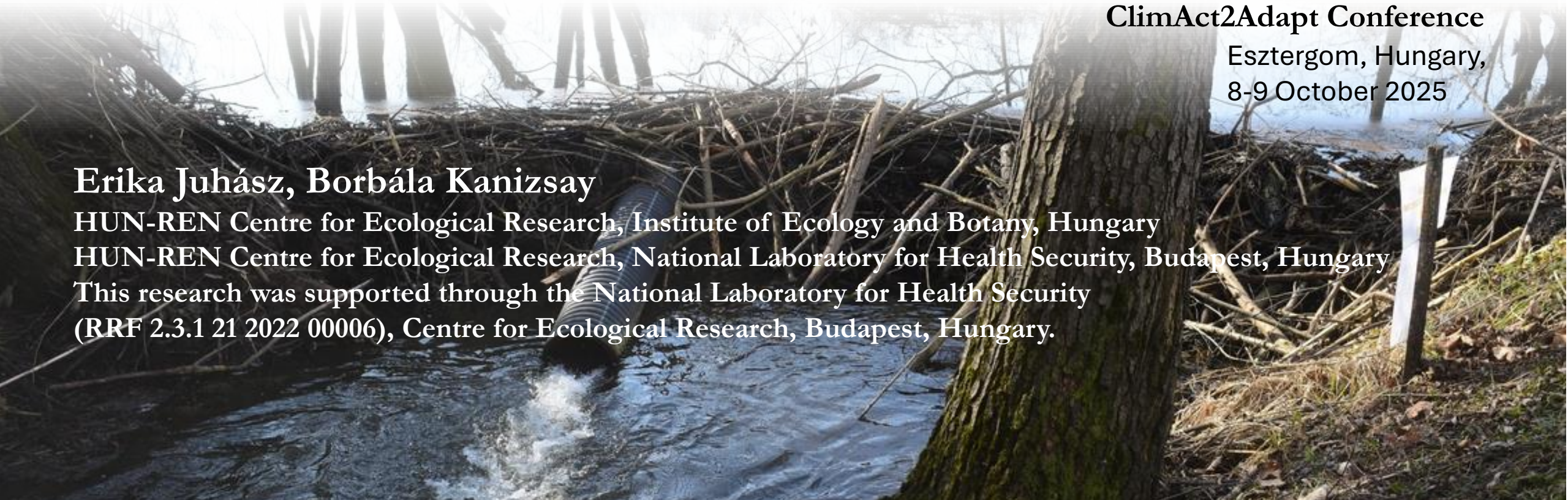
A nature-made solution for water retention: beaver impact



ClimAct2Adapt Conference
Esztergom, Hungary,
8-9 October 2025

Erika Juhász, Borbála Kanizsay
HUN-REN Centre for Ecological Research, Institute of Ecology and Botany, Hungary
HUN-REN Centre for Ecological Research, National Laboratory for Health Security, Budapest, Hungary
This research was supported through the National Laboratory for Health Security
(RRF 2.3.1 21 2022 00006), Centre for Ecological Research, Budapest, Hungary.

Eurasian beaver – the reintroduced ecosystem engineer

Landscape alteration

- Rapid expansion
- Foraging, dam building, burrowing
- Conservation benefits, conservation conflicts
- Human-nature conflicts


Fotó: Szendőfi Balázs


Fotó: Juhász Erika

Our projects

- Beaver impact research (field surveys)
- BeaverMap citizen science program
- Semi-structured interviews

