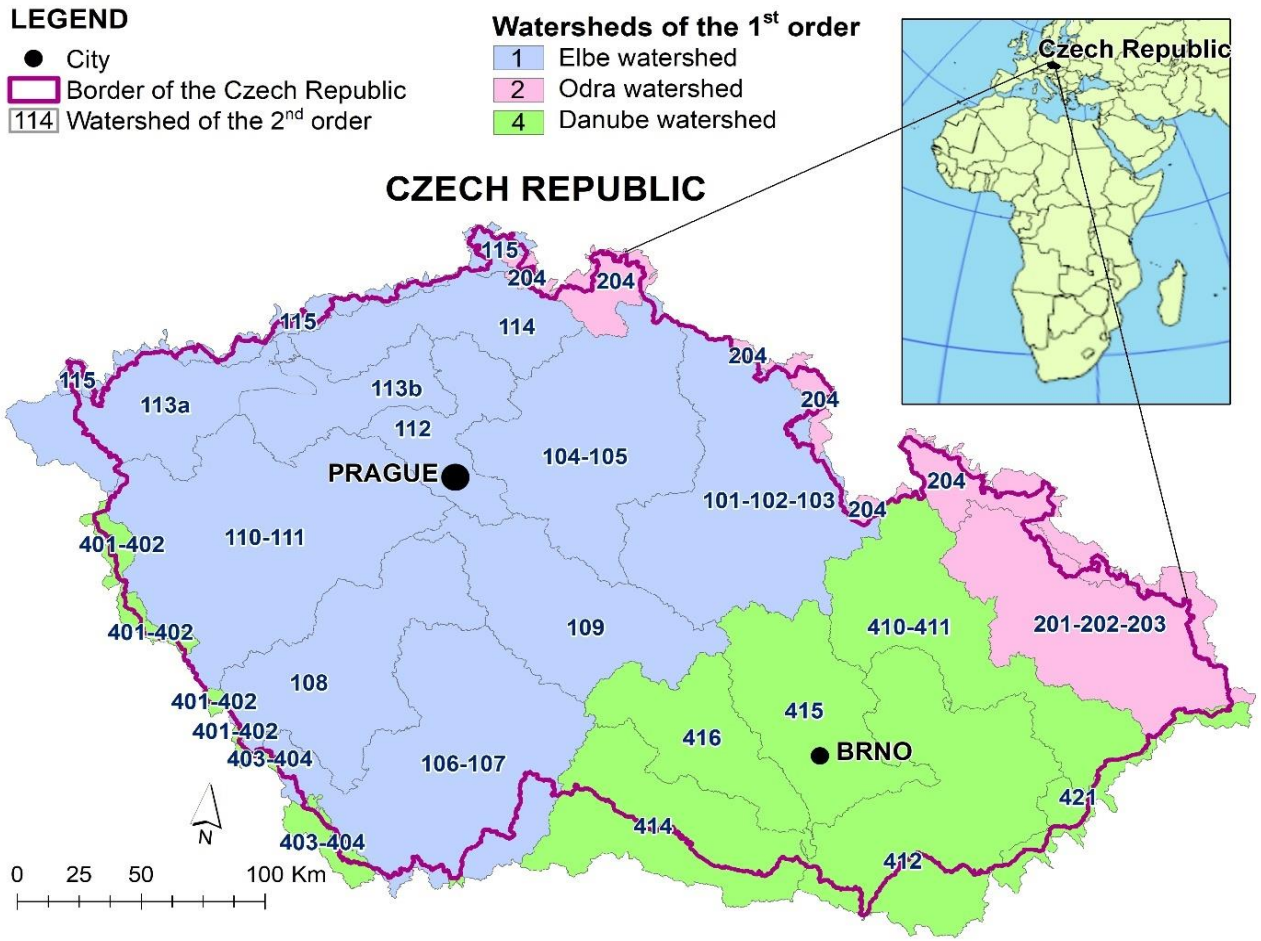
The Czech Republic roof of central Europe



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The identification of critical points

- The identification of critical points serves as an indicator of the possible risk of flooding from torrential rainfall.

