

Five military training areas – five different trajectories of land cover development? Case studies from the Czech Republic

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Research questions

1. Has land cover developed differently in each of researched military training areas (MTA)?
2. If so, are the differences statistically significant?
3. What might be causes of these differences?
4. What happens in the future?



Existing/recently abandoned MTAs in the CZ

Hradiště

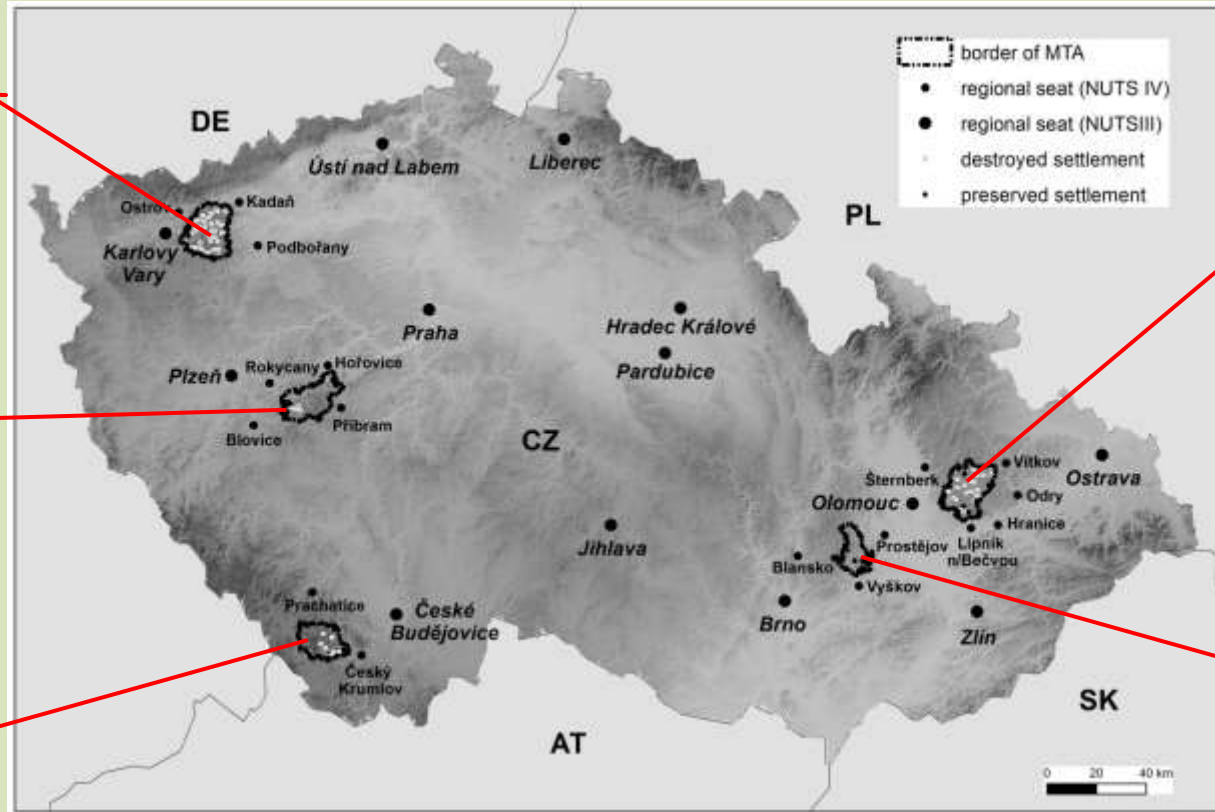
Established 1953
All-military training
332 km² (281 km²)

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)