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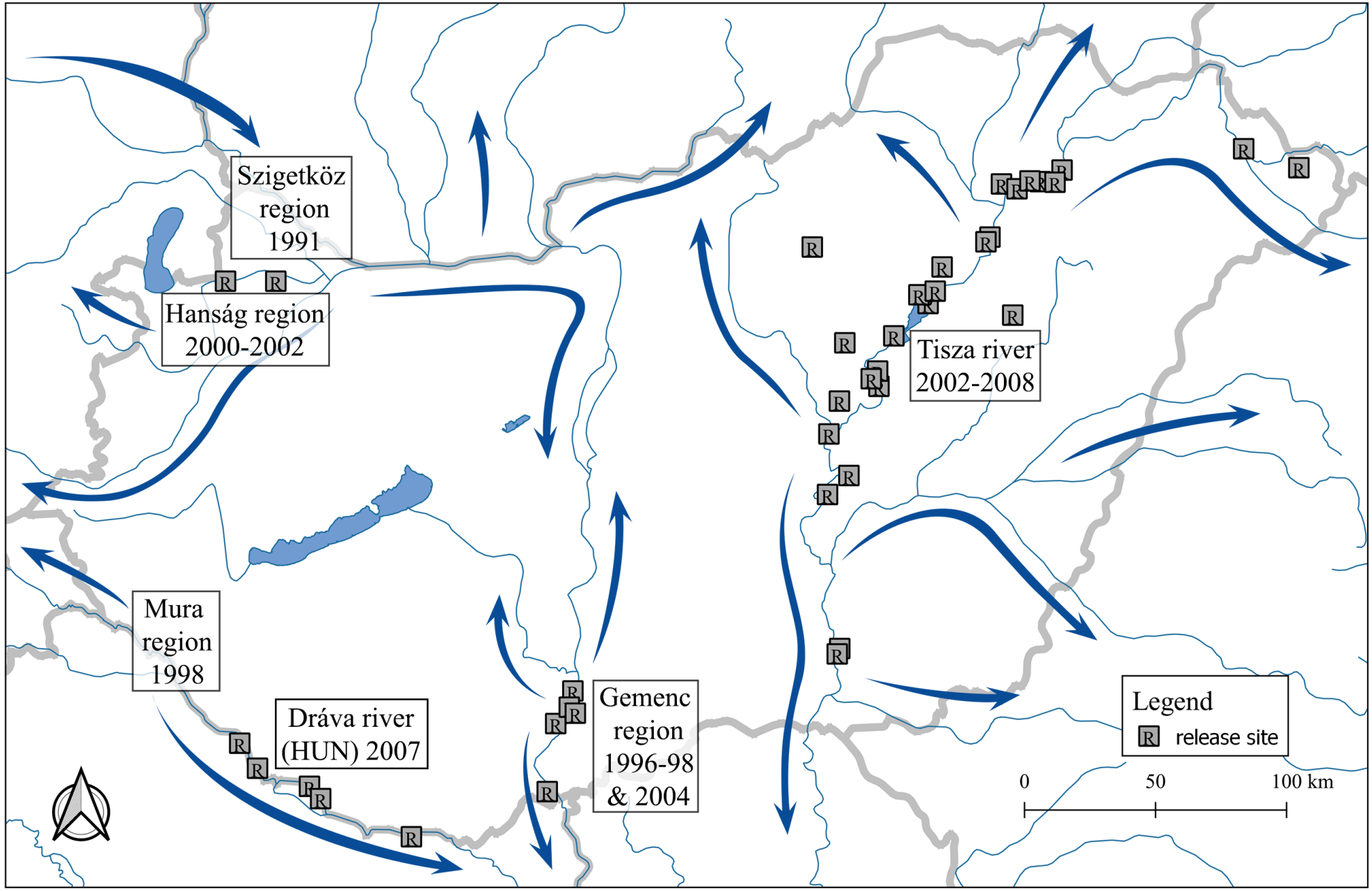
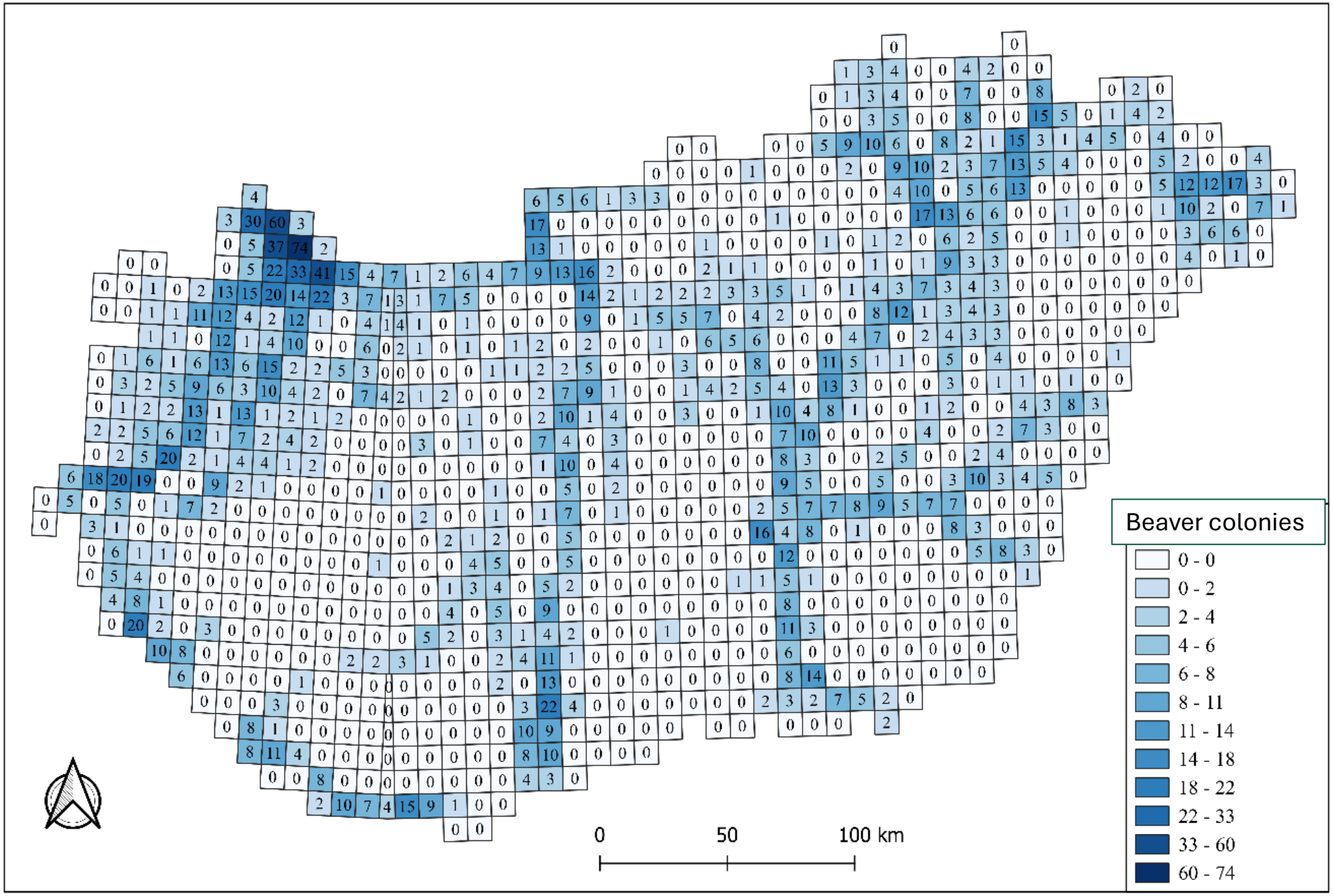


