

# Ecosystem Service Trade-offs under Future Management Scenarios in Třeboň Basin Biosphere Reserve, the Czech Republic

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# Key questions

- How do ecosystem changes in vulnerable areas influence the well-being of local inhabitants?
- How to improve the governance of these areas?



# Social-Ecological Systems (SES)

## Global change drivers

Climate change, Land conversion, Globalization

### Ecological systems

Biodiversity  
Trophic structure  
Functional traits  
Primary productivity  
Nutrient fluxes  
Ecosystem functions

### Ecosystem services

Provisioning  
Regulating  
Cultural

### Socio-economic systems

Socio-economic metabolism  
Ecological footprints  
Policy  
Markets  
Mitigation and adaptation  
Human well-being

## Long-term Social-Ecological Research (LTSER)

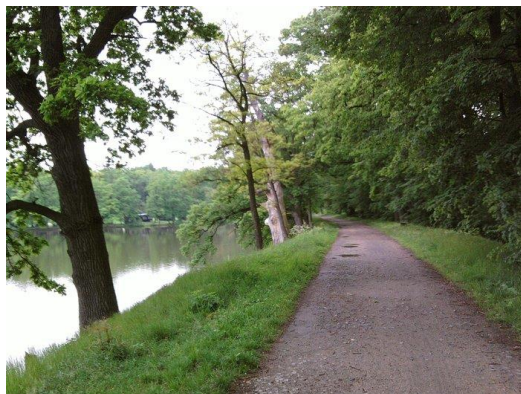
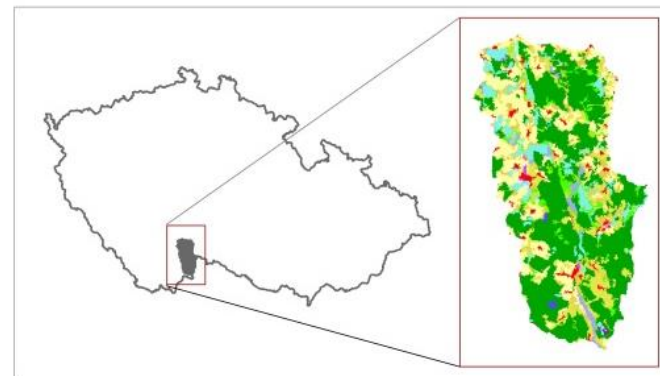
# LTSER in the Czech Republic

- Contribute to the creation of a **new national LTSER** platform by integrating social-ecological research in ongoing LTER
- Develop a **methodology** usable within the MaB LTSER platforms
- Assess the socio-ecological system and **ecosystem service provision scenarios** in a pilot area



# Třeboň Basin SES

- UNESCO Biosphere reserve, Wetland PLA, LTER site
- High cultural and natural value
  - **Cultural assets:** historically formed landscape, a system of fishponds and canals from the 16th century
  - **Natural assets:** natural wetlands, peatbogs with high biodiversity levels





- Threatened by **anthropogenic influence**:



Sand and gravel mining



Biogas production



Tourism and recreation



Intensive fishing

- **Provisioning ecosystem services** favoured at the cost of **regulating and cultural services**

# Aims

1. Modelling **scenarios** of potential future **land use and land cover** development of Třeboň Basin landscape.
2. Assessing the level of **regulating, provisioning and cultural ecosystem services** provided under each scenario.
3. Estimating **trade-offs** between the scenarios.

