

Is there any relationship between long-term land cover changes in military training areas and present natural biotopes? Case studies from the Czech Republic

Hana Skokanová, Marek Havlíček
Silva Tarouca Research Institute, Brno, Czech Republic

Research questions

1. How has land cover changed in researched military training areas (MTA) over the past 190 years?
2. Are present natural biotopes associated with no changes in land cover?



Existing/recently abandoned MTAs in the CZ

Hradiště

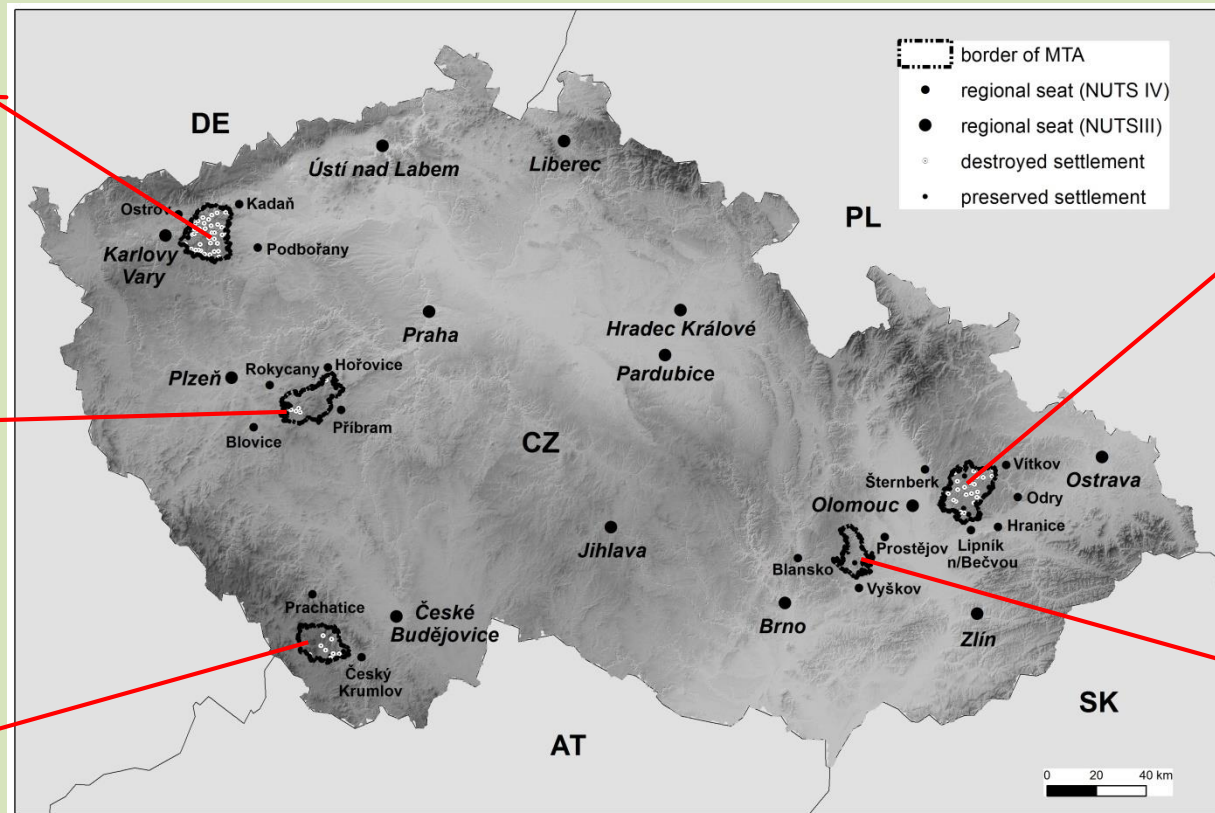
Established 1953
All-military training
332 km² (281 km²)

Brdy

Established 1926/1952
Artillery, aerial shooting range
260 km² (5 km²)

Boletice

Established 1948
All military training
220 km² (165 km²)



Libavá

Established 1947
Tanks, artillery, infantry, aerial shooting range
327 km² (236 km²)

