

Natural grazing by large ungulates - a tool for soil and landscape restoration

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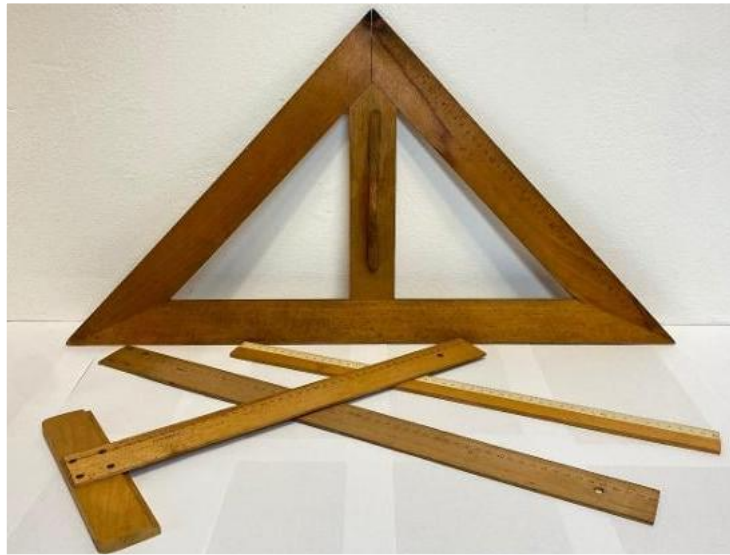


Most
17.-19. 9. 2025

Pedologické dny 2025
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Technical reclamation in the Ústí region: more than 15 billion CZK



...creates artificial landscape with low habitat diversity with a need of costly subsequent maintenance, low resistance and resilience, and therefore with problematic sustainability.

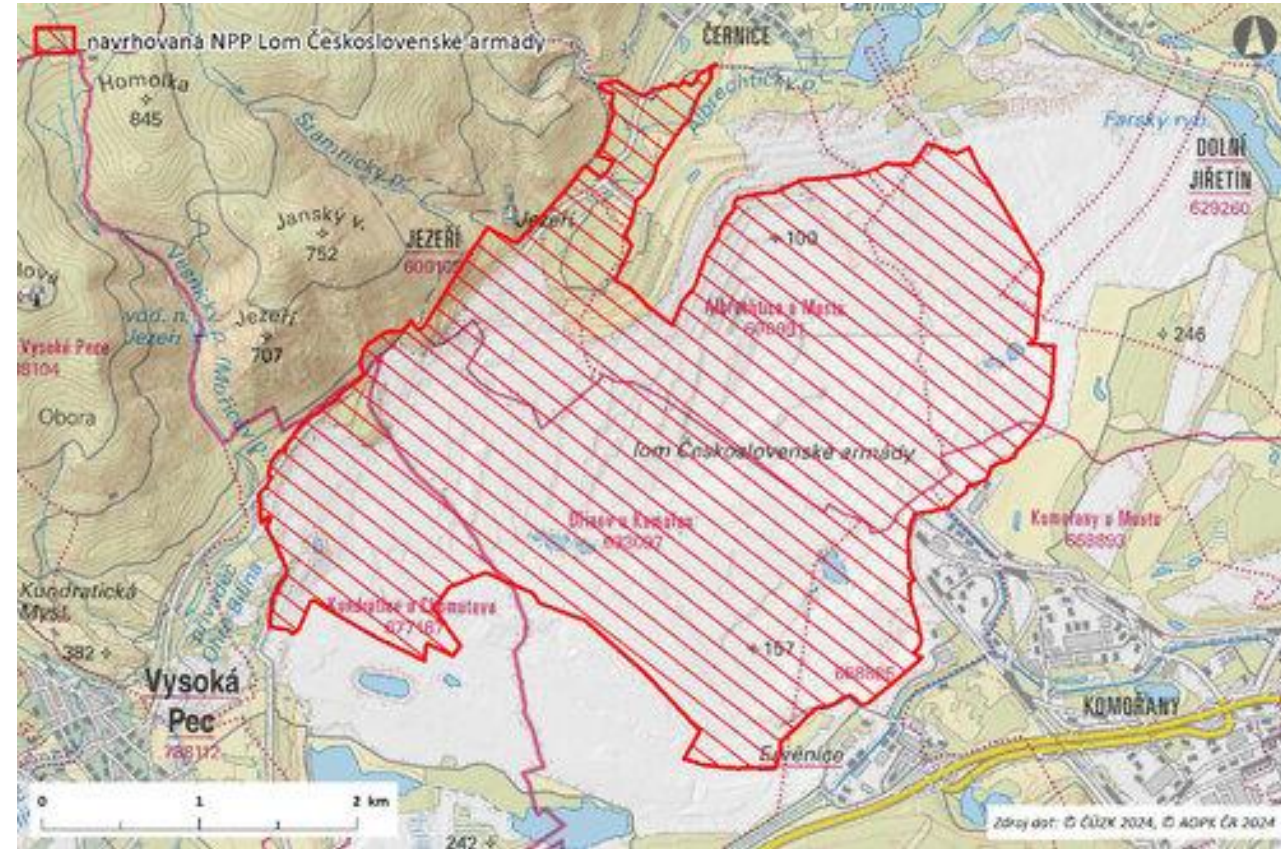
Forestry and agricultural reclamation of the Jan Šverma spoil tip (> 160 mil CZK)

