Examining Water Flow Regulation Ecosystem Services in Natura 2000 Sites of the Czech Republic

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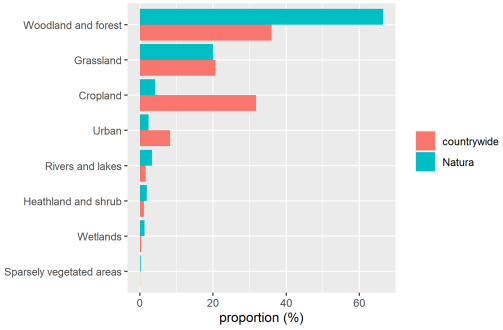
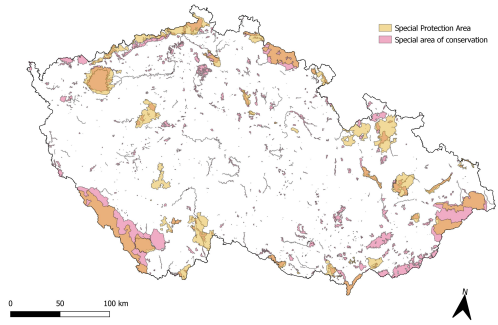
Natura 2000 in the Czech Republic





- mostly forests and grasslands

IP Life One Nature Project

- Integrated Life project
- Funded by EU
- Prioritization of management planning
- Assessment of socio-economic benefits
- `www.jednapriroda.cz/en/`

ONE
NATURE

Water regulation ecosystem services

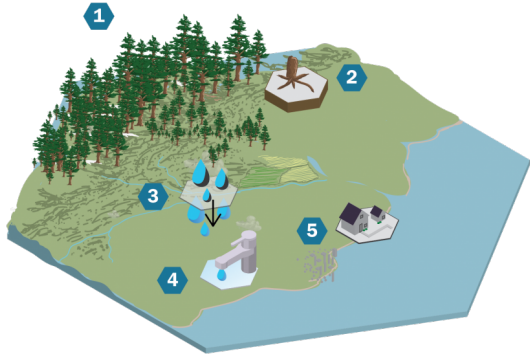
CICES

The regulation of water flows by virtue of the chemical and physical properties or characteristics of ecosystems that assists people in managing and using hydrological systems, and mitigates or prevents potential damage to human use, health or safety

IPBES

Regulation, by ecosystems, of the quantity,location and timing of the flow of surface and groundwater used for drinking, irrigation,transport, hydropower, and as the support of non-material contributions. Regulation of flow to water-dependent natural habitats that in turn positively or negatively affect people downstream,including via flooding (wetlands including ponds, rivers, lakes, swamps). Modification of groundwater levels, which can ameliorate dry land salinization in unirrigated landscapes

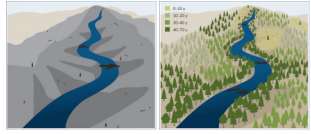
Water regulation ecosystem services



Methodology

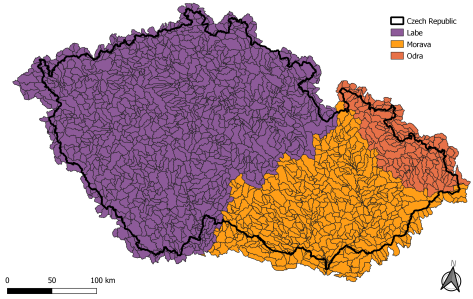
Estimating the effect of water flow regulation

- SEEA-EA - System of Environmental-Economic Accounting - Ecosystem Accounting
- Comparison of actual state with context where the ecosystem does not supply the regulating service
- Natura sites replaced by bare land, urban CN, asphalt roughness



Methodology

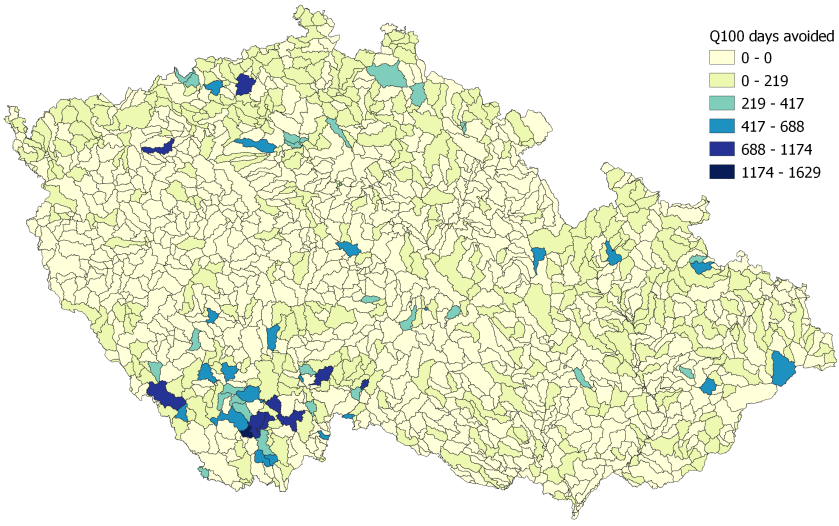
- 3 separated models
- Subbasins delineation threshold 30 km^2
- Calibration against measured streamflow (KGE as objective function)