Březina

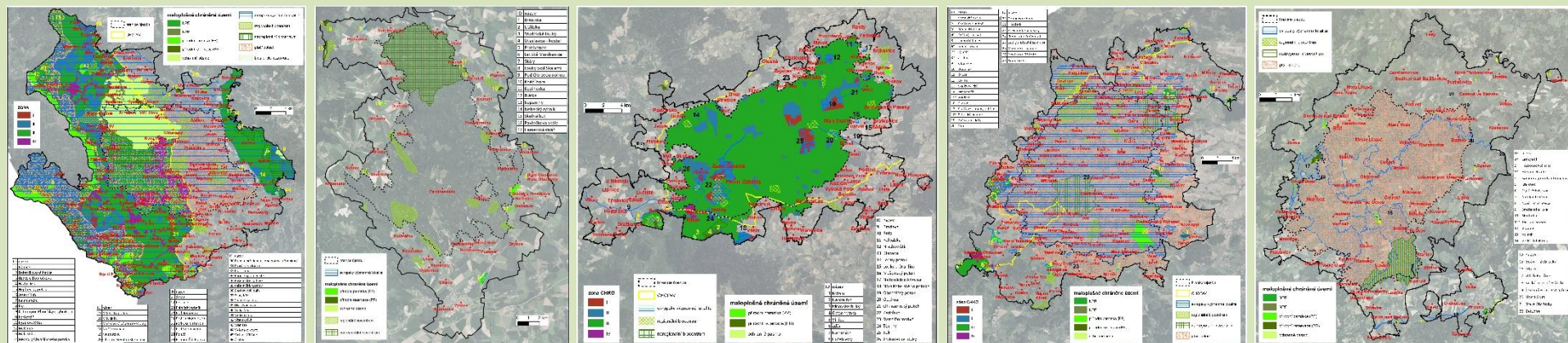
Established 1936/1953
Preparation and training of specialists
158 km² (150 km²)

In 2016 – five MTAs underwent optimization resulting in:

- Reduction of their size (5-28%)
- Creation of 6 new municipalities (3 in Libavá, 2 in Hradiště, 1 in Boletice)
- Creation of protected landscape area (PLA) Brdy

Existing/recently abandoned MTAs in the CZ

- From midland regions (400-599 m ASL) – Březina, Libavá, Hradiště, through upland regions (600-800 m ASL) – Brdy, to mountain regions (800> m ASL) – Boletice
- Cambisols dominate, podzols (Boletice), pseudogleys (Brdy)
- Potential vegetation: herb-rich beech forests (Libavá, Hradiště, Boletice), acidophilous beech & silver fir forests (Brdy), woodrush- & silver fir forest (Březina), oak-hornbeam forest (Březina, Hradiště)
- Predominantly German population expelled after 1945 – establishment of MTAs (→ further population decline) – remaining population connects with military; Březina – population only after 1961
- Protected areas: Březina 0 %, Boletice 100 % (NATURA 2000, part of PLA Šumava), Brdy 100 % (PLA, some NATURA 2000 sites), Hradiště 100 % (NATURA 2000, some small protected areas), Libavá 100 % (NATURA 2000, some small protected areas)