Forestry and agricultural reclamation of the Malé Březno spoil tip (> 1 mil CZK)

Reclamation of the Radovesická spoil tip with a part left for primary succession

ČSA open-pit mine: The largest ecological restoration project in the Czech Republic (1230 ha)

...an opportunity to create a dynamic, heterogeneous, and resilient landscape



- 227 protected and red list species (birds, amphibians, mammals, invertebrates, plants - AOPK ČR, ČZU 2022)
- mostly require open landscape with wetlands

gradual flooding of the large lake + natural succession

+ additional activities: creating pools and piles of stones - nesting opportunities for birds, local blocking of succession - active mowing or even **grazing by large herbivores...**

The "holy trinity" of large grazers used in European trophic rewilding of grazing reserves



European bison

- **the only surviving large wild grazer in Europe**
- an ecologically key species for Europe's natural ecosystems
- **grazer (mainly) of grasses** + gnawer (twigs, bark)
- adult male: 530-925 kg, about 30 kg of food per day



Taurus cattle (*Bos primigenius primigenius*)

- widespread throughout Eurasia below 60°N, very abundant
- ancestor of Neolithic domestic cattle
- extinct in Europe in the 12th (W)-15th (E) centuries
- **back-bred** within the TaurOs project by the Dutch Taurus Foundation
- **primary grazer of grasses and herbs (indiscriminate - unlike domesticated breeds)**
- adult male: 800-1,000 kg, about 40 kg of food per day



Exmoor pony

- equids abundant in Europe in the late Atlantic - several (sub)species: western/middle European and eastern (DOM2) wild horse
- extinct in Europe about 5000 years ago
- **semi-wild breed since the 11th century** year-round in the open countryside of SW England - long adapted to the local relatively cool and wet climate (bogs, moors)
- **grazes grasses including senescent material**
- adult male: about 300 kg, about 7 kg of food per day

Ecological function

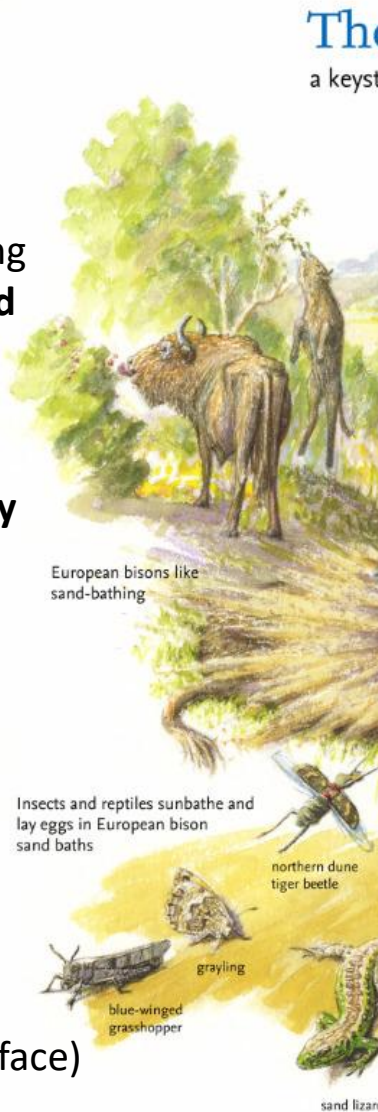
Create and maintain **semi-opened dynamic landscape** by large grazing pressure

Preferential grass eating supports **flowering and nectar-giving plants**

Support **insect diversity and bird diversity**

Reduce **fire frequency** by grazing flammable biomass

Create **special habitats** (baths, paths...bare surface) for **pioneer organisms**



no additional feeding, no veterinary care (no antibiotics, deworming agents...)

Effects in landscape

Increase **trophic and functional complexity**, make the system **resilient and adaptable**

