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Mapping ecosystem services as a method for evaluating the ecological, social, and economic benefits of restoration efforts

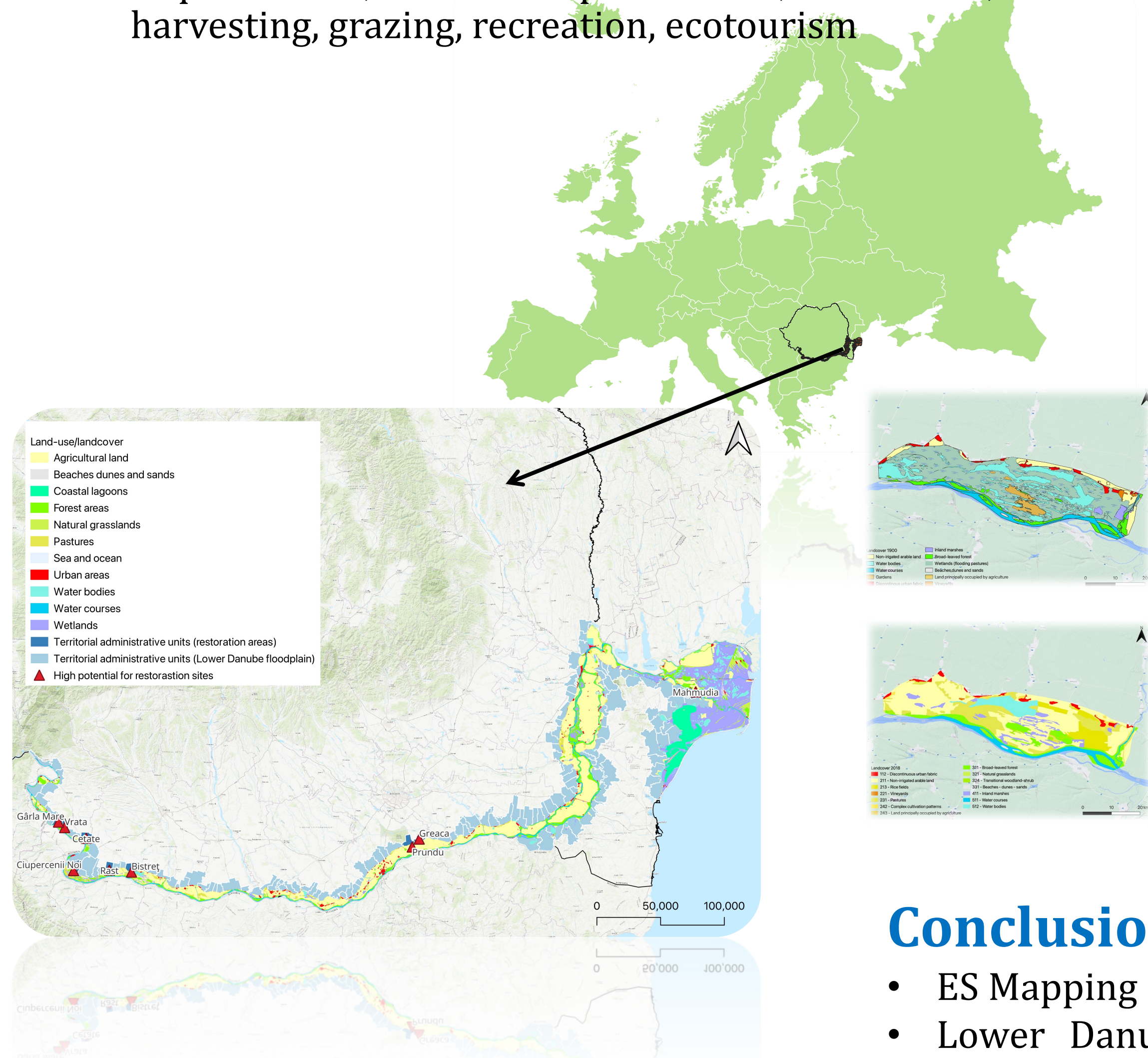
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Introduction

- Ecological restoration requires integrated ecological, social, and economic approaches. Wetlands provide key services: biodiversity, carbon storage, flood regulation, and cultural value.
- The Lower Danube Wetland System (Romania) — one of Europe's largest restoration areas — is highly vulnerable to climate change, making it an ideal case for integrated ES mapping.
- The ReSponSE project supports biodiversity conservation through aquatic ecosystem health assessment and ES integration into decision-making, demonstrating how ES mapping can assess co-benefits and guide restoration policies.

