GROUNDWATER BODY SYSTEM IN CR

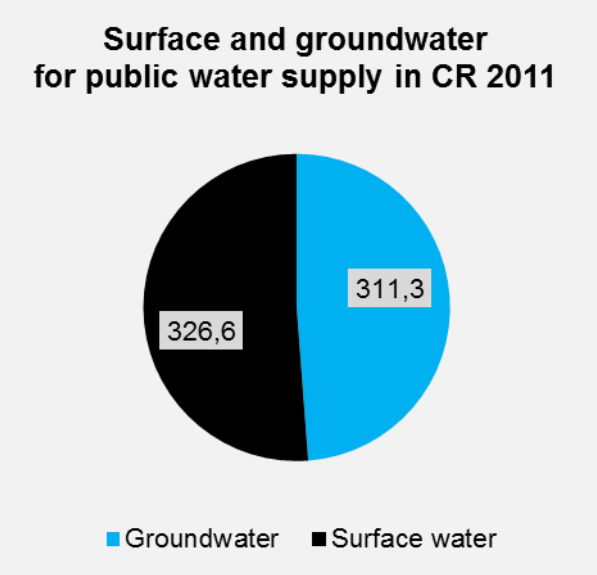
Hana Prchalová, Marie Kozlová

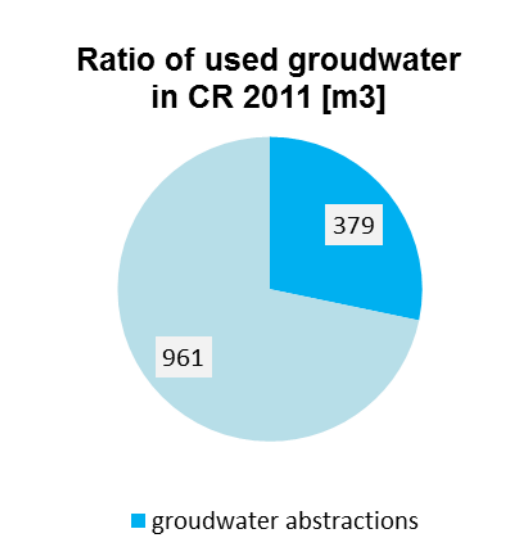
T.G. Masaryk Water Research Institute, Prague

International Workshop on „Groundwater Systems in Europe“,
Berlin, 22– 23 August 2013

Significance of Groundwater in CR

- **Drinking water: 48,8 % of groundwater (2011)**
- **93,4 % of inhabitants connected on public water supply**
- **Use of groundwater: less than 30 % of available groundwater sources**
- **Most of groundwater (82 %) used for drinking water**





Water management planning and protection of groundwater in CR

- Long tradition in CR – from 60-ies (20th century)
- Groundwater was a part of plans
- Focused mainly on water quantity and water use
- From the end of 70-ies – groundwater quantity balance, inventory of all abstractions above 6000 m3 per year or 500 m3 per month, reporting of month volume of abstracted water
- Units for groundwater quantity balance: hydrogeological zones
- Systematic monitoring of groundwater quality - beginning of 80-ies

Groundwater in CR before WFD

- Detailed hydrogeological surveys, detailed maps
- Authorization of GW abstractions, obligatory of safeguard zones
- Water management balance (comparison of total abstractions in hydrogeological zone to groundwater long-term resources)

Groundwater in CR after Transposition of EU Law WFD

Implementation of Water Framework Directive and Groundwater Directive

What was new:

- New units (groundwater bodies);
- Systematic collection of relevant data;
- Inventory of significant anthropogenic pressures;
- Focus on all groundwater;
- Different methods for monitoring and assessment (impacts for surface water ecosystems);
- Public participation;
- Clear and strong link between status results and measures

Hydrogeological zones and groundwater bodies

- Delineation of hydrogeological zones in CR: 1965, 1973, 1986 and 2005
- Last delineation – in compliance with Water Framework Directive, base for groundwater bodies – main difference – hydrogeological zones are based on natural conditions only (= they are more stabile than 6 year period)

Methodology for hydrogeological zones delineation:

- Simplification of hydrogeology
- Large zones in old crystalline rocks
- Several aquifers in one zone, but not all existed ones – only used for water supply
- Projection of boundaries on surface