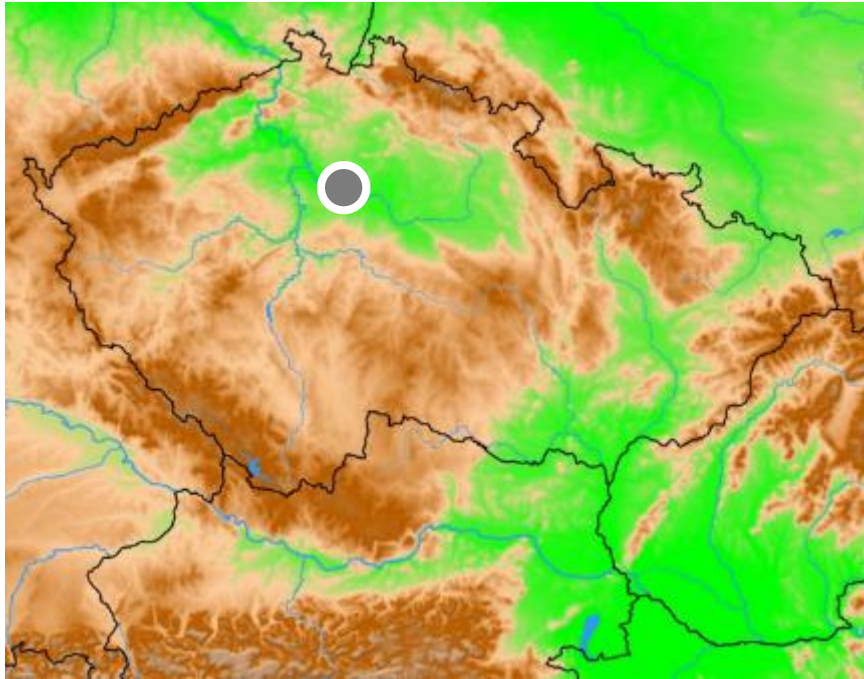
Support birds, scavengers (on carcasses), mesograzers, dung beetles and other insect and decomposing organisms

Promote **plant productivity** by **fast recycling of nutrients** otherwise „locked“ in plant biomass via deposition of dung and urine,

Enhance root exudation, microbial growth and promote **stabilization of carbon in soil**

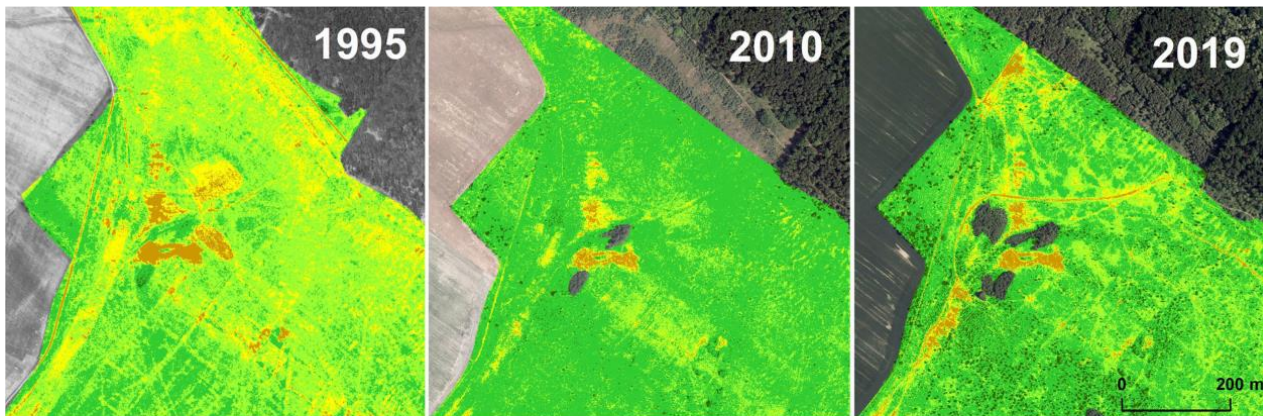







Trophic rewilding in the Czech Republic - history begins to be written in Milovice in 2015

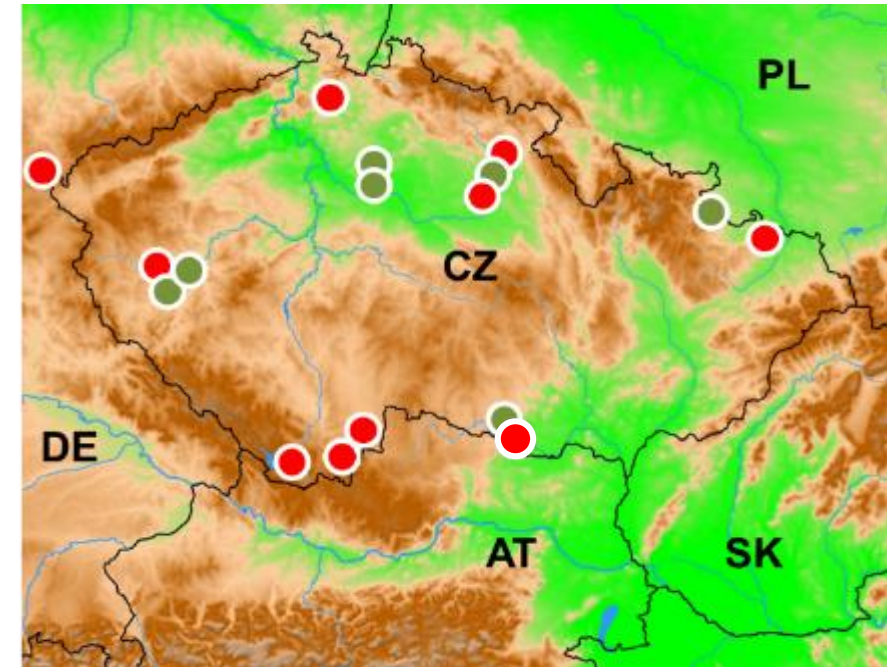




2015

- 1 location - Milovice
- 40 ha (a part of former military area used from 1905 till 1991 (cancelled 1995))
- 15 Exmoor horses



