

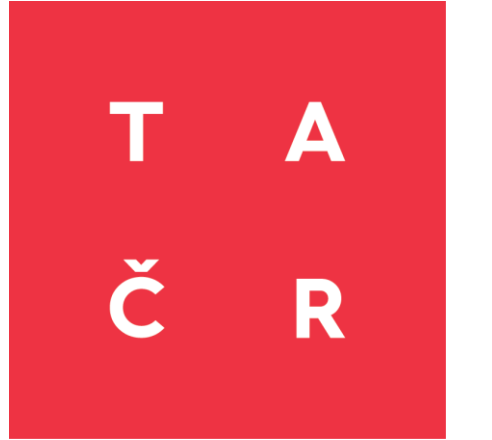
A comprehensive approach to the protection of drinking water sources - risk analysis of the catchment areas



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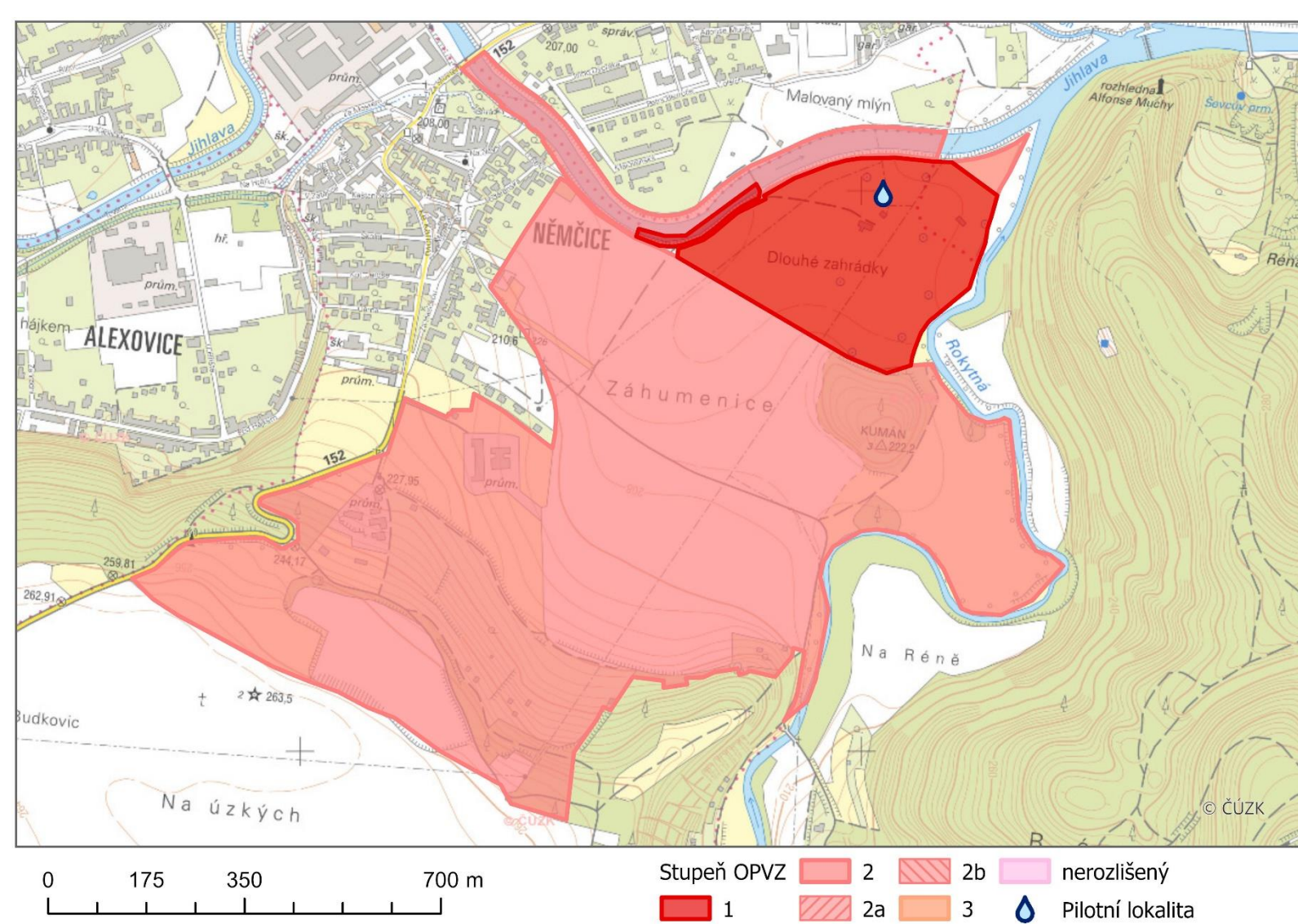
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Access to good quality and safe drinking water is one of the basic requirements of modern society. Already in 2004, the World Health Organization published a new concept based on comprehensive risk assessment and management, covering the entire supply system from the raw water source to the consumer's tap. Only in 2020 was the new EU Directive 2020/2184 on the quality of water intended for human consumption [1] published. This Directive emphasises the comprehensive protection of water resources and introduces the obligation to prepare not only a risk assessment and risk management of the water supply system, but also risk assessment and risk management of the catchment areas for abstraction points of water intended for human consumption. Within the project "Tools for risk assessment of catchment areas for abstraction points of water intended for human consumption" (supported by the Technology Agency of the Czech Republic) we develop the methodology for risk assessment and management of the catchment areas.