- The results of the presented method became part of the central preventive flood system of the Czech Republic

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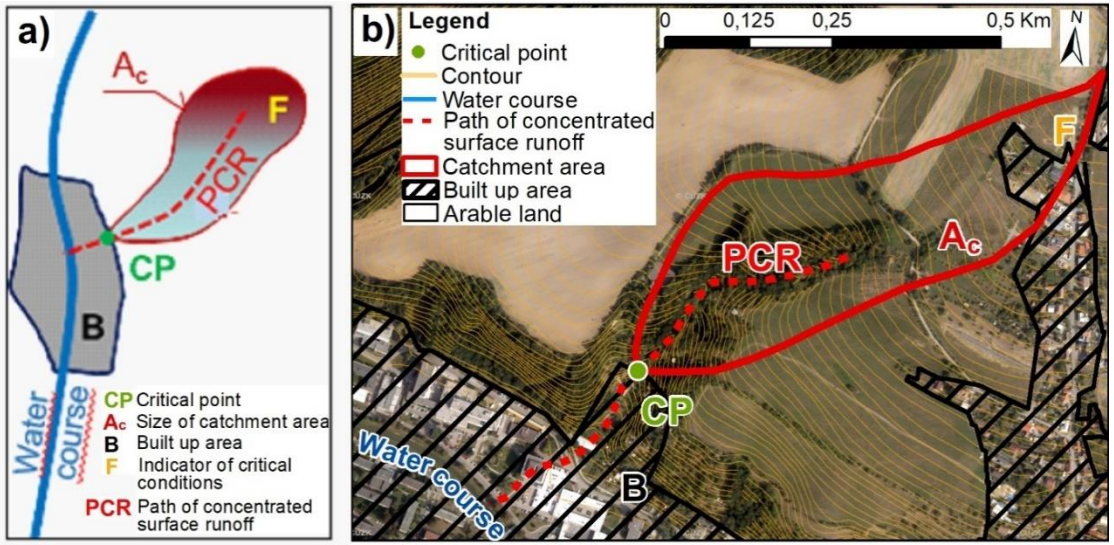
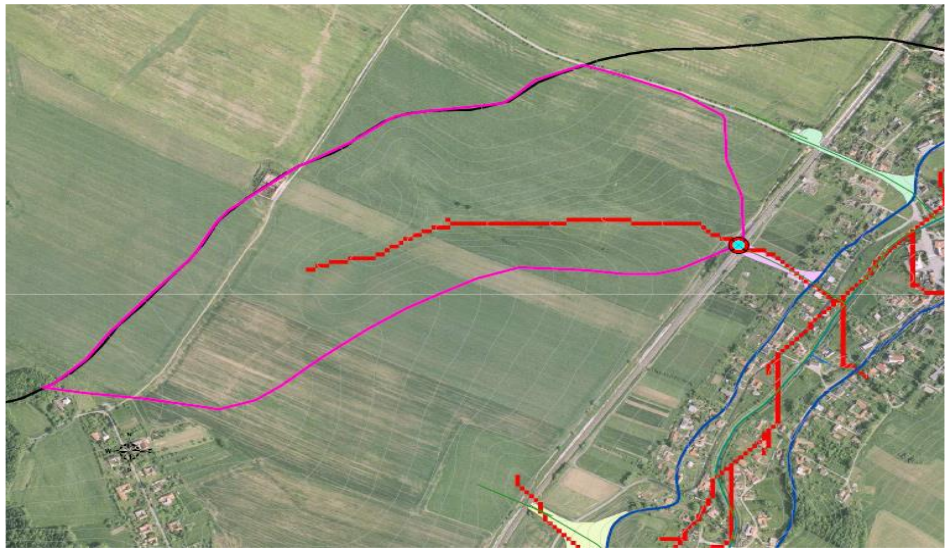
The principle of determining critical points





Critical points (CP) are determined in places where concentrated surface runoff caused by intense rainfall enters the built-up area from the catchment area.