- | | | |
|--|--|--|
|  without vegetation |  short-stemmed lawn |  scattered bushes |
|  sparse lawn |  tall grassland | |



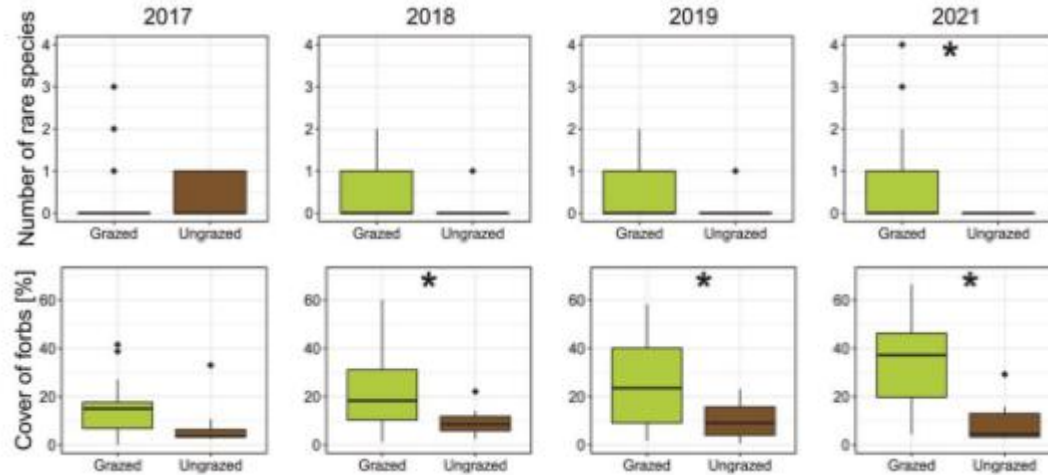
-  former military areas
 other types of grazing reserves

2025

- **17 sites**
- 756 ha (5-250 ha)
- 282 animals (176 Exmoor horses, 52 European bison, 54 Taurus cattle)

Development of the Milovice-West grazing reserve (from 2015 to present)

- The cover of dicotyledonous - mainly light-loving species has gradually increased, the overall diversity and number of protected plant species has increased



Dvorský et al. 2022:10.1007/s11258-022-01225-w

21

© Miloslav Jirků



Examples of butterflies in Milovice reserve:

- a. (*Polyommatus amandus*), b. (*Lycaena dispar*),
c. (*Argynnis aglaja*), d. (*Melanargia galathea*),
© Michal Köpping

Copris lunaris – coprophagous critically endangered, relatively recently extinct species introduced to the Milovice reserve one year after the reintroduction of the founding individuals (foto 11. 5. 2021). © Lucie Ambrožová





Development of the Havraníky Heath grazing reserve (6 Exmoor horses since May 2018)



character of the site at the time of the introduction of 6 horses

... and a year later in spring 2019



The highly endangered *Pulsatilla grandis* has one of the strongest populations in the Czech Republic and is one of the target species of the project. (Photo: M. Jirků, 2019)

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U Havraníků kvetou koniklece. Jsou jich tisíce



Na jedny z nejvýraznějších květů Podyjí – koniklece velkokvěté – se z nedalekého Havraníků.



Ilona Bergrová | 23. 1. 2019



... and the 5th year

☒ Kriticky ohrožený syselec obecný se poprvé po 50 letech objevil v Národním parku Podyjí, díky divokým koním

2022 - 06 - 17

The critically endangered common gopher has reappeared in a grazing reserve after 50 years thanks to horses



Josefovské meadows bird park near Jaroměř – waterlogged, seasonally flooded meadows