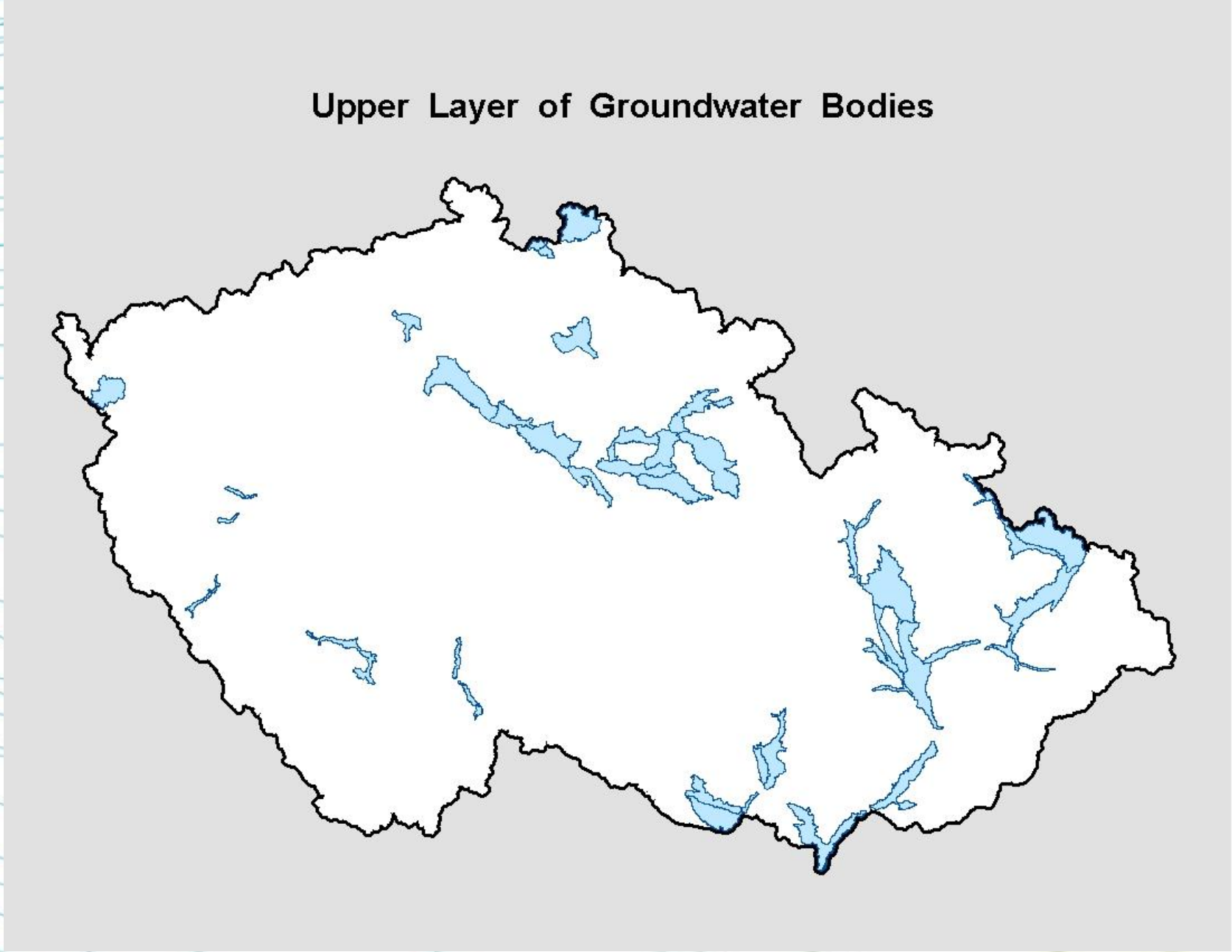
Hydrogeological Zones

Hydrogeological zones and groundwater bodies

Three horizons:

- Upper horizon: Fluvial quaternary deposits, only significant for groundwater abstractions (37 zones), boundaries: geological, but simplified, average area: 130 km2