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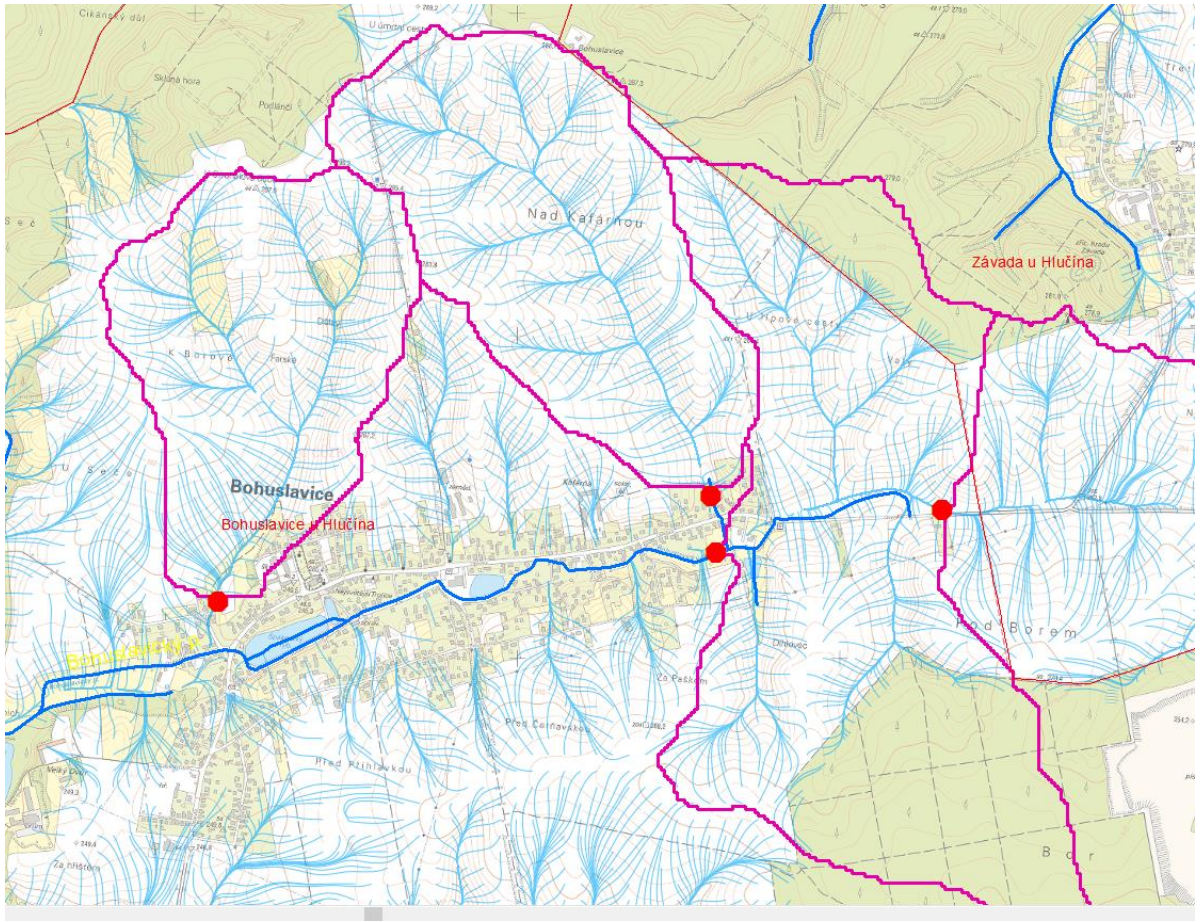
Identification of critical points



GIS ANALYSIS

Combined criteria

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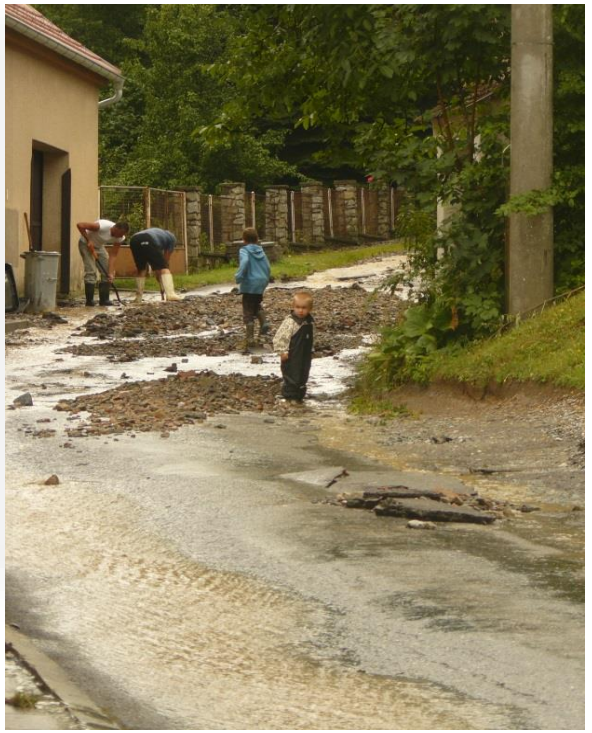
Adverse consequences of concentrated runoff



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Combined criteria for determination of CP

The Combined criteria was determined on the basis

- of the authors' physical evaluation of hundreds of flooding situations developing during torrential rain
- multicriteria GIS analysis and statistical evaluation

Combined criteria (C) are recommended for identification of CP:

C1 – size of catchment area (*Ac*) ($0.3 \leq Ac \leq 10.0$ km^2)

C2 – average slope (*Ip*) of catchment area ($Ip \geq 3.5$ %)

C3 – percentage of arable land (*AL*) in catchment area ($AL \geq 40$ %)

On the basis of the application of combined criteria a total of 9,261 CPs were identified.