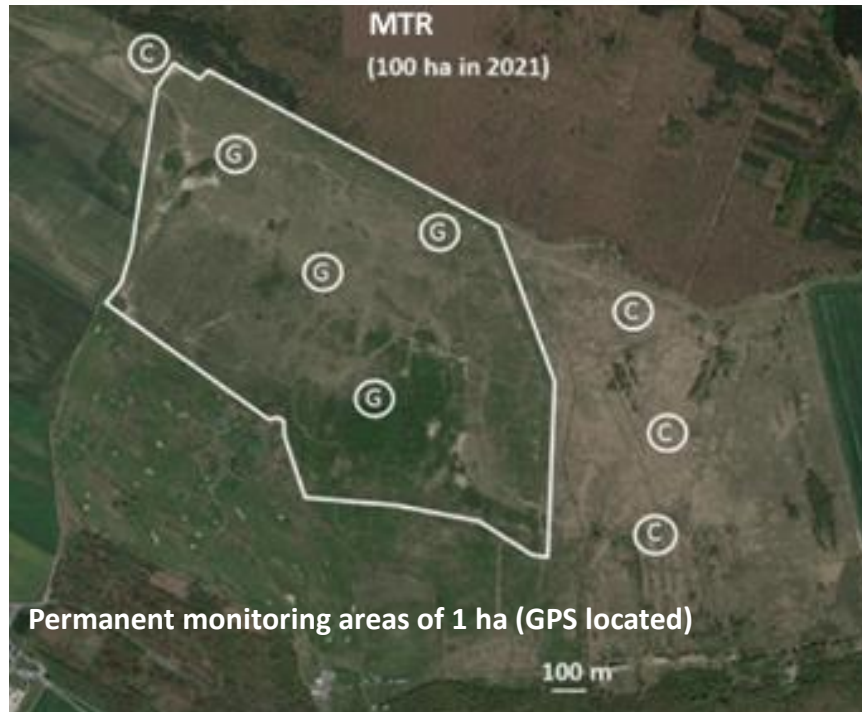


The first group of horses arrived in 2018 and helped increase number of flowering and nectarivorous species of the site. Cattle grazes on dicotyledonous weeds that the horses do not graze. © Břeněk Michálek



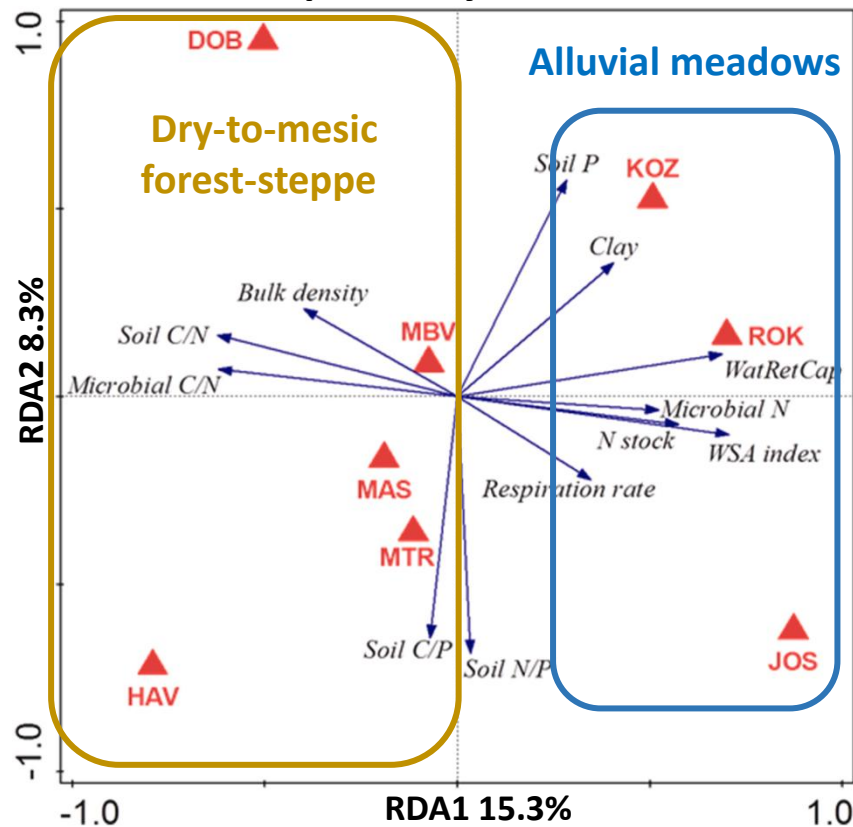
The benefits of ungulate grazing go far beyond supporting biodiversity... (data from 2020-2023)

TA CZ (SS03010232): Grazing of large ungulates as a tool for nature and landscape conservation: biodiversity and ecosystem services