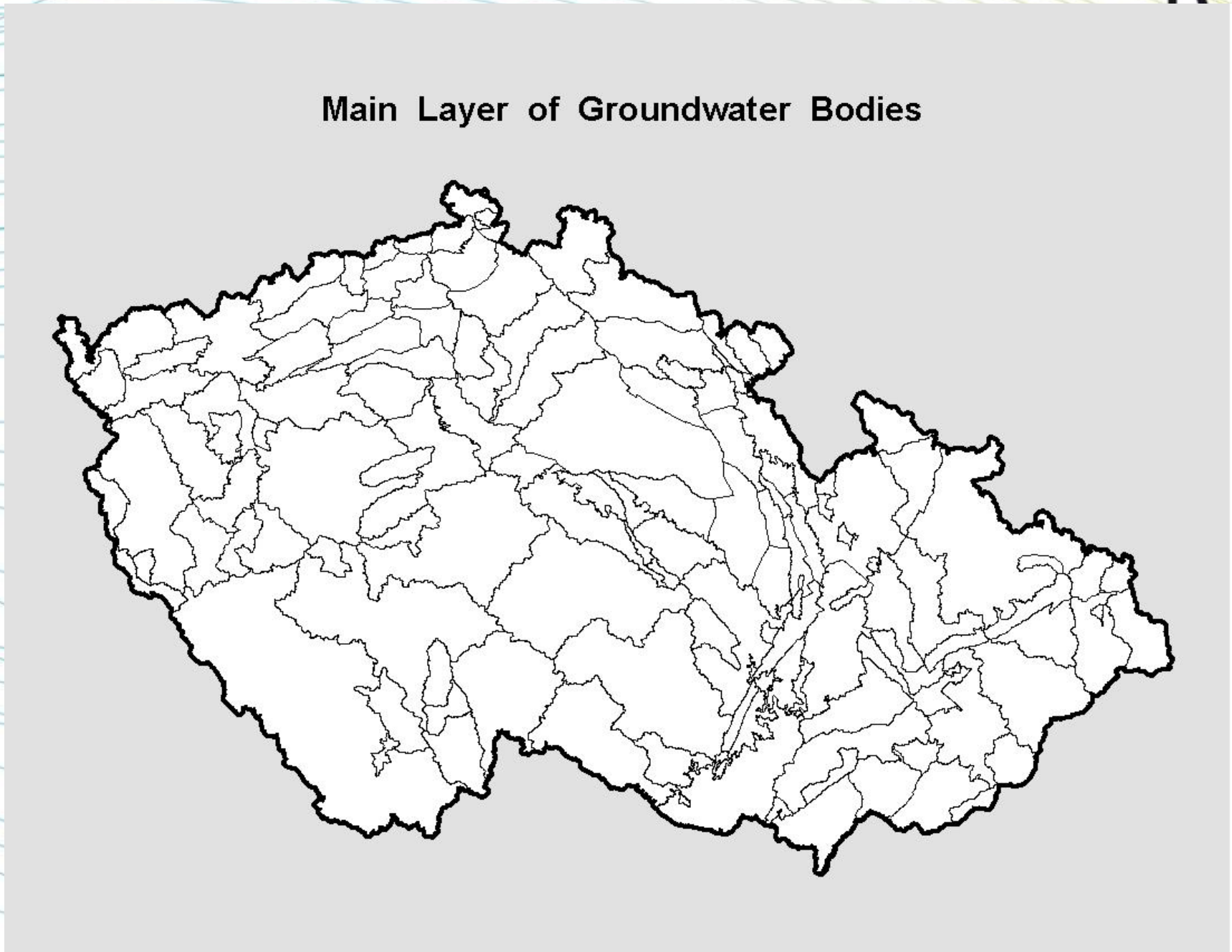
Upper horizon



Hydrogeological zones and groundwater bodies

- „Main“ horizon: all types of hydrogeological zones except quaternary deposits and 3 cenoman zones, Upper Cretaceous zones – more aquifers (1-3), coniak, turon and cenoman;
  boundaries:
  - ✓less productive zones – catchments of surface waters and RBDs, large zones (about 1000 – 5800 km2)
  - ✓deep basins – hydrogeological and hydraulic boundaries