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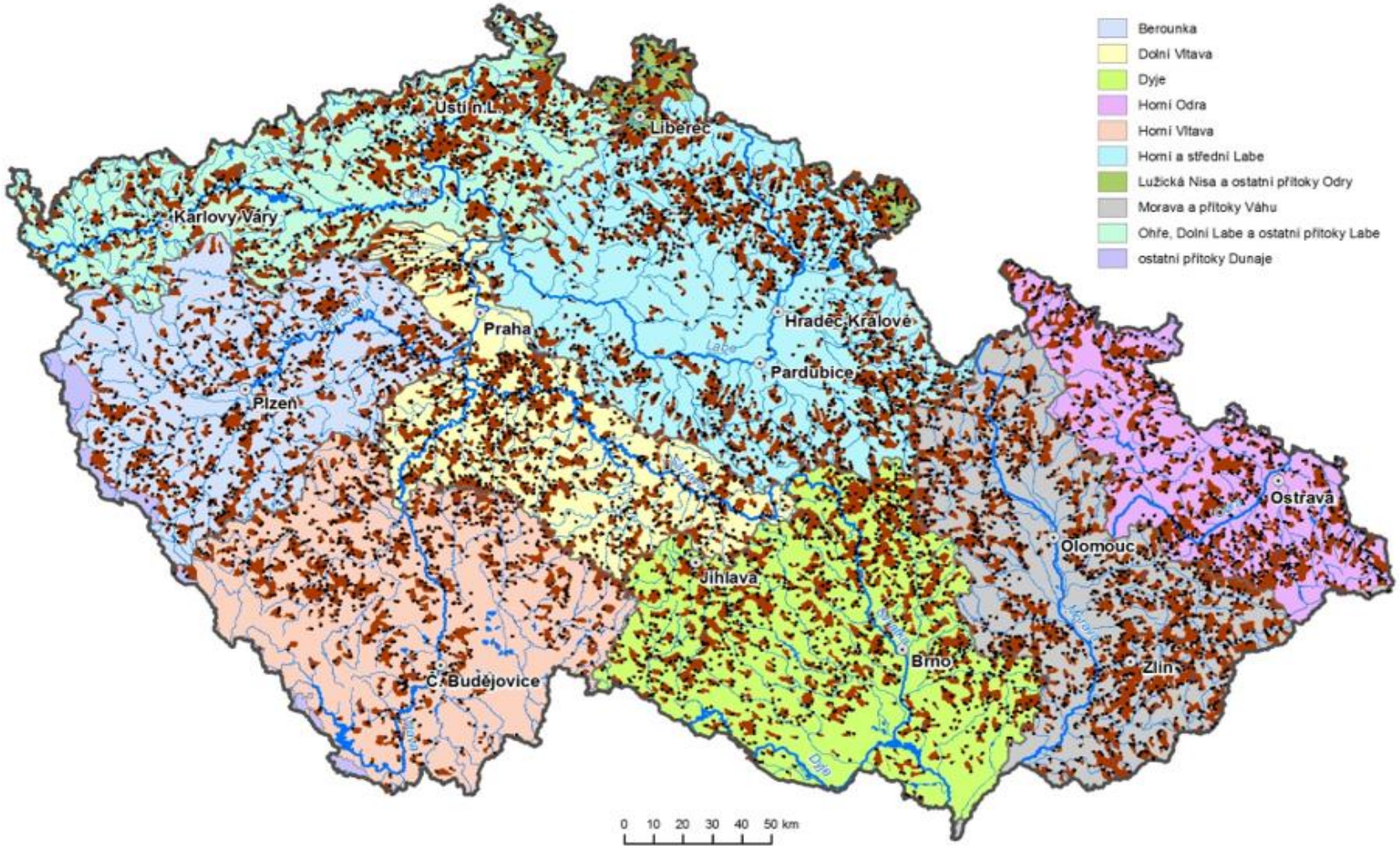
Spatial distribution of 9261 CP in Czech Republic



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Indicator of critical conditions for flooding, *F*

- Combinations of physical-geographical situation, variation in land cover, land use, and potential for extreme precipitation in specific catchment areas :

$$F = A_{c,r} \cdot H_{m,r} \cdot (a_1 \cdot I_p + a_2 \cdot AL + a_3 \cdot CNII)$$

- where *F* is the indicator of critical conditions [dimensionless],
- a_i (i = 1,2,3) are the model parameters (a_1 = 1.48876; a_2 = 3.09204; a_3 = 0.467171),
- $A_{c,r}$ is the size of the catchment, $H_{m,r}$ is the relative sum of one-day precipitation with a return period of 100 years
- *Ip* is the average slope [%], *AL* is the percentage of arable land [%], *CNII* is CN values,