# Methods: LULCC scenarios

Stakeholder  
Engagement

Administration of Třeboňsko PLA  
Gravel mining companies  
Biogas production company  
Local spas  
The City of Třeboň

LULCC  
scenarios

GIS: CORINE Land Cover 2006,  
ALARM 2050/EcoC  
"Protection"  
"Business as Usual (BaU)"  
"Exploitation"



# Methods: Ecosystem services

- Regulating ecosystem services:

- InVEST (Integrated Valuation of Environmental Services and Trade-offs)
  - Climate regulation
  - Water quality: nitrogen retention



- Cultural services:

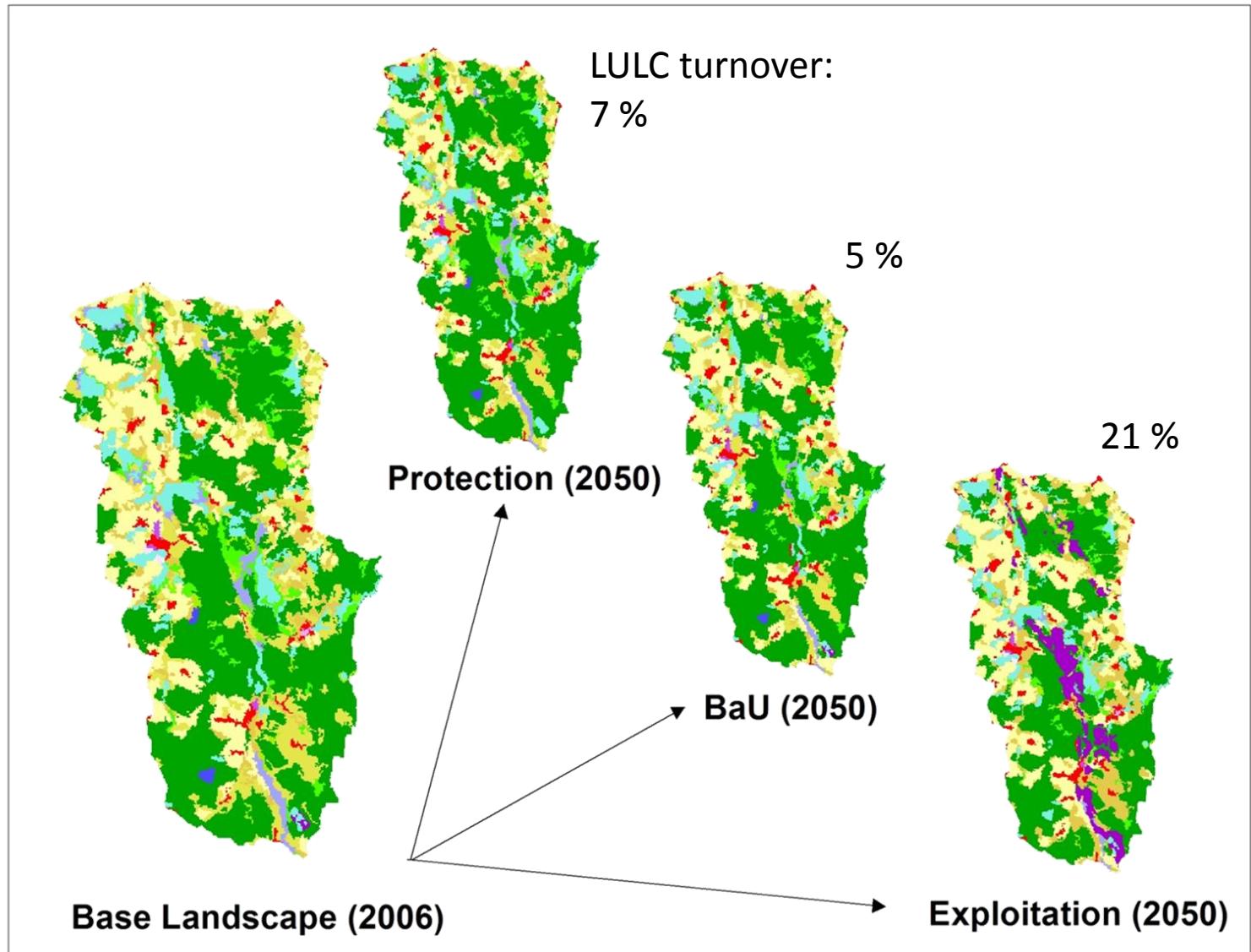
- ARIES (Artificial Intelligence for Ecosystem Services)
  - Aesthetic viewsheds and proximity
  - Recreation