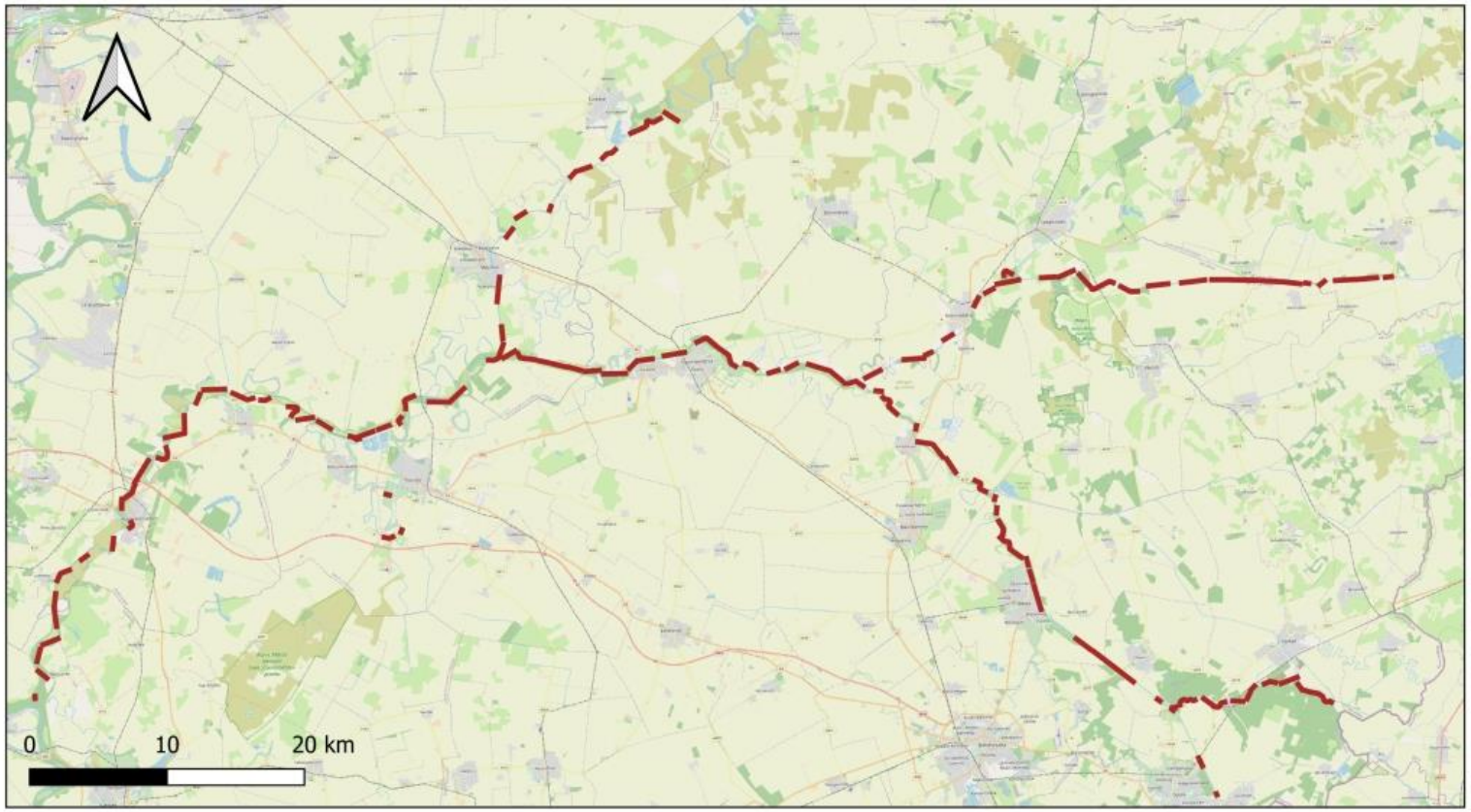
Czabán, D., Juhász, E. Rapid expansion of Eurasian beavers in Hungary: Rapid expansion of Eurasian beavers in Hungary: thirty-year history of the species' return (European Journal of Wildlife Research)