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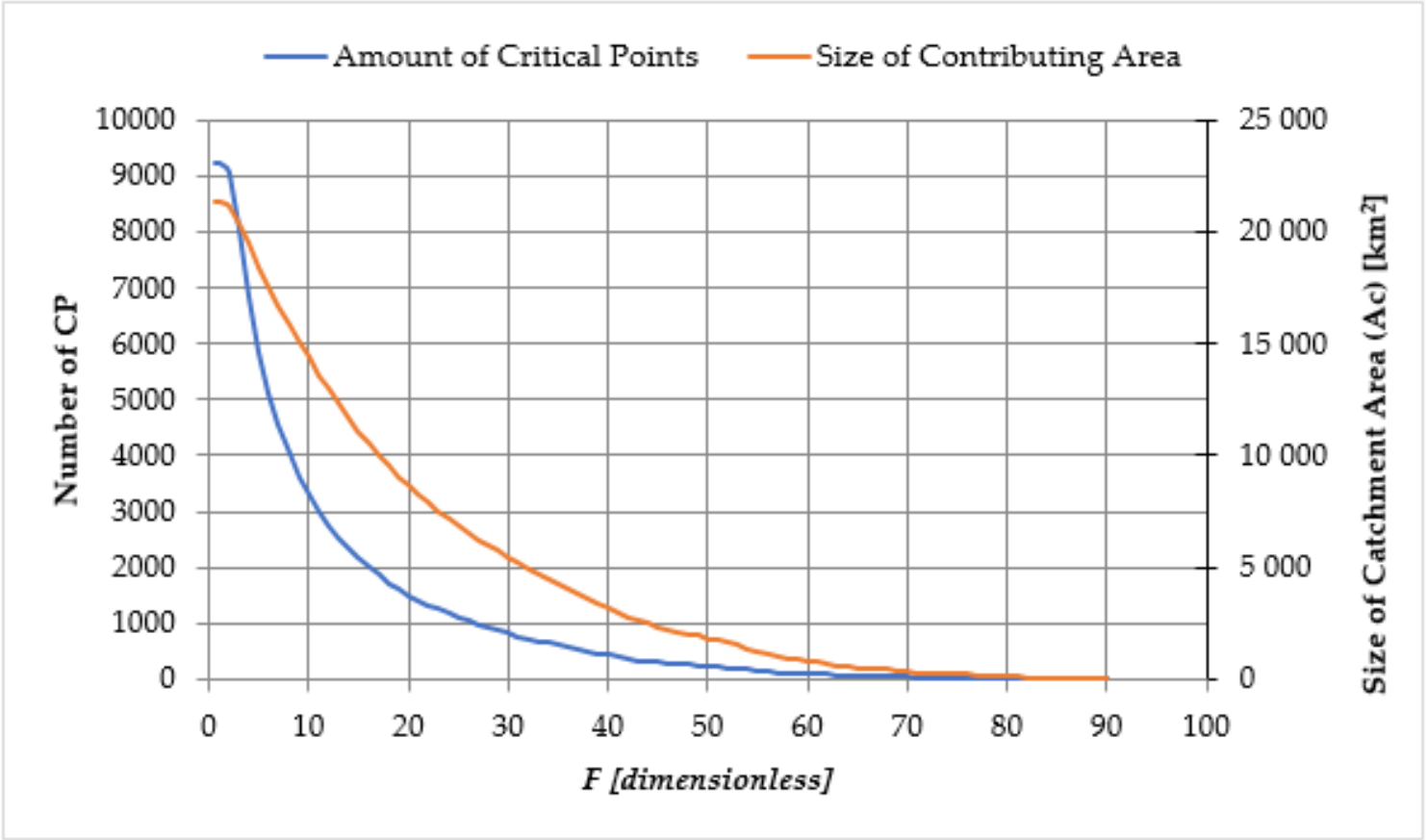
Relations of the number of CP (blue curve) to the values of the indicator of critical conditions (*F*) and size of catchment areas (*Ac*).