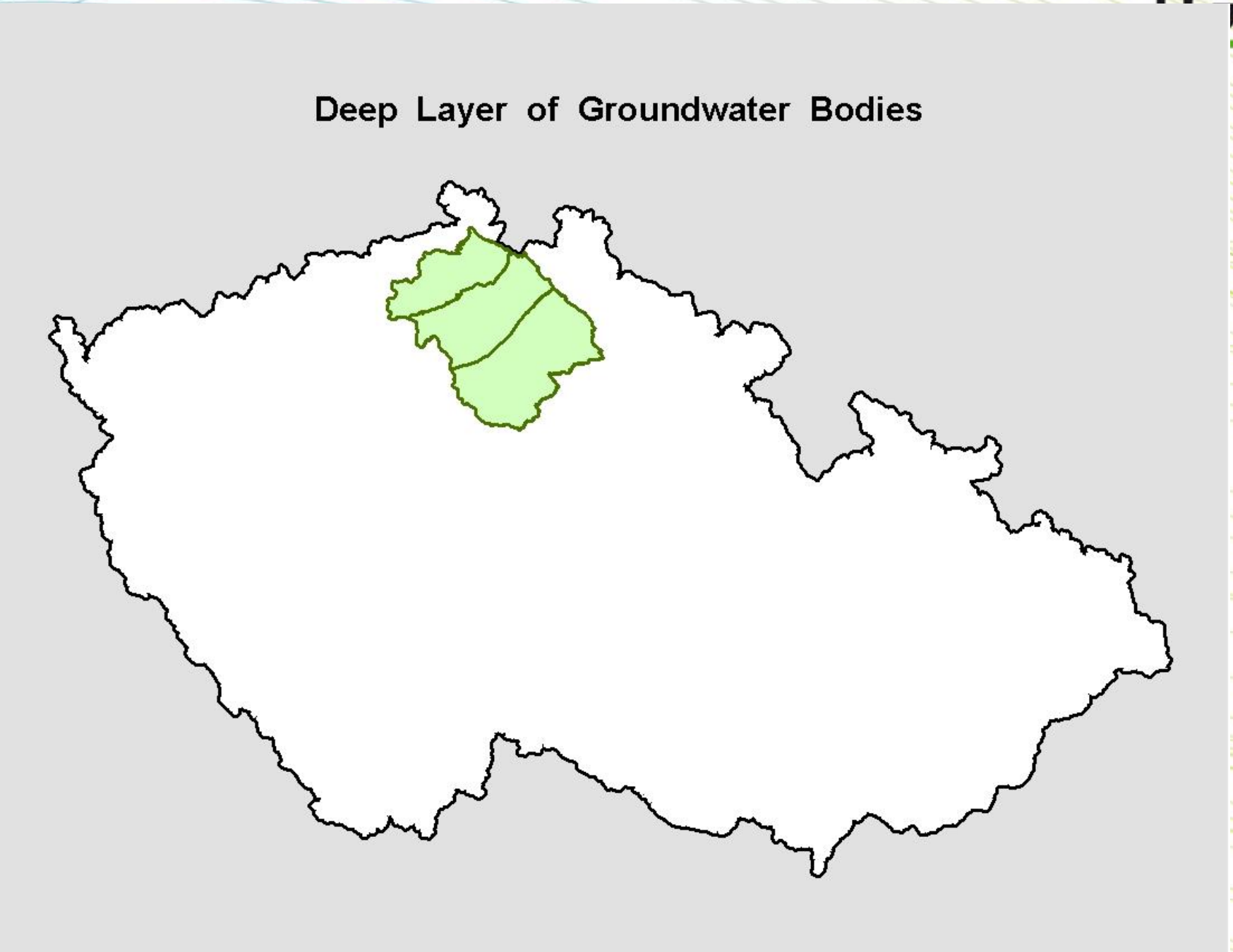
Main horizon



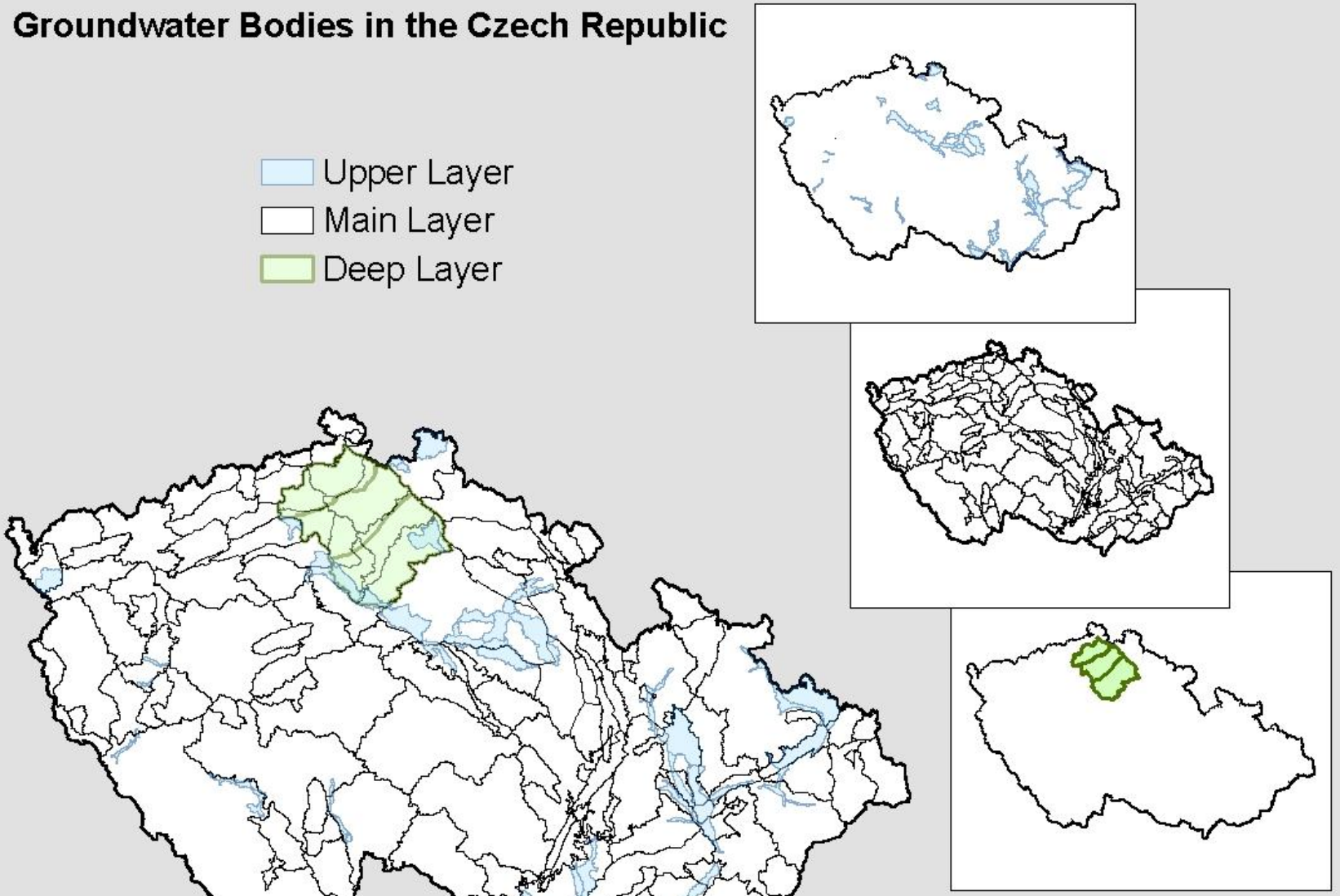
Hydrogeological zones and groundwater bodies

- Deep horizon: 3 cenoman zones with different boundaries, used for abstractions or significantly affected by human activity – former uranium mining (acid discharge in 100 m deep boreholes)