Czabán, D., Juhász, E. Rapid expansion of Eurasian beavers in Hungary: Rapid expansion of Eurasian beavers in Hungary: thirty-year history of the species' return (European Journal of Wildlife Research)

BEAVER MONITORING – FIELD SURVEYS

Körös river: 2021-2022: 124 colonies/227,5 km;
2018: 40 colonies/99,7 km



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Csincse

Csincse

Csincse

Csincse

Geszti-
patak

Geszti-patak

Laskó

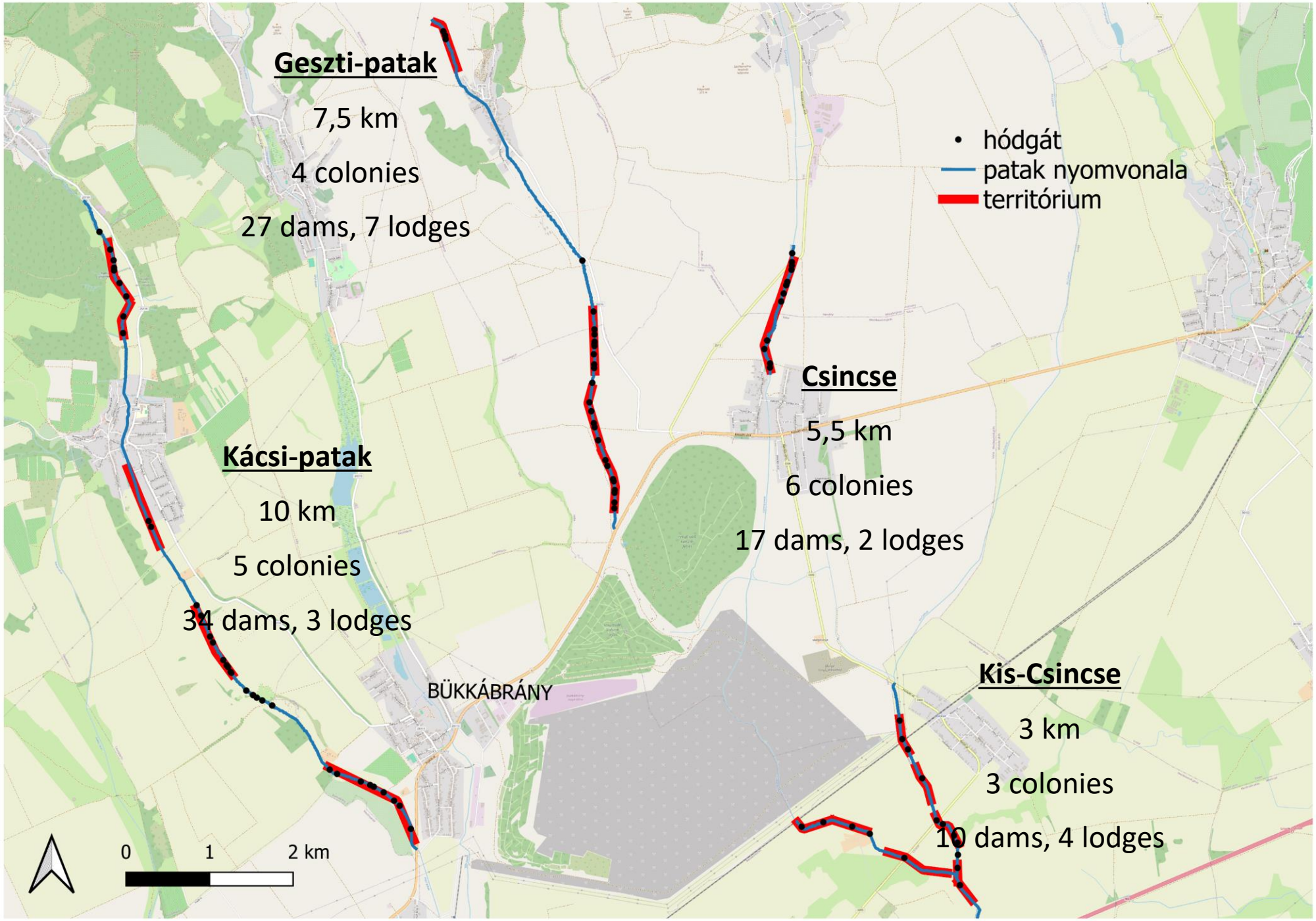
Laskó

Laskó

FIELD SURVEYS IN 2024

Vas county
2 streams
30 km
13 colonies
49 dams
13 lodges

Borsodi Mezőség and Bükkalja