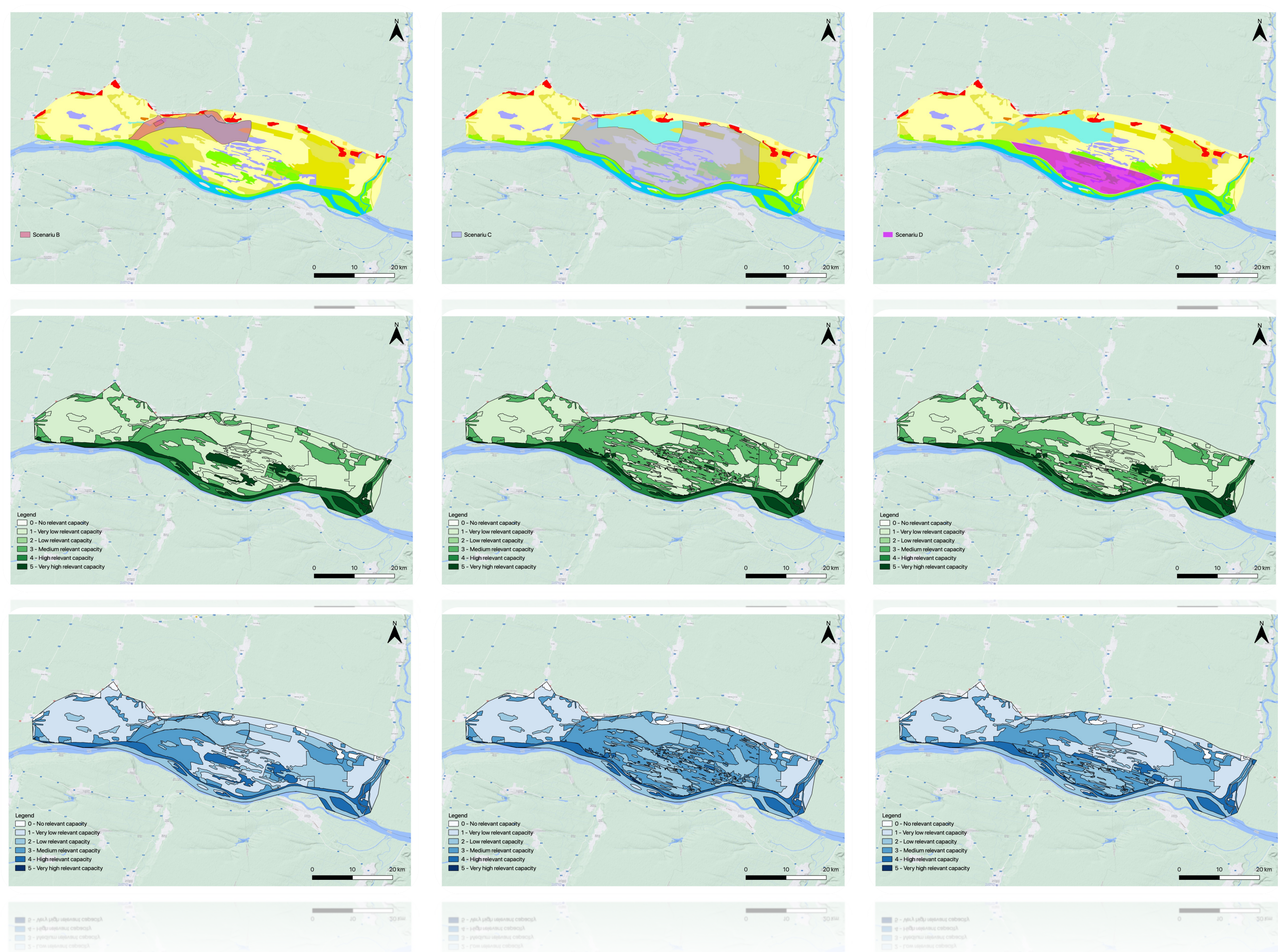
Material and Methods

- **Study Area:** Lower Danube Wetland System — floodplain and deltaic wetlands
- **Scenarios** (from Fuzzy Cognitive Mapping with stakeholders):
 - No action / Business-as-usual
 - Partial restoration
 - Full restoration with Nature-based Solutions (NbS)
- **ES Categories:** provisioning, regulating, supporting, cultural — using ecological indicators, hydrological and biodiversity data, and socio-economic information
- **Key services assessed:** flood regulation, carbon sequestration, water purification, fisheries, reed harvesting, grazing, recreation, ecotourism



Results and Discussion

- **Decline in regulating & cultural services:** Wetland conversion to agriculture (Bistret/Potelu) reduced flood protection, water purification, carbon storage, recreation, and biodiversity values.
- **Restoration enhances resilience:** increase regulating and cultural services, strengthening climate adaptation and ecotourism opportunities.
- **Valuation shows long-term gains:** higher overall economic and societal value when regulating and cultural services are included — despite short-term provisioning losses.



scenariu	Scenariu A (reference)	Scenariu B (realist)	Scenariu C (optimist)	Scenariu D (< optimist)	Scenariu E (as usual)
wetland area	19,088	2,944	9,178	3,737	2,066
Agricultural area	4,302	18,709	12,255	17,763	18,877
Total value/year based only on agriculture area*	1,006,668	4,377,906	2,867,670	4,156,542.00	4,417,218
Total value/year based on wetland	26,360,528	4,065,664	12,674,818	5,160,797	2,853,146
Total value/year	27,367,196	8,443,570	15,542,488	9,317,339	7,270,364

Conclusions

- ES Mapping is a powerful tool to assess and communicate co-benefits of restoration
- Lower Danube case highlights the importance of transdisciplinary collaboration and stakeholder engagement
- ES valuation provides a transferable decision-support tool for comparing scenarios and guiding nature restoration policies in the Lower Danube and beyond

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