Obr. 1. Pilot abstraction point VAS Brno-venkov – Ivančice.



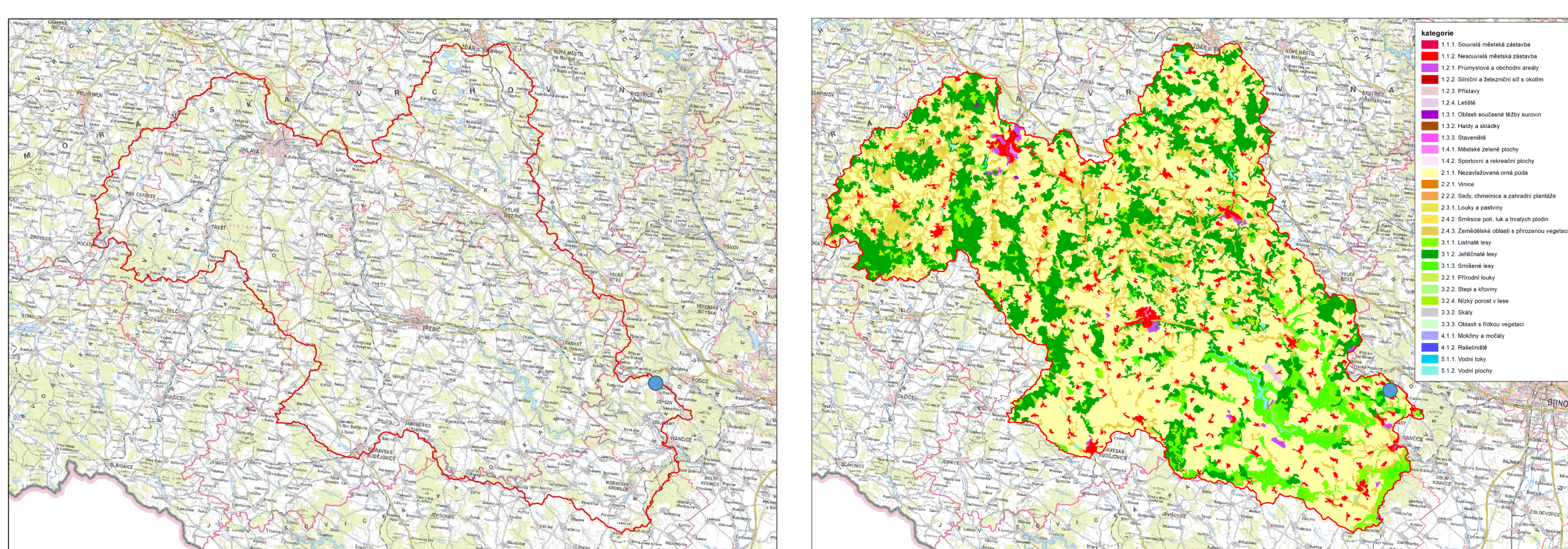
2. Pilot locations

At least one pilot location was selected for all categories. At the same time, the basic characteristics of the abstraction points were processed (the size of the abstraction point, the localization, the depth, the determination of the type of hydrogeological region and category of the abstraction point, and information on the water resource protection zone (OPVZ)).