5 streams
40 km
26 colonies
114 dams
21 lodges



BEAVER MONITORING – FIELD SURVEYS

FIELD SURVEYS IN 2024

Tápió region
2 streams
40 km
20 colonies
59 dams

Bakony
3 streams
30 km
22 dams

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Photo: Balázs Szendőfi

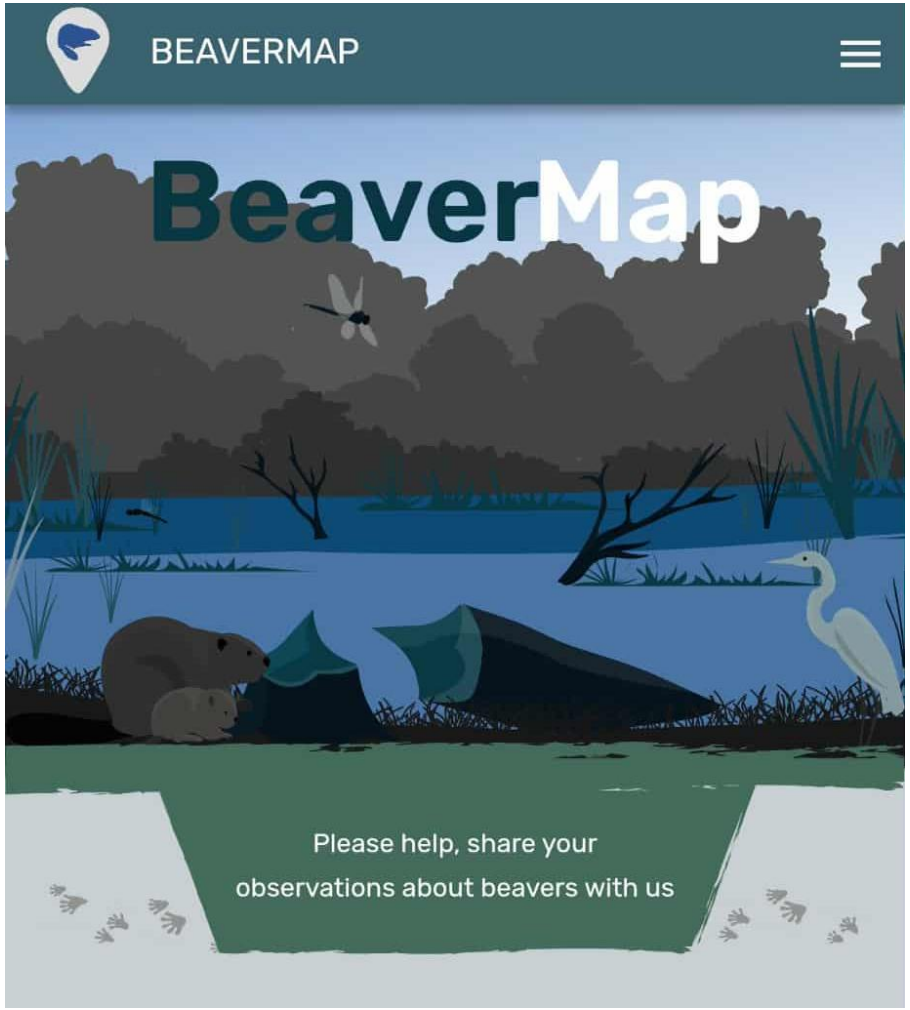
Photo: Balázs Szendőfi

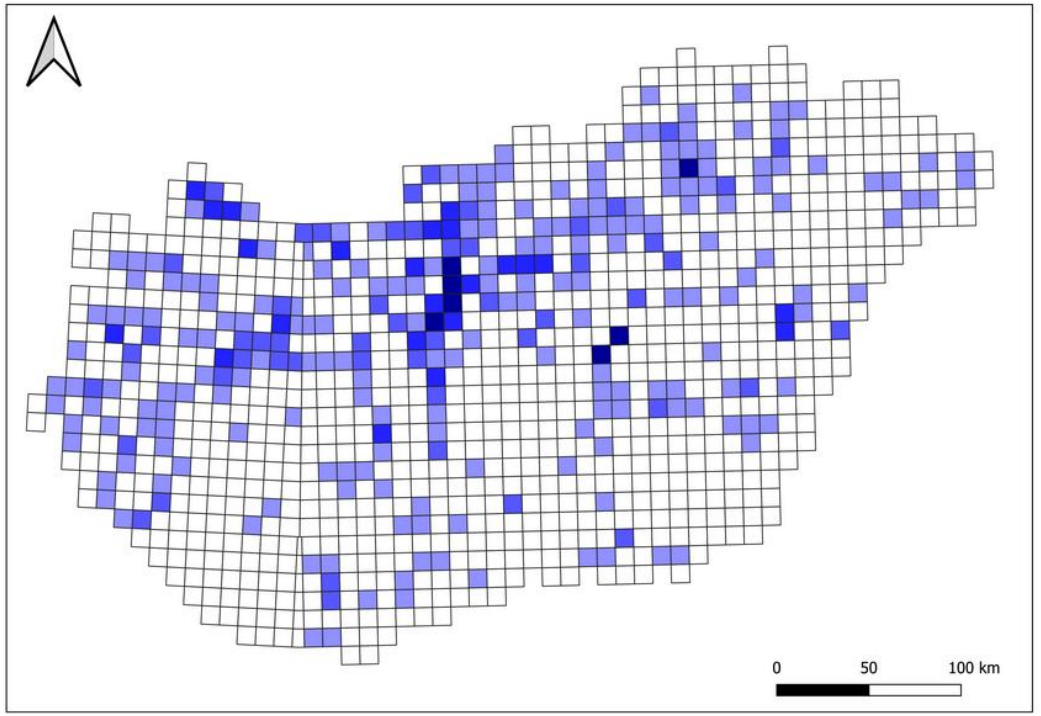
Photo: Balázs Szendőfi

Photo: Balázs Szendőfi

Photo: Balázs Szendőfi

BEAVERMAP – CITIZEN SCIENCE PROGRAM





There have been 844 uploads to the BeaverMap. The observations mainly came from the territory