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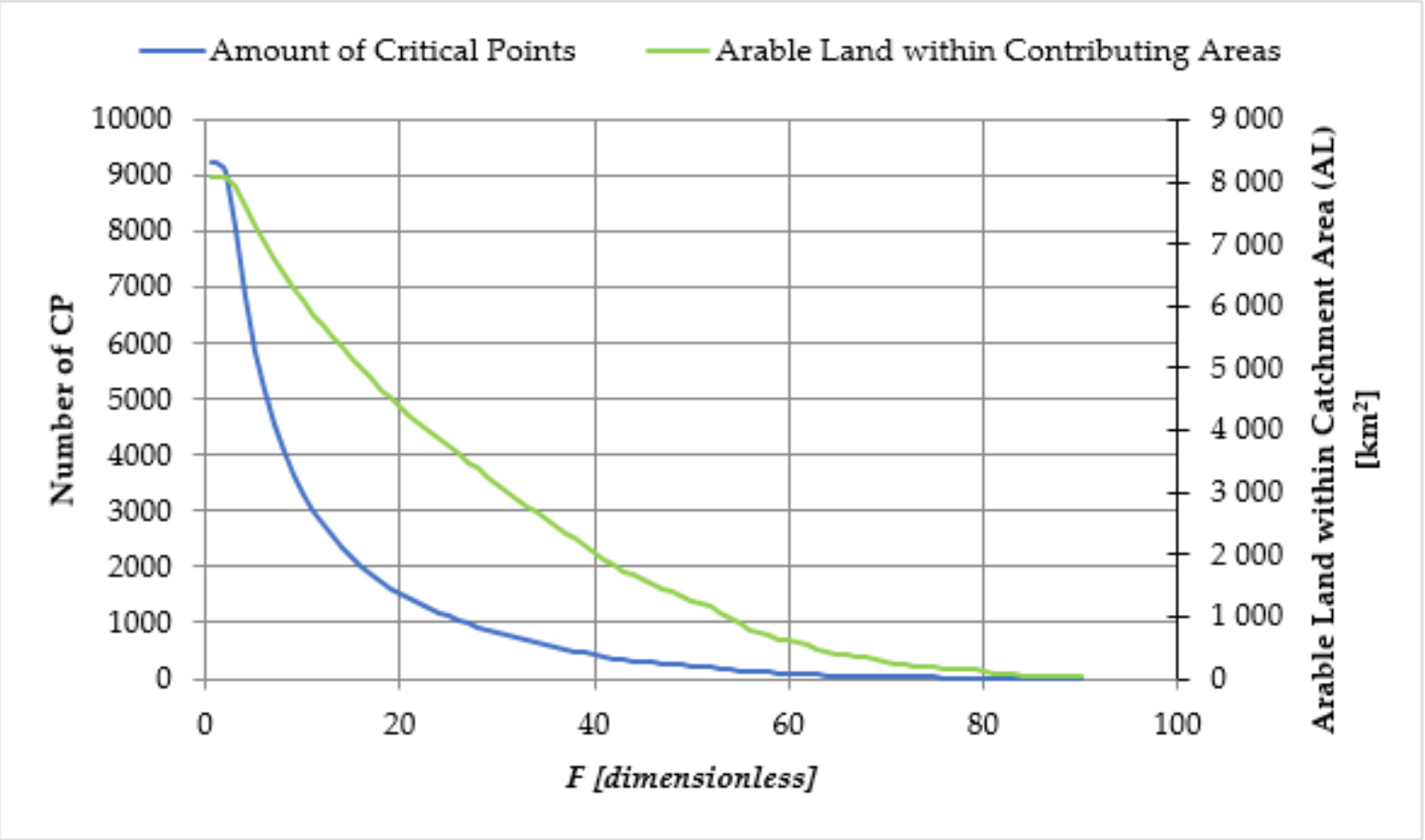
Graph of dependences of the number of CP (blue curve) on the values of the indicator of critical conditions (*F*) and size of arable land within catchment areas (*AL*).