Materials and methods

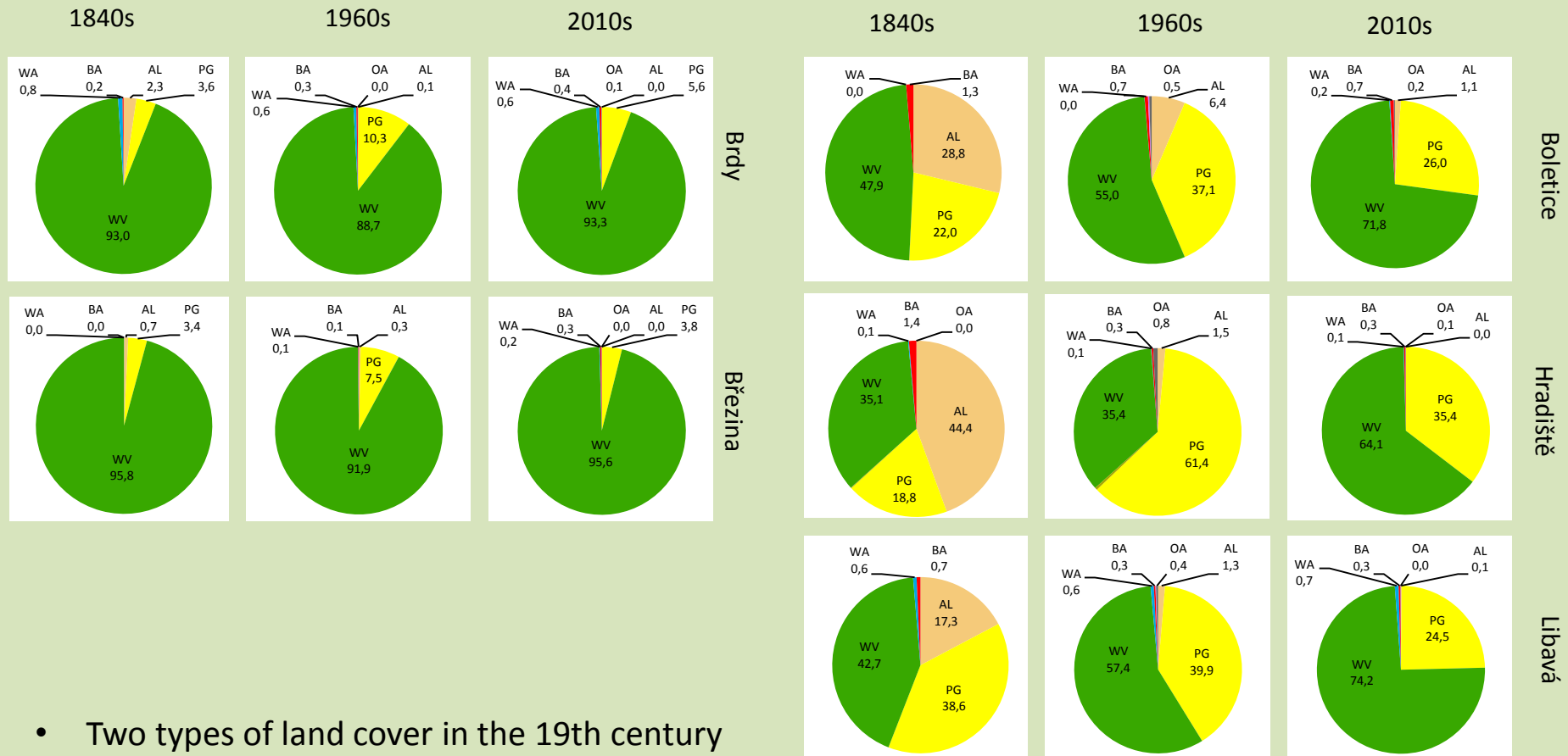
Land cover data & analyses

- 8 digital land cover layers from 1840s, 1870s, 1940s, 1950s, 1960s, 1990s, 2000s, 2010s
- On-screen digitization
- 6 land cover classes: arable land (AL), permanent grassland (PG), woody vegetation (WV), water areas (WA), built-up areas (BA), other areas (quarries, ruins, impact areas; OA),
- Minimum mapped unit 0.8 ha
- Overlay of layers → plots with no changes; focus on woody vegetation, permanent grassland and water areas

Biotope data & analyses

- Digital layer of biotope mapping in CZ (NCA, 2016) – 2000-2004, update 2007-2016
- Minimum mapped unit 0.15-0.25 ha
- 6 groups: forests & shrubs; grasslands; water affected biotopes (wetlands, springs, water areas); mosaic, anthropogenic biotopes; (no data)
- Overlay with landcover layers

Land cover development – general trends

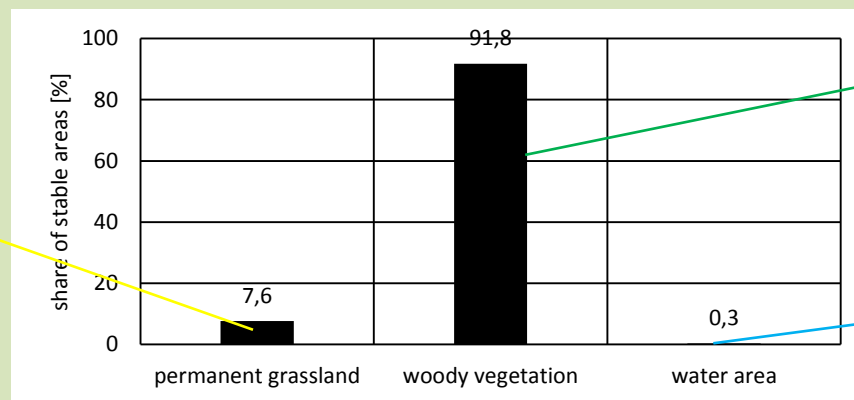


- Two types of land cover in the 19th century
 - predominant forest: Březina & Brdy
 - predominant open landscape (arable land, permanent grassland) – Boletice, Hradiště, Libavá
- After establishing MTAs, transformation of arable land to permanent grassland, abandonment of settlements and their transition to ruins, spread of woody vegetation; in case of Brdy & Březina clearance of woody vegetation for military purposes
- Nowadays – spread of woody vegetation