of Hungary. The presence of beaver dams was reported in 185 cases, while flooding by beavers was reported in 69 cases.

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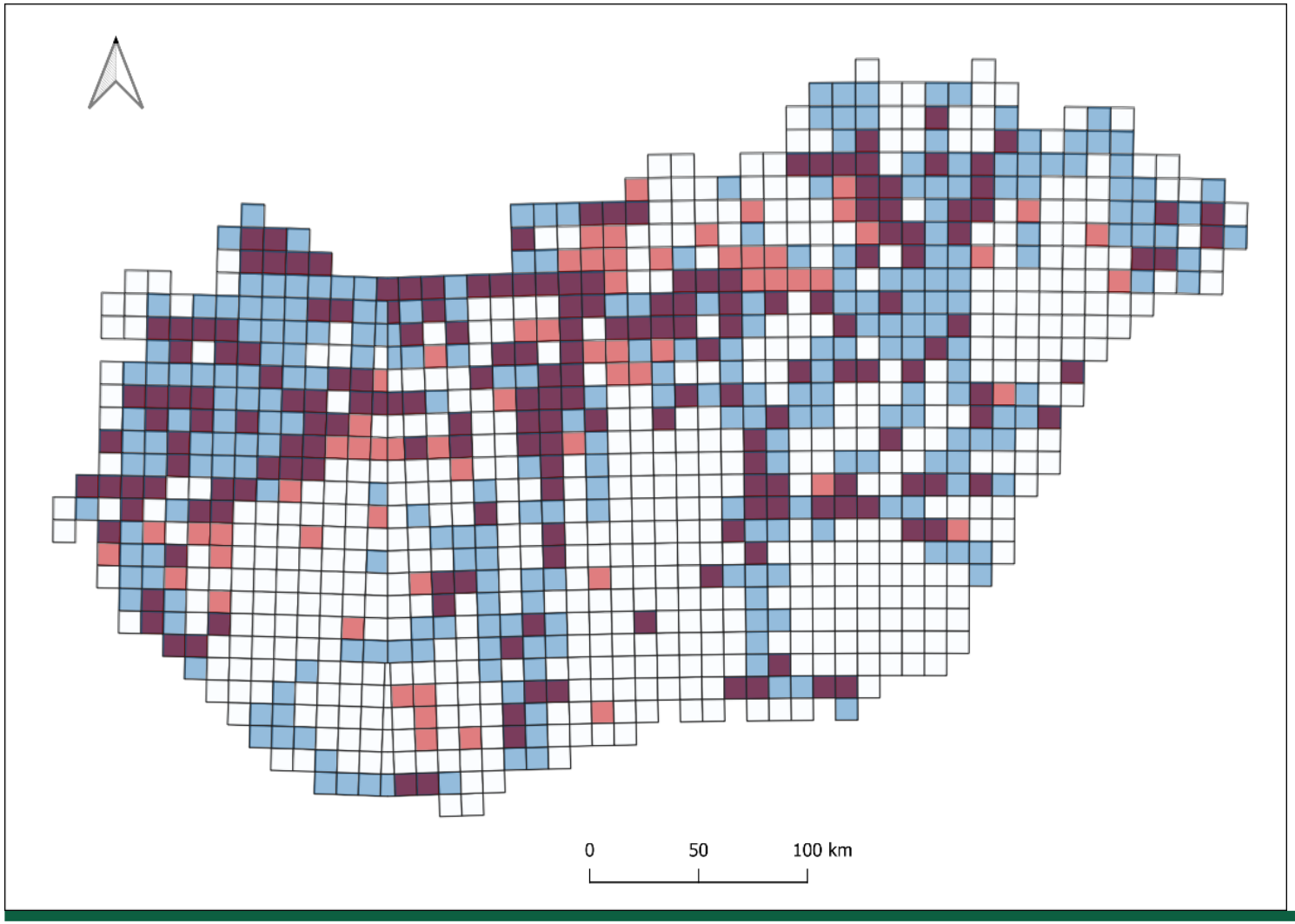
DISTRIBUTION OF THE BEAVER



Blue: field survey data from researchers, national park directorates, water management authorities (Czabán & Juhász 2024)

Red: citizen science (BeaverMap 2024)

Czabán, D., & Juhász, E. (2024). Rapid expansion of Eurasian beavers in Hungary: thirty-year history of the species' return. *European Journal of Wildlife Research*, *70*(4), 71.