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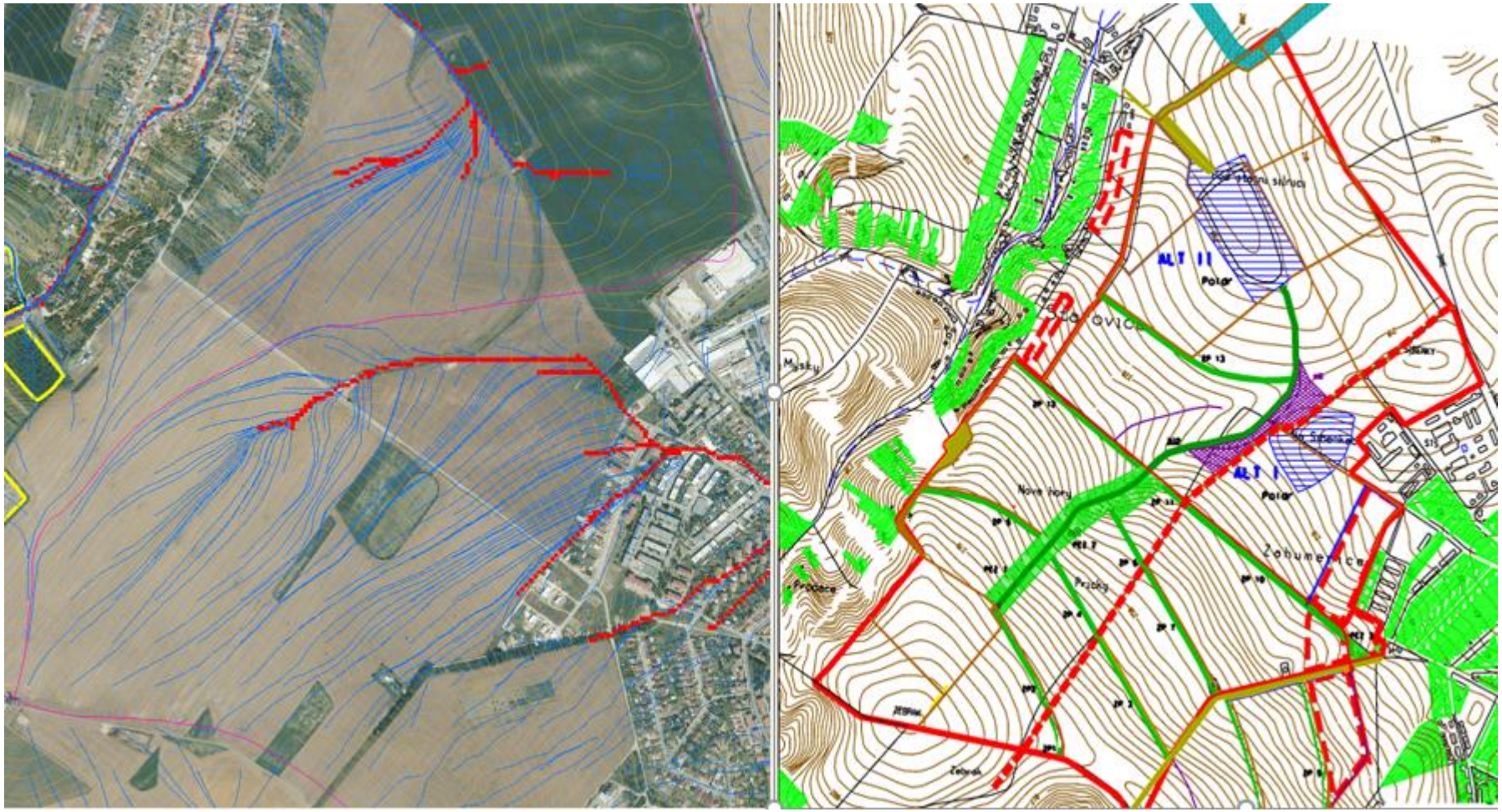
Soil and water conservation measures



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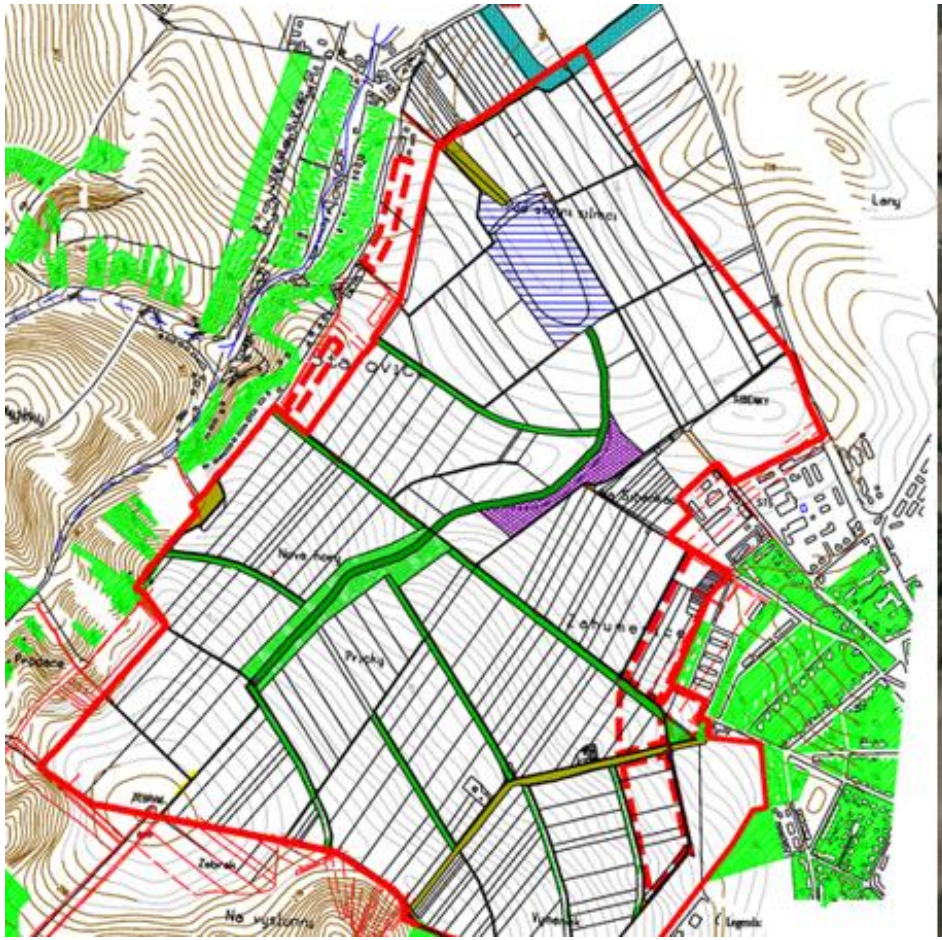
LAND CONSOLIDATION