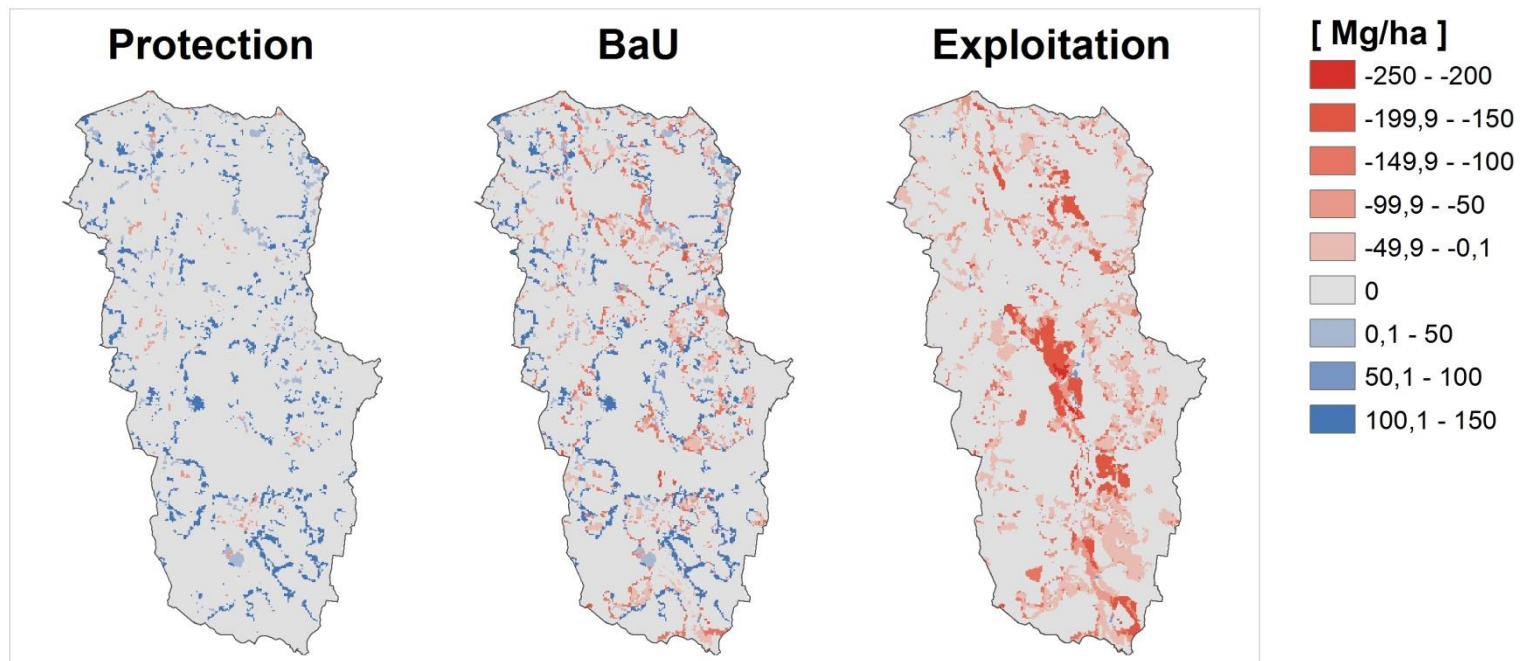
- Provisioning services:

- FAO and OECD projections, national agriculture land databases and statistics

# Land use and land cover scenarios

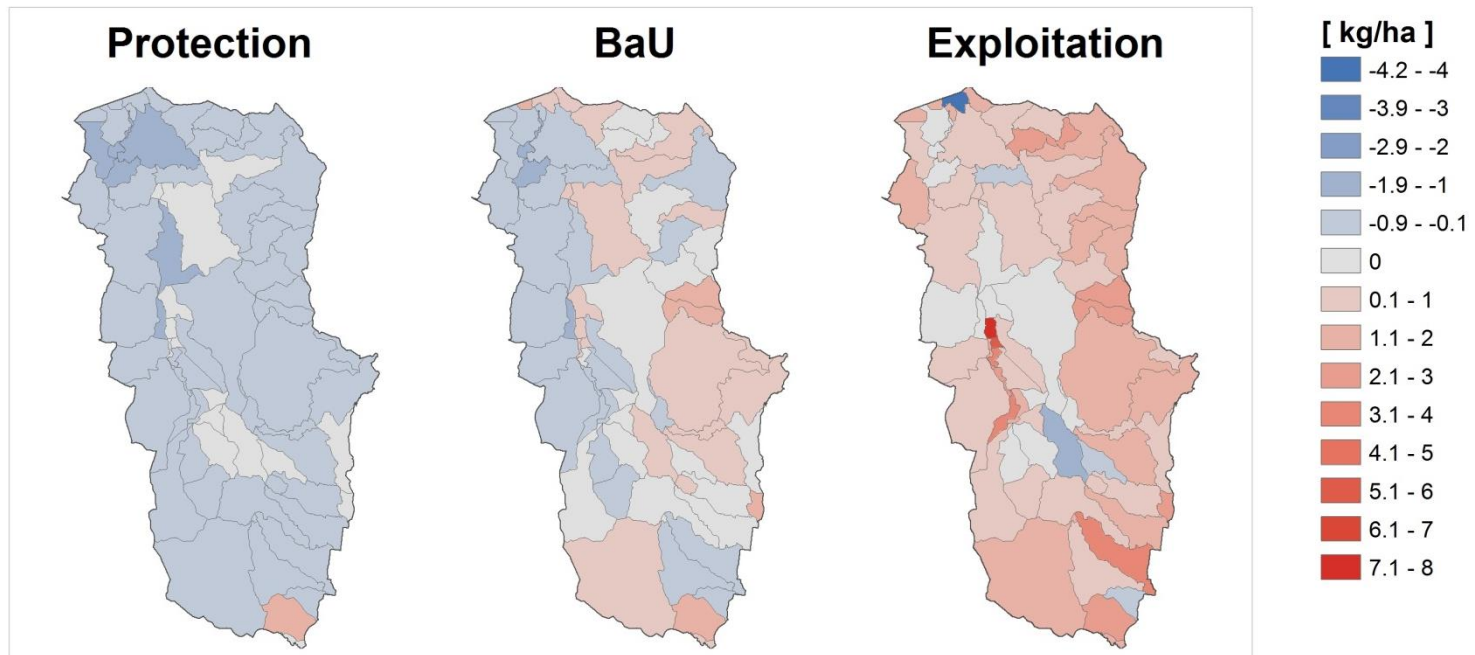


# Climate regulation: Carbon storage



	Carbon storage [Mg ha <sup>-1</sup> ]	Carbon sequestration (2006-2050) [Mg ha <sup>-1</sup> yr <sup>-1</sup> ]
Protection	131	+ 6.45
BaU	126	+ 1.20
Exploitation	108	- 16.57