Deep horizon



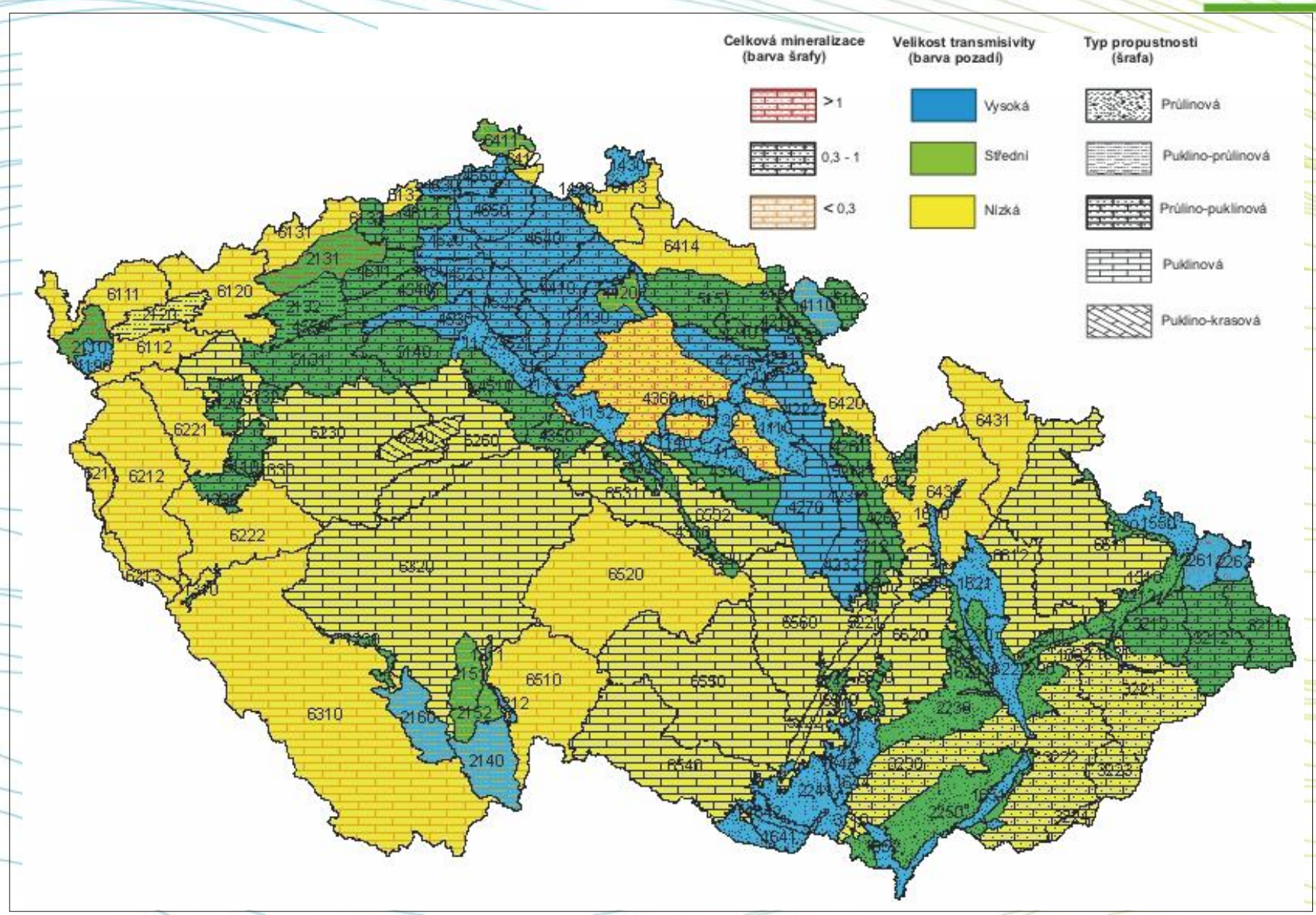
Hydrogeological zones and GWBs



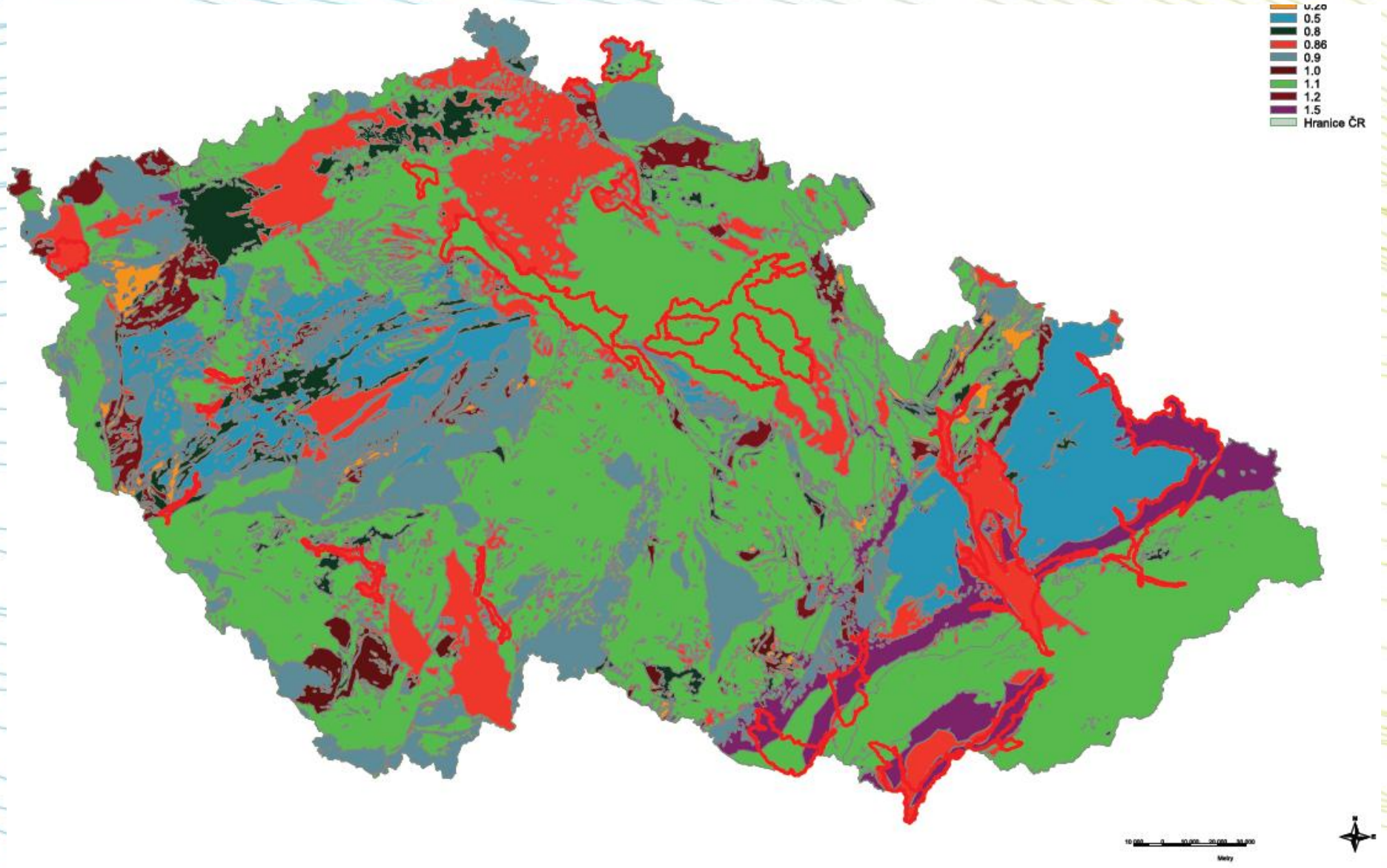
Natural Characteristics of Groundwater

- Conceptual model of groundwater bodies
- Significant information – e.g. mineralisation, transmisivity, permeability, natural background of selected metals in GW, link between groundwater and surface water, vulnerability of groundwater

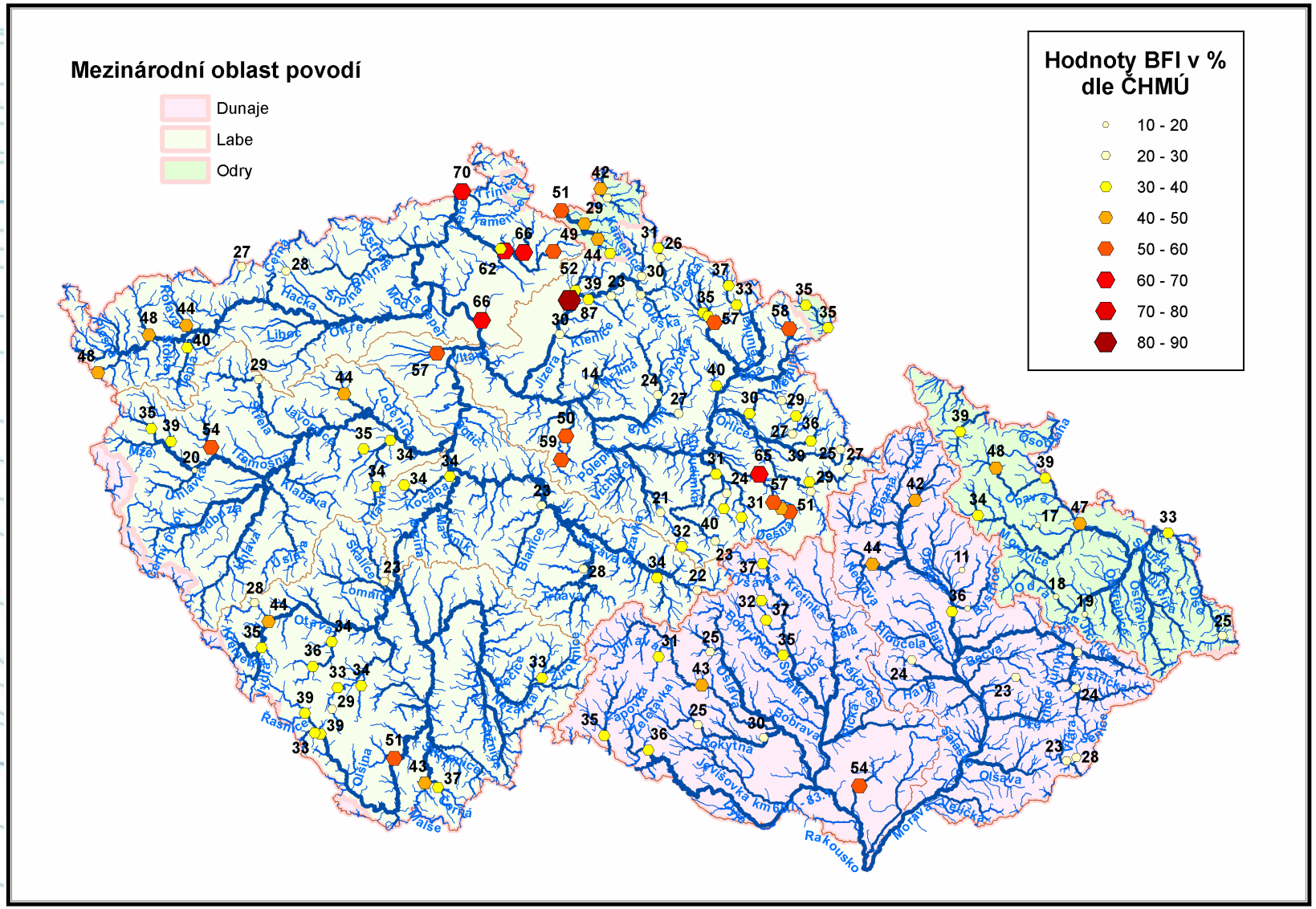
Combination of characteristics – mineralisation, transmisivity and permeability