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CONCLUSION

Identification of such critical points offers a basis for a optimal new strategy of threat mitigation, via both organizational and structural measures in catchment areas.

Knowledge of the existence of critical points enables

- evaluation of flood risk associated with transport of sediment due to erosion processes, and
- the implementation of conservation preventive measures,
- improvement of management measures in respective catchment areas, even before an event occurs.

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Palacký University Olomouc, Brno University of Technology, Research Institute for Soil and Water Conservation Prague, and Societas pedologica Slovaca

in cooperation with

IUSS (International Union of Soil Sciences)
ESSC (European Society for Soil Conservation)
ISCO (International Soil Conservation Organization)

under the auspices of

both Ministers of Agriculture and the Environment of the Czech Republic

organize

5th WASWAC World Conference
(World Association of Soil and Water Conservation)

on the topic

ADAPTATION STRATEGIES FOR SOIL AND WATER CONSERVATION IN A CHANGING CLIMATE

19. - 23. 6. 2023, at Palacký University, Olomouc, Czech Republic

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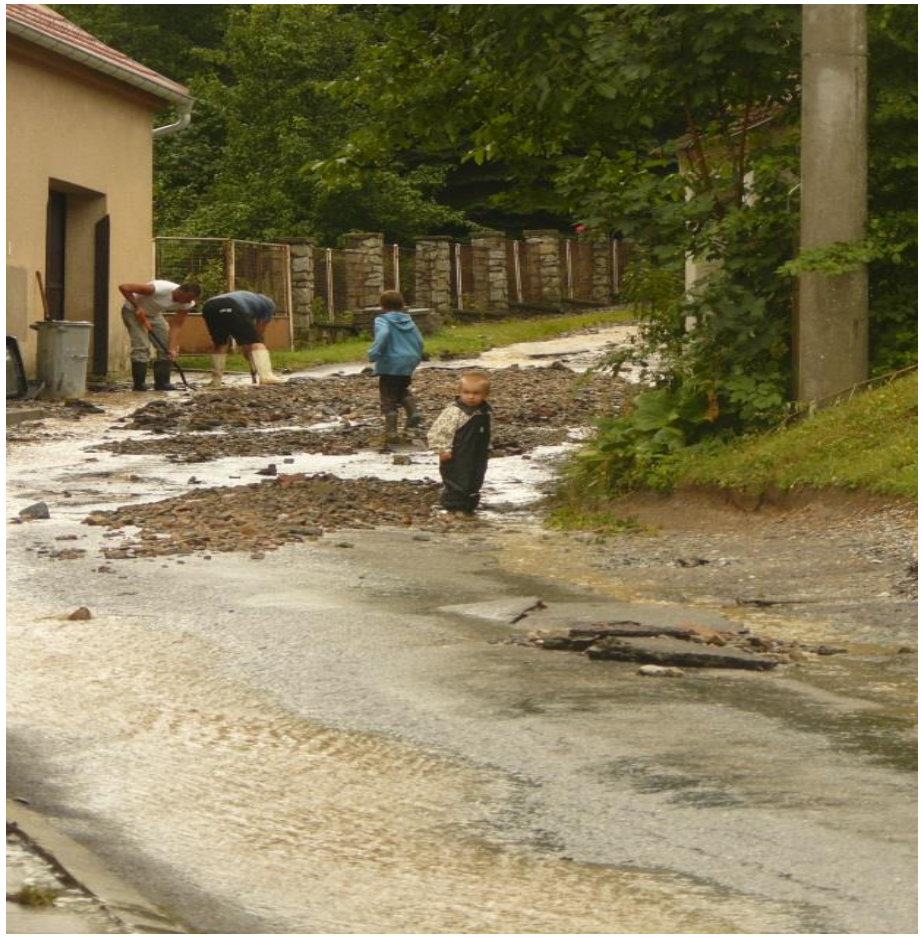

Thanks you for your attention

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