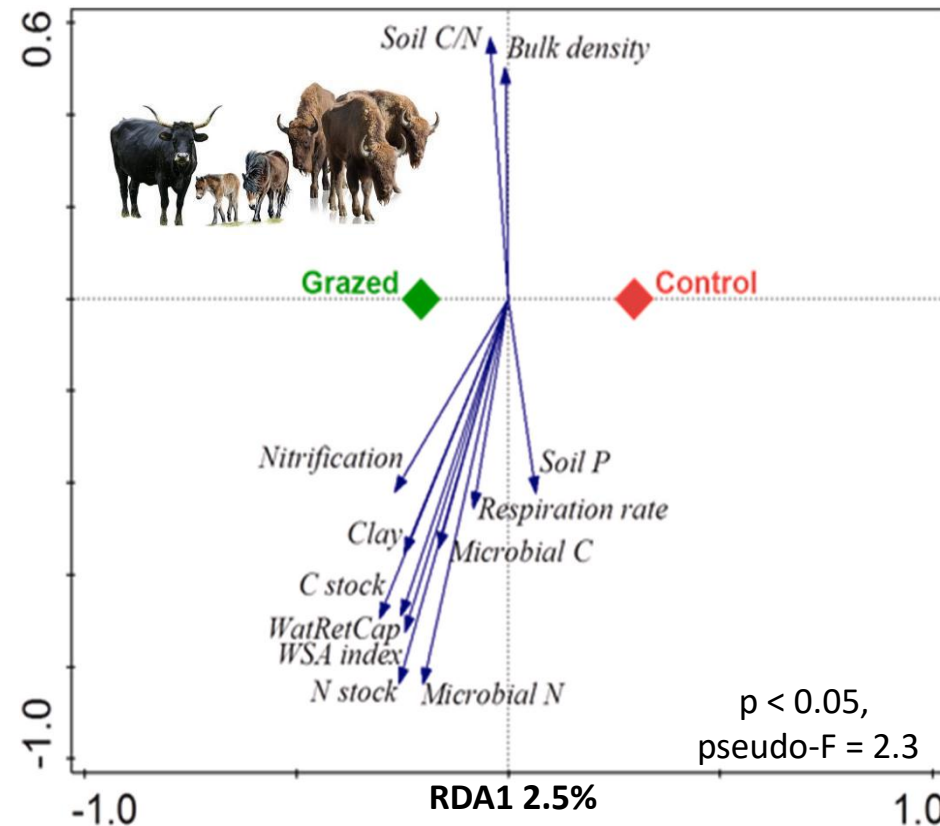


Grazing by large ungulates has a positive effect on soil properties...