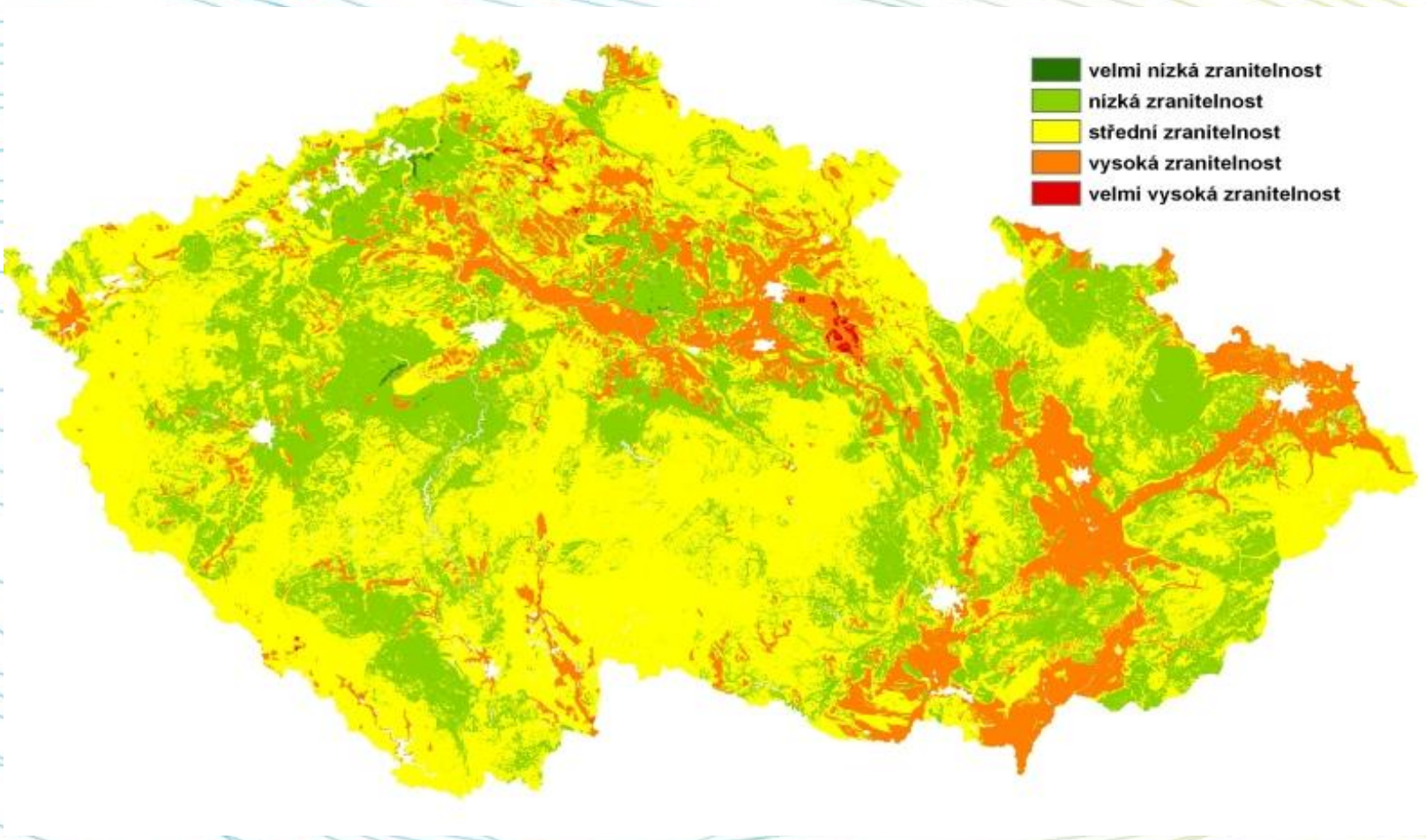
Natural background of arsenic (based on detailed lithology)



River Gauging Stations with Base-Flow Index



Vulnerability of groundwater (chloridazon)



Source: CHMI

Thank you for your attention