Land cover development and plots with no changes

55 % of woody vegetation, grassland and water plots without changes

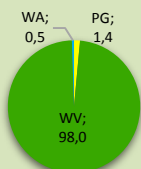
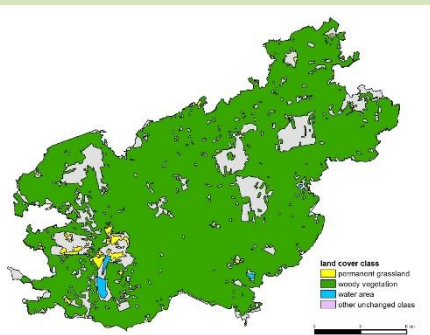
Boletice, Hradiště



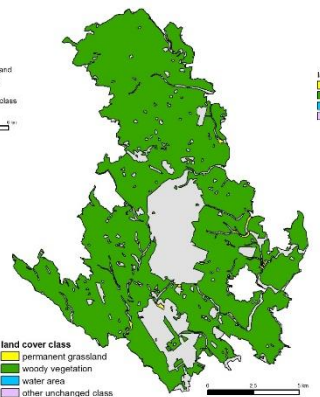
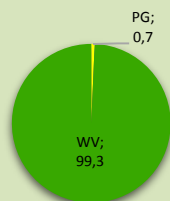
Březina, Brdy

Boletice, Brdy

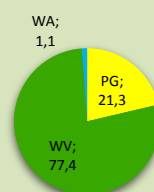
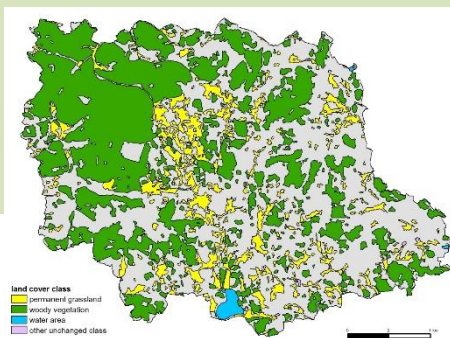
Brdy



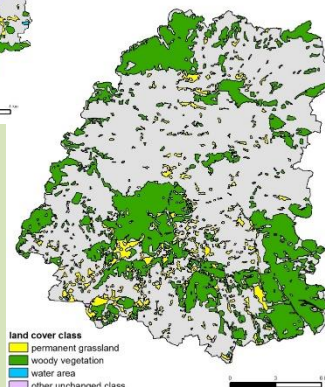
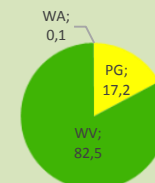
Březina



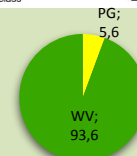
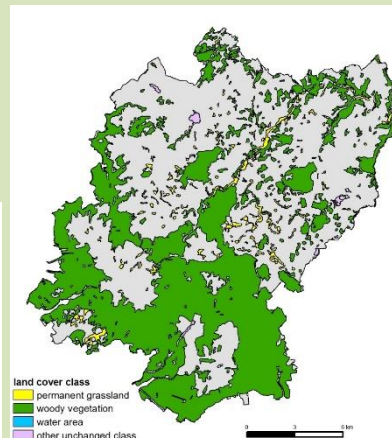
Boletice