input variable	data source
meteorology	CHMI stations, interpolation to subs centroids centroids
terrain	EU-DEM
lanuse	CORINE Land Cover
soils	Open Soil Data Cube for Europe, EUPTF2

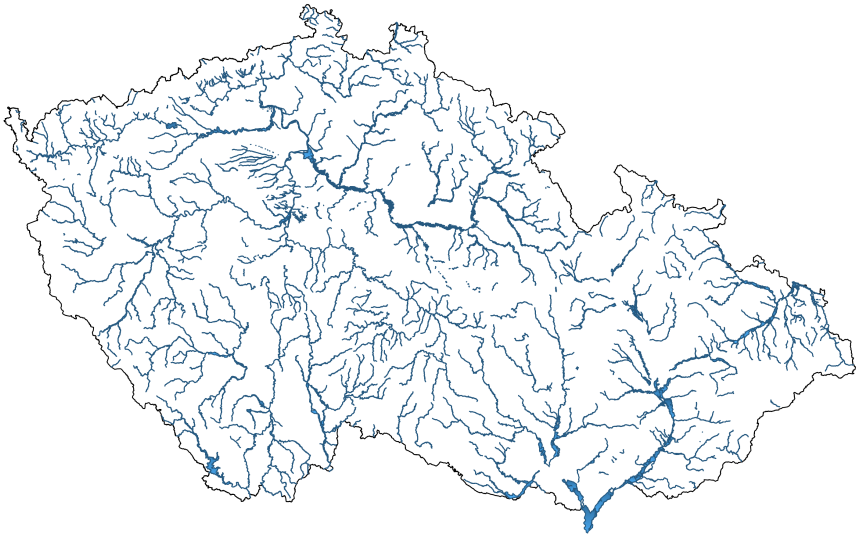
Floods regulation

Avoided flood 100yr events 1991-2020



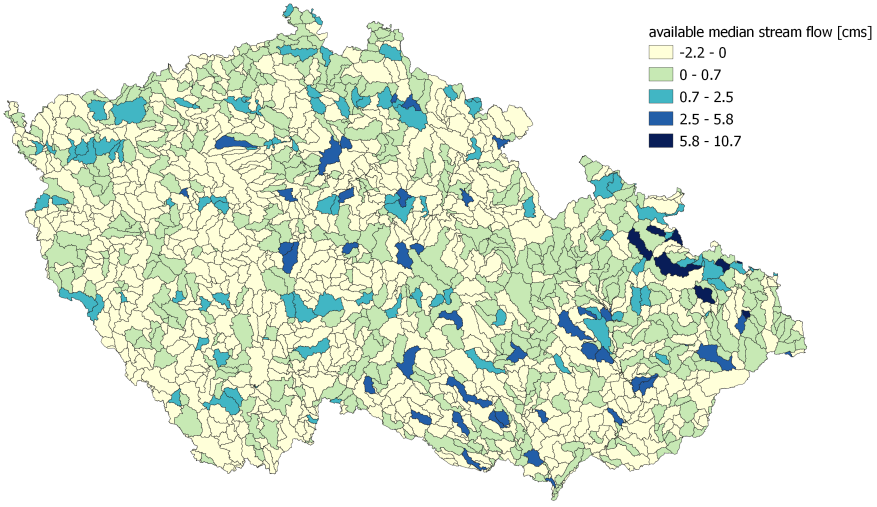
Floods regulation

Economical benefit - avoided damage in flood areas



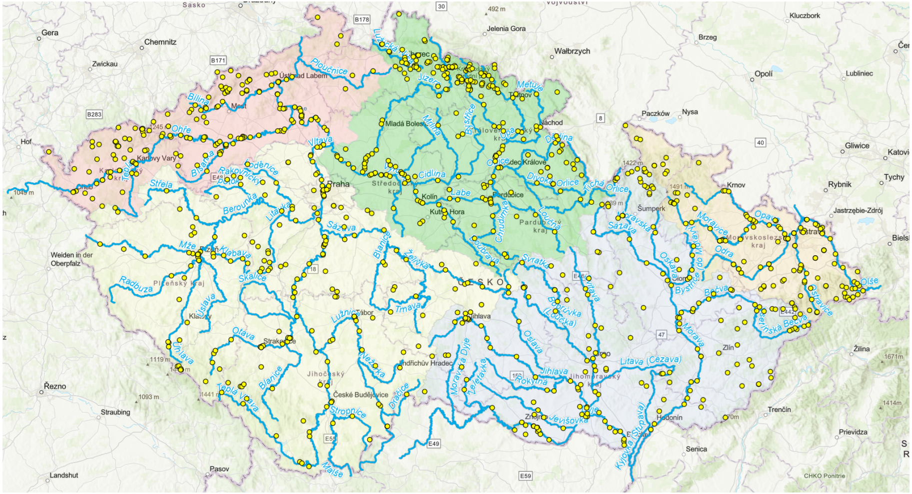
Water supply

Increase of available water over environmental flow limit (330 days exceedence)



Water supply

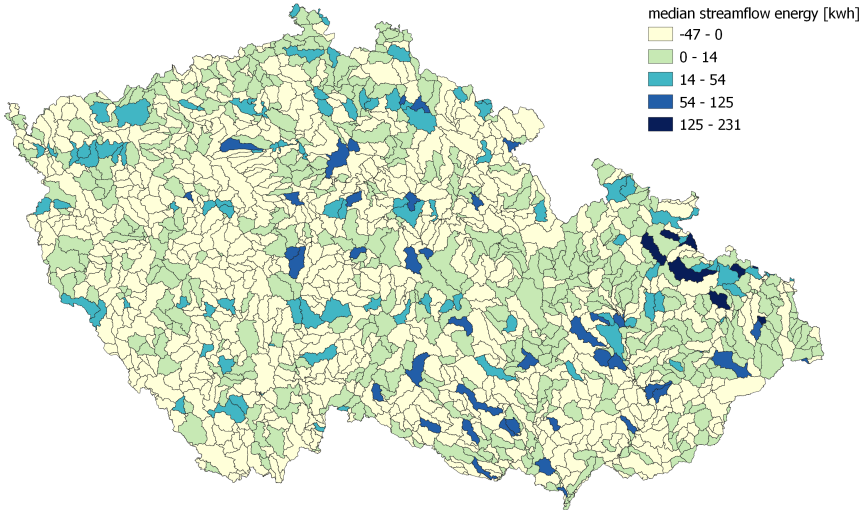