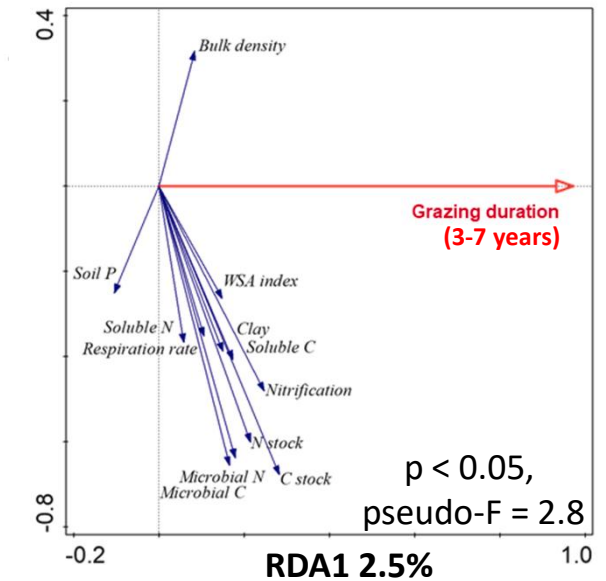
Site-specificity of the soils



Grazed and control sites



Effect of grazing duration

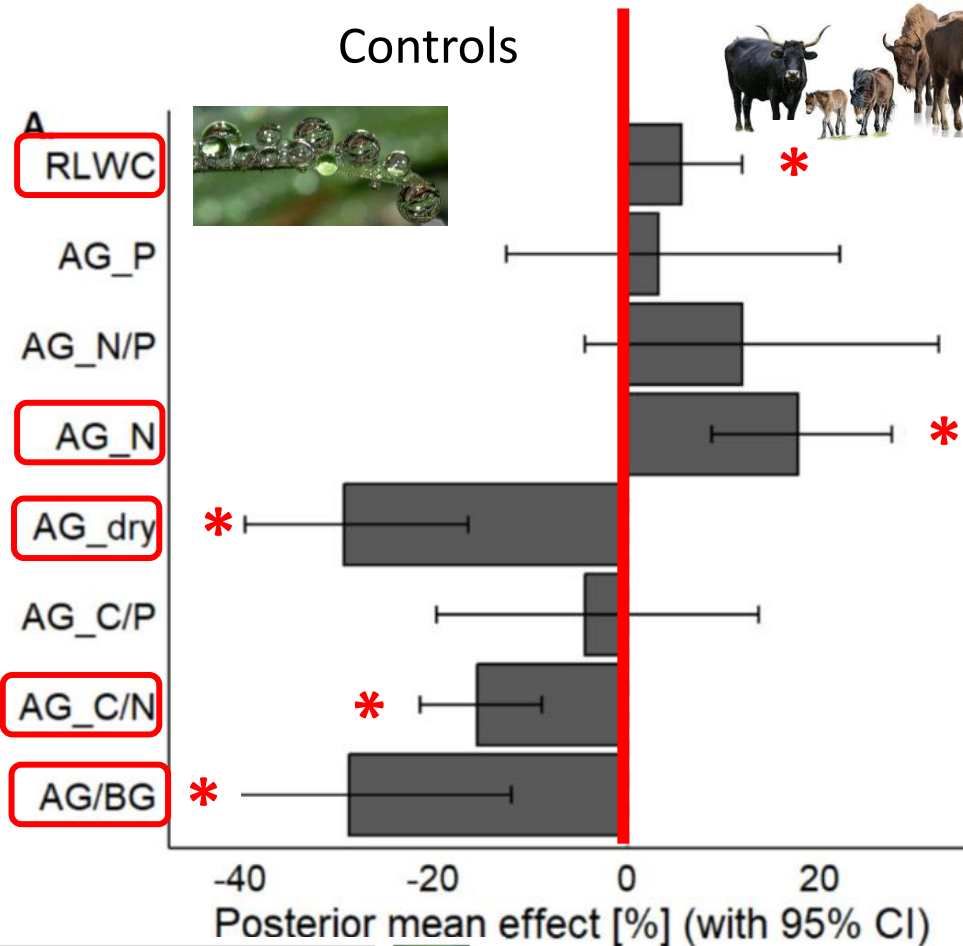


Natural year-round grazing of large ungulates:

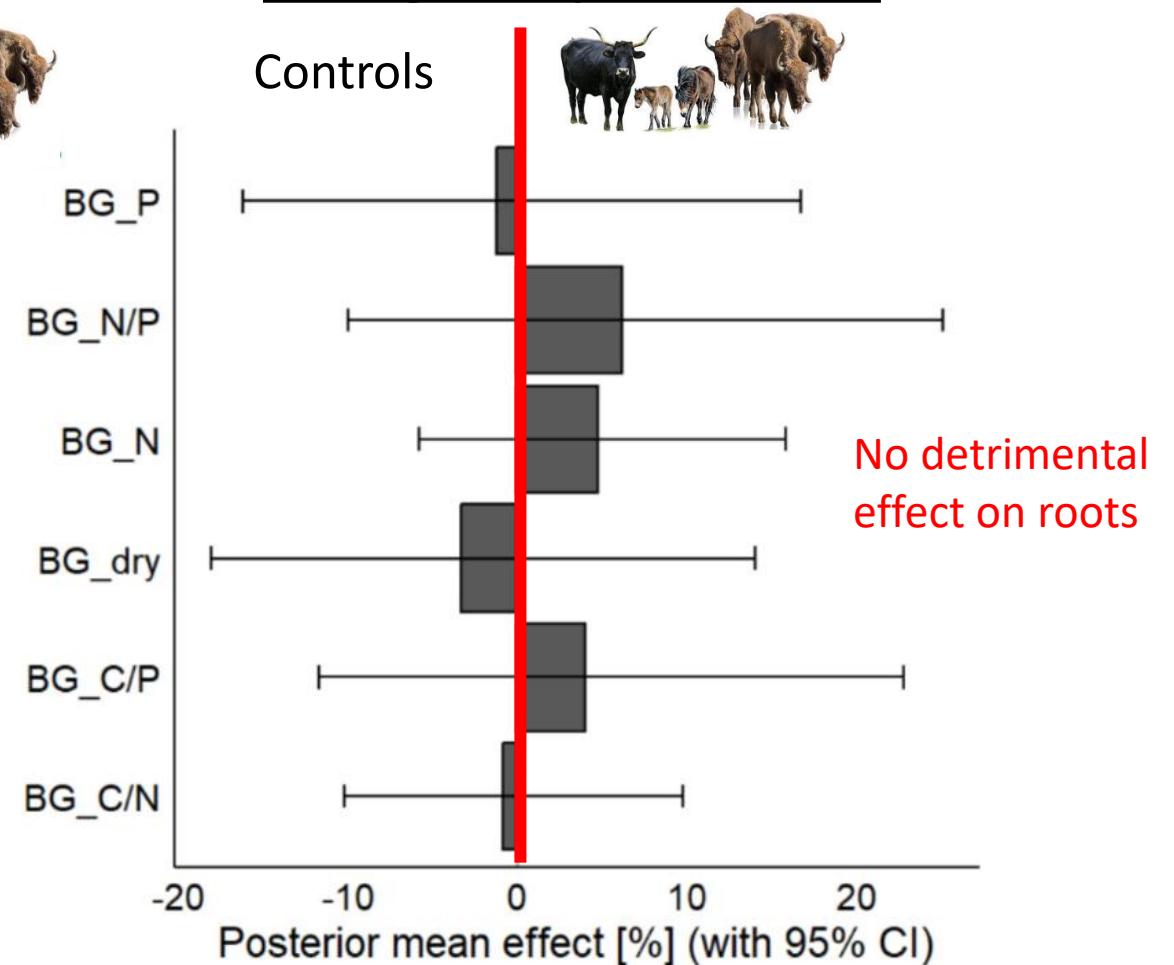
- increases the total stock of soil organic matter (and soil microbial biomass)
- improves soil water holding capacity (and actual soil water availability)
- improves nitrogen availability to plants
- reduces the amount and availability of phosphorus - the proposed solution is to leave carcasses on the site
- the positive effects on soils increases with the duration of grazing

...and increased soil N and water availability were reflected in higher-quality fodder

Aboveground plant biomass



Belowground plant biomass



Natural year-round grazing of large ungulates:

- decreases AG biomass but not BG biomass
- increases N and relative water content in biomass = better nutritional character for animals
- more efficient P uptake by roots
- connect and tighten the plant- microbe-soil activity relationships



Summary

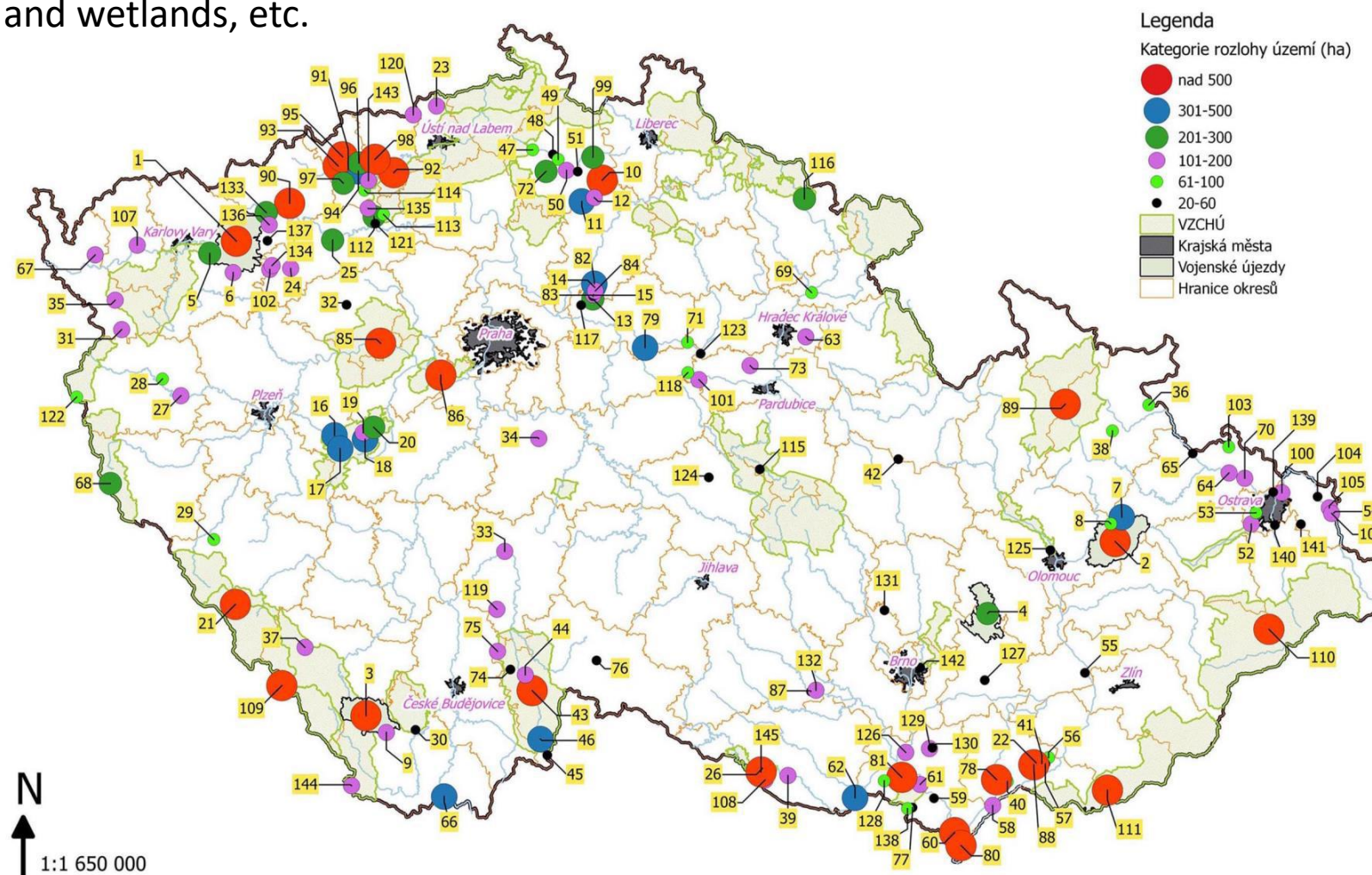
- **Grazing by „wild“ large grazers (trophic rewilding)**

→ nature-based, cost-effective, sustainable care for large areas, based on the restoration of trophic interactions and fostering self-regulating resource-grazer processes

→ a tool for ecological restoration and improving soil quality in landscapes damaged by mining or intensive use with positive biodiversity, socio-economic and climatic effects

Possible implementation of trophic rewilding to solve environmental problems

- former military areas
- areas damaged by mining - slag heaps, spoil tips, open pits/mines
- open areas, forest -steppe and sparse forests in marginal areas and protected areas
- floodplain meadows and wetlands, etc.



[Jirků, Dostál a kol., 2022: Přirozená pastva velkých býložravců: Metodika přírodě blízkého a dlouhodobě udržitelného managementu nelesních a lesních stanovišť](#) (certifikovaná metodika MŽP)

Thanks for attention



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