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IMPACTS OF BEAVER DAMS

1) Impounding → water depth ↑, velocity ↓
2) Sediment transport ↓, residence time of water and nutrients ↑, anaerobic processes ↑ → C, N, P circles
3) Evapotranspiration↑
4) Ecosystem: lotic → lentic transition
5) Geomorphological and habitat heterogeneity ↑, wetlands, anastomosing stream systems
6) Longitudinal connectivity ↓, lateral connectivity ↑, vertical connectivity ↑
7) Water retention ↑, surface water ↑, groundwater ↑
8) Flood mitigation, peak flow↓

Photo: Balázs Szendőfi

Larsen, A., Larsen, J. R., & Lane, S. N. (2021). Dam builders and their works: Beaver influences on the stru
hydrology, geomorphology, biogeochemistry and ecosystems. Earth-Science Reviews, 218, 103623.

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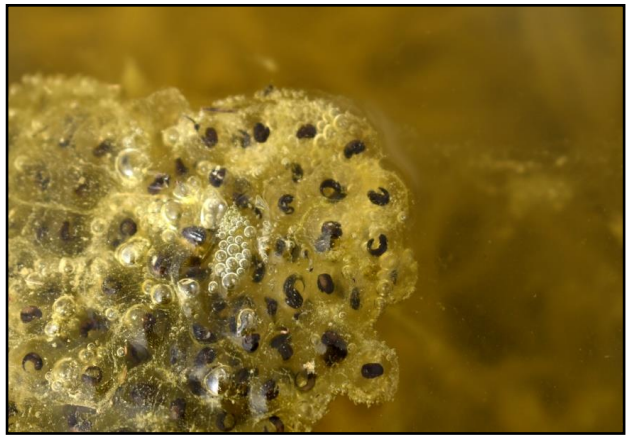
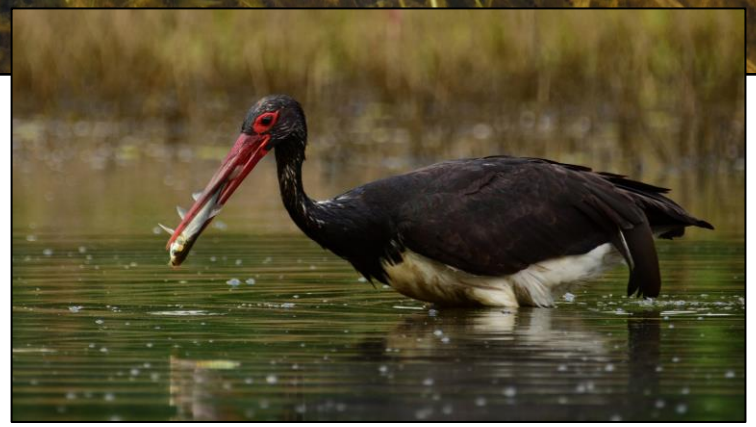
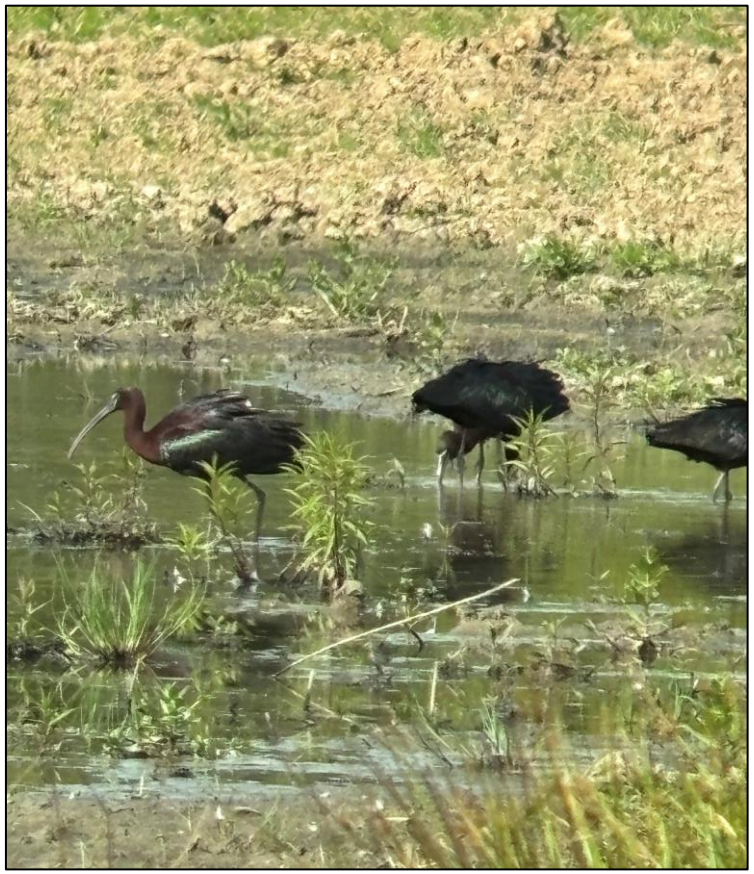
BEAVER IMPACTS - BIODIVERSITY