# Water quality: Nitrogen discharge

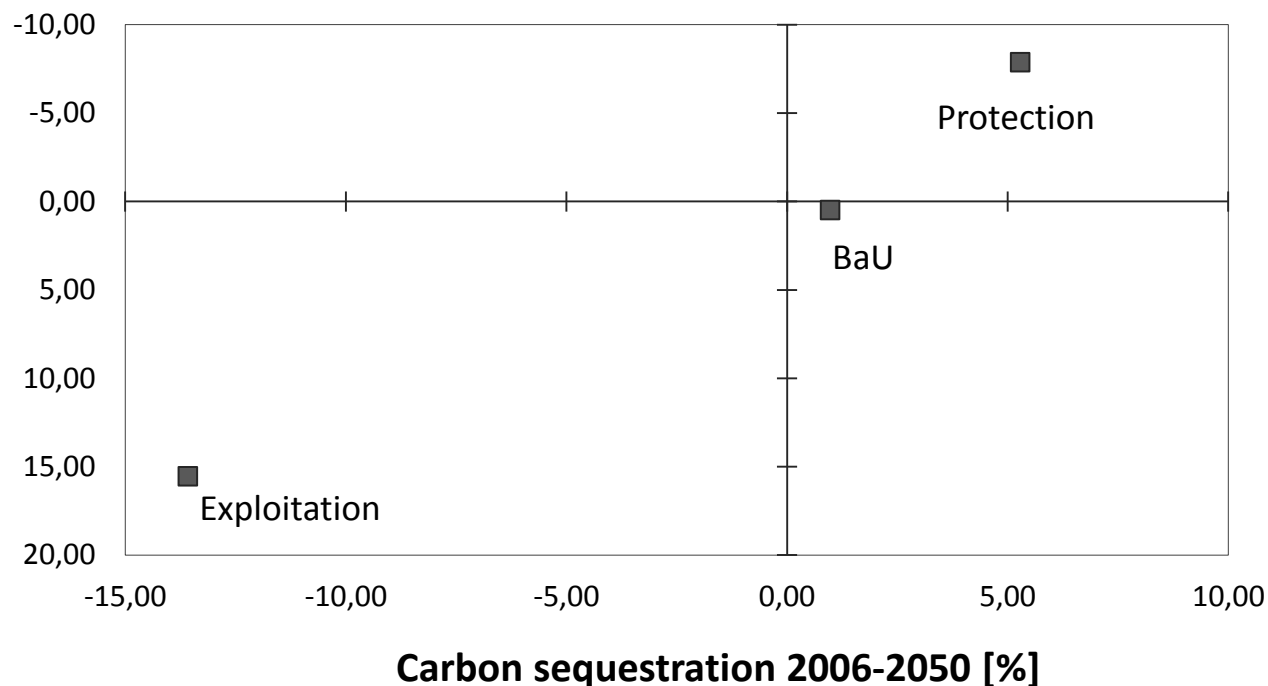


	Nitrogen discharge [kg ha <sup>-1</sup> yr <sup>-1</sup> ]	Change in nitrogen discharge (2006-2050) [kg ha <sup>-1</sup> ]	Nitrogen retention [kg ha <sup>-1</sup> yr <sup>-1</sup> ]
Protection	5.10	- 0.44	3.37
BaU	5.63	+ 0.02	3.63
Exploitation	6.40	+ 0.84	4.01

# Trade-offs between scenarios

	Mean carbon sequestration [%]	Mean change in nitrogen discharge [%]
Protection	+ 5.29	- 7.87
BaU	+ 0.98	+ 0.50
Exploitation	- 13.58	+ 15.55

Change in water quality  
(nitrogen discharge) 2006-2050 [%]



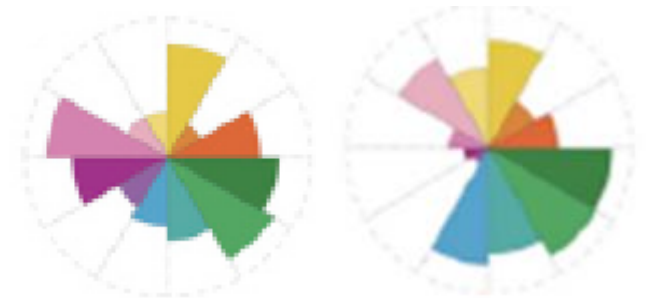


# Conclusions

- Protection scenario:
  - Beneficial in terms of regulating ES
  - Favoured by nature conservation authorities due to the conservation of high ecosystem values.
- Exploitation scenario:
  - Undesirable changes in regulating ES
  - Favoured by local stakeholders due to potential financial profit, resulting from exploitative activities.
- **Governance implications?**

# Applications and further steps

- **Application** of the results:
  - Local governance and landscape management (e.g. by the Administration of Třeboň Basin PLA)
  - Contribution to the creation of an **LTSER platform**
- **Further steps:**
  - Extension of ES included in trade-off analysis (**provisioning, cultural services**)
  - Extension of **scenarios** with participation of other stakeholders



# Thank you for your attention

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