Economical benefit - missing water for abstraction and use in economy



Electric power generation

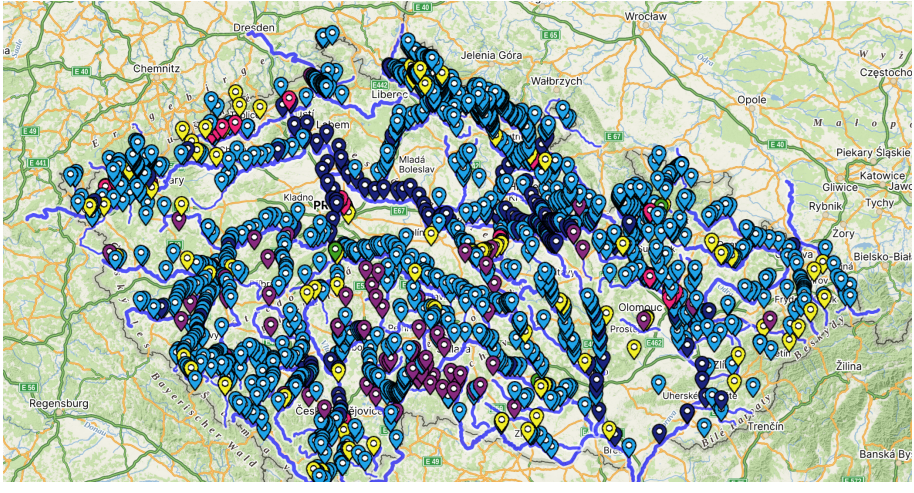
Available kinetic energy for electric power generation

$$P = \rho g Q H$$



Electric power generation

Economical benefit - supply of energy for hydro powerplants



Conclusion and upcoming work

- SWAT model can provides outputs for Natura 2000 sites benefits of water flow regulation assessment
- Calibration of national scale model needs more effort
- Monetary valuation will be more specified

Questions

Thank you for your attention!

Any questions?

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