Photos: Dávid Bencze, Zsombor Hibbey, Erika Juhász

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LOCAL PERCEPTIONS ABOUT BEAVER IMPACTS

Examples from the BeaverMap project:

”[...] almost all trees were felled down into the river, completely altering its character. Its flow has slowed down significantly, and aquatic plants have completely overgrown it.”

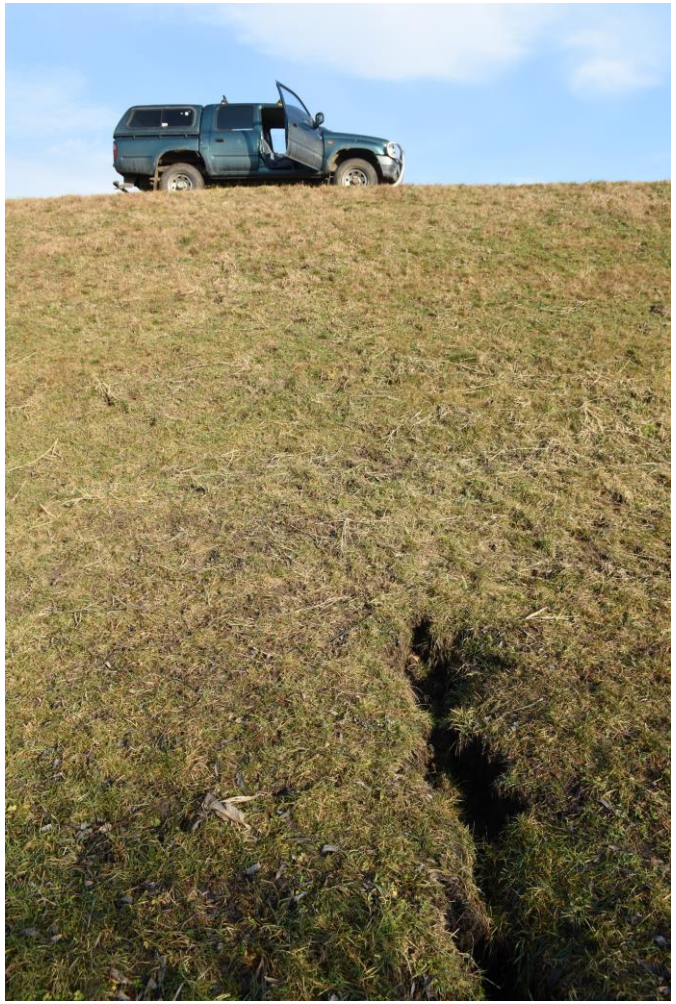
”The streams they dammed flooded agricultural areas.”

”The beaver impounds the water of the stream, thus affecting the disposal of the sewage plant, which endangers the operation of the plant.”

”In the pasture, it is not a problem in terms of land use, since the winter-spring shallow water cover decreases (dries out) in the summer, and the area can be managed by grazing [...]”

”The impounded water serves as a drinking place for mammals, a feeding site, e.g. for kingfishers, and a breeding site for fish and amphibians. While we were there, a common snipe jumped up from the beaver dam.”

CONFLICTS RELATED TO BEAVER BURROWS



Forrás: Keller Richárd/Egri ügyek

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CONFLICTS RELATED TO BEAVER DAMS

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BEAVER IMPACTS – WIN-WIN-WIN

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CONFLICT MANAGEMENT I.

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CONFLICT MANAGEMENT II.

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CONFLICT MANAGEMENT III.

HUN REN ÖKOLÓGIAI KUTATÓKÖZPONT MONITORING

CONFLICT MANAGEMENT IV.

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CONFLICT MANAGEMENT IN HUNGARY

TALPALATNYI VADON természetmegőrzési alapítvány

LOGOS 4 WATERS

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CONFLICT MANAGEMENT IN HUNGARY

DUNA-IPOLY NEMZETI PARK 1997

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Adaptation to the spontaneous habitat reconstruction

Photos:
Zsombor
Hibbey
landowner

Adaptation to the spontaneous habitat reconstruction

Photos:
Zsombor
Hibbey
landowner

THANK YOU FOR YOUR ATTENTION!

Photo: Juhász, E.

E-mail: juhasz.erika@ecolres.hu

This research was supported through the National Laboratory for Health Security (RRF 2.3.1 21 2022 00006), Centre for Ecological Research, Budapest, Hungary.

BEAVERMAP
(www.beavermap.com)