Obr. 2. The situation around the pilot location VAS Brno-venkov – Ivančice.

3. Catchment areas

Another important step in the risk analysis of the catchment areas is the determination of the catchment area, which represents the infiltration area related to the abstraction point. Ideally, this catchment area would be identical to the OPVZ. Unfortunately, it turns out that not for all categories the existing OPVZ is sufficient for the correct processing of the catchment area. In some cases, the zone that belongs to a specific abstraction does not correspond to the infiltration area from which the water source can be polluted. In several localities, only a small area of the 1st degree is proposed, or the OPVZ is proposed completely outside the abstraction point. And even in a small number of selected pilot locations, a situation arose where the source of drinking water has no OPVZ established (according to available information). Therefore, the next step in the solution will be to determine for which abstraction categories the correctness of the OPVZ area definition is essential, and for which it is possible to determine the catchment area differently.



Obr. 3. The Jihlava and Rokytná watersheds above the Ivančice abstraction point and the way the landscape is used in the catchment area (zdroj: CORINE Land Cover 2018 databáze České republiky (CLC18_CZ)).

4. Methodology - draft structure

- 1) Characteristics of abstraction points (size, location, depth, etc.).
 - 2) Identification and mapping of the catchment areas (OPVZ or another area).
 - 3) Risk identification (risk substances in the catchment area – pesticides, nitrates, metals, PAHs, PFAS, etc.).
 - 4) Characterization of the risk and its probability.
 - 5) Conclusions/Goals:
- I) Determination and implementation of preventive measures in the catchment areas related to the abstraction points.
 - II) Ensuring proper monitoring of indicators in raw water.
 - III) Assessment of the need to establish or adapt OPVZ.

1. Classification of groundwater abstraction points

The largest number of abstraction points for drinking purposes in the Czech Republic are groundwater abstraction points. We focused the most on them when we did the categorization. We classified groundwater abstraction points according to two criteria (Tab. 1). The first criterion is the significance of the abstraction based on the amount of abstracted water. For larger sources that are of strategic importance, more information and input data are usually available, therefore a more detailed risk analysis of the catchment area and, of course, the water supply system should be prepared. The second criterion for categorizing groundwater abstraction points is natural characteristics. With them, we focused on hydrogeological structures characterized by their time-space regime, which depends on the morphology of the terrain, the permeability of the rock group and the slope of the groundwater level. Based on this criterion, we divided groundwater sampling into four basic groups: sampling from the subsurface zone, sampling from the fluvial quaternary, sampling from deeper structures and sampling from the karst. We are now selecting pilot abstraction points for individual categories, for which we will evaluate the potential risk and propose procedures for processing the risk analysis of the catchment areas.

Tab. 1. Classification of groundwater abstraction points according to the significance and the natural characteristics.

Natural characteristics/ Amount of abstracted water (m ³ /day)	A Sampling from the subsurface zone	B Sampling from the fluvial quaternary	C Sampling from deeper structures	D Sampling from the karst
Do 100	1A	1B	1C	1D
101 – 1 000	2A	2B	2C	2D
1 001 – 10 000	–	3B	3C	–
Nad 10 001	–	4B	4C	–

5. Conclusion

Among the main objectives of the risk analysis of the catchment areas are the design and implementation of preventive measures in parts of the watershed related to water abstraction points intended for human consumption. Subsequently, proper monitoring of relevant indicators, pollutants and other substances in surface or underground water in the catchment basin as well as in raw water should also be ensured. Finally, there should be an assessment of the need to establish or adapt water resource protection zones (OPVZ). This approach should be further focused on the possibilities of reducing the degree of treatment necessary for the production of drinking water by identifying problematic areas in the catchment area and proposing remedial measures aimed at improving the quality of the water taken.

By the end of 2024, the main output of the project will be a methodology (NmetS) describing the procedure for identifying and assessing risks of the catchment areas with abstraction points of water intended for human consumption, including a proposal for the effective use of nationally available data.

For more information, visit the project website (pitnavoda.vuv.cz).

Literature

- [1] DIRECTIVE (EU) 2020/2184 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2020 on the quality of water intended for human consumption (recast).
- [2] DIRECTIVE 2000/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2000 establishing a framework for Community action in the field of water policy.

Acknowledgements

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