Hradiště



Libavá

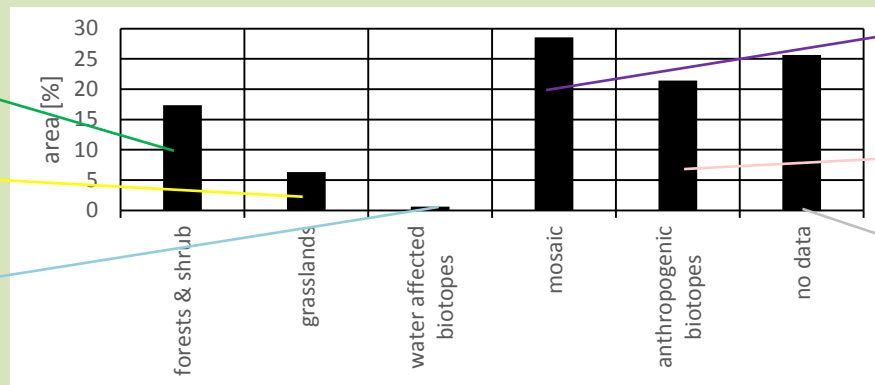


Biotope data

Boletice, Březina

Hradiště, Boletice

Boletice



Hradiště, Březina

Boletice, Březina

Brdy, Libavá

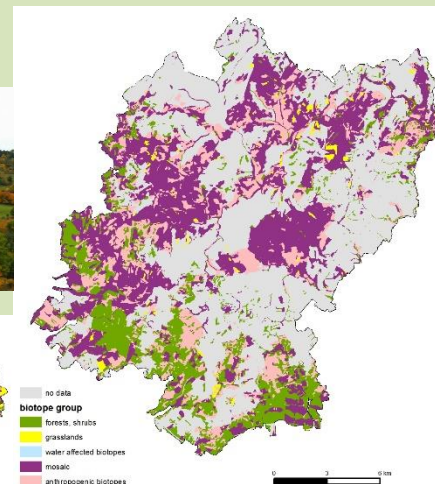
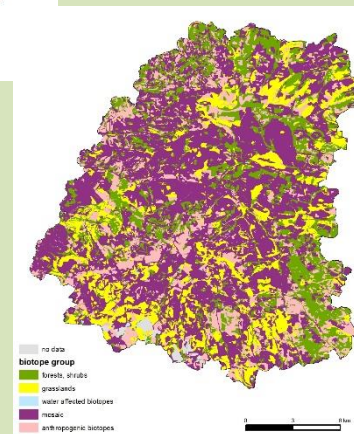
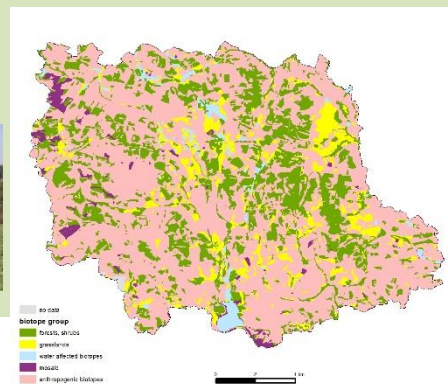
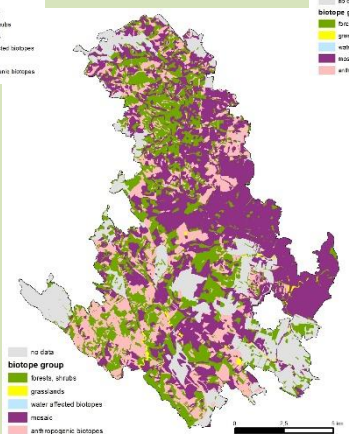
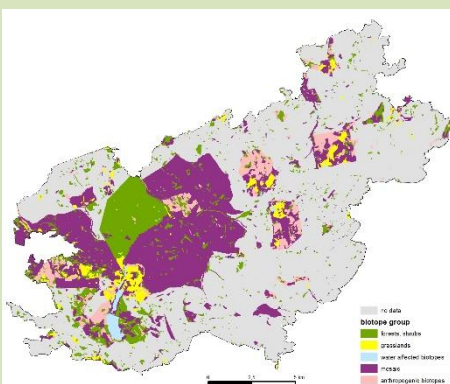
Brdy

Březina

Boletice

Hradiště

Libavá



Biotope data vs. no change

Woody vegetation

- Unchanged LC 92 %
- Mapped biotopes 65 %
- Natural biotopes 26 %
- Only forest biotopes 59 %
 - Natural 23%
 - Anthropogenic 36 %

Permanent grassland

- Unchanged LC 8 %
- Mapped biotopes 98 %
- Natural biotopes 56 %
- Only grass biotopes 77 %
 - Natural 51 %
 - Anthropogenic 26 %

Water areas

- Unchanged LC 0,3 %
- Mapped biotopes 89 %
- Natural biotopes 93 %
- Only water biotopes 59 %
 - Natural 89 %
 - Anthropogenic 0 %



Final remarks

- Quite a lot of unchanged plots despite tumulus development in the MTAs
→ due to military activities that concentrate on rather small areas
- Three MTAs (Brdy, Libavá, Březina) are not sufficiently covered by biotope data
 - restrictions in biotope mapping due to military regime led to estimation of high proportion of anthropogenic biotopes on the basis of other sources (not field mapping)
 - Biotope mapping focused mainly on protected areas and areas that would be part of the NATURA 2000 network – only Boletice completely belong here; Březina has no protected areas; Brdy – when the mapping occurred, no hints on establishing PLA – it will probably change
- Specific category of „mosaic“
 - In some cases (Hradiště, Libavá) quite well shows vegetation succession of formerly open landscape
- Majority of unchanged plots are not covered by natural biotopes
→ Predominantly represented by regularly managed forests, namely spruce, therefore often not mapped

Thanks for listening!

More info at: <https://www.researchgate.net/project/Military-training-areas-as-a-transformation-territory-scenarios-of-impacts-of-their-optimization-on-society-and-landscape>