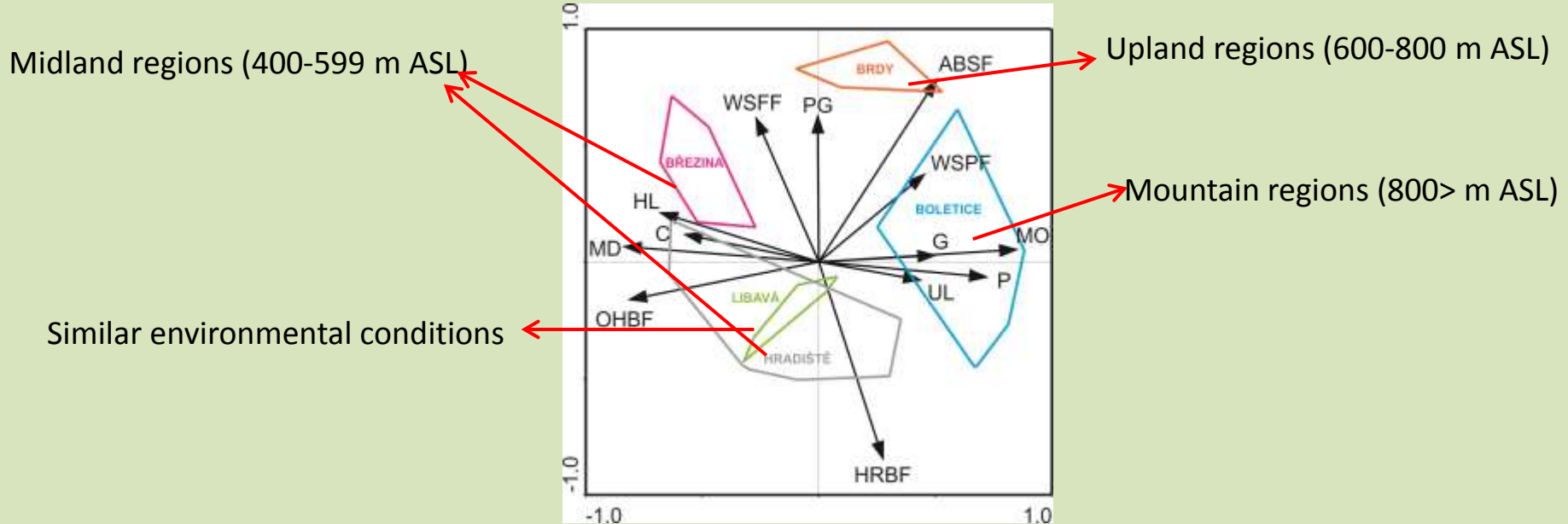
Březina

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

In 2016 – five MTAs underwent optimization resulting in:

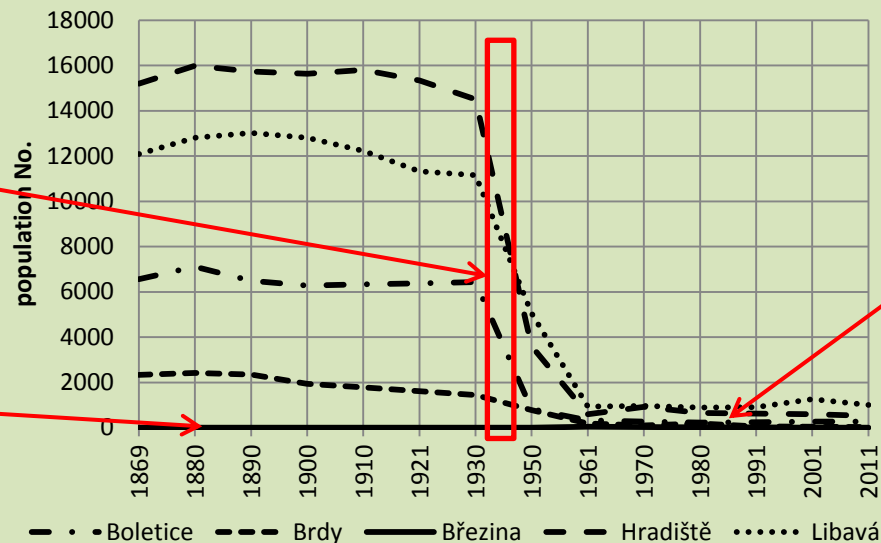
- Reduction of their size (5-28%)
- Creation of 6 new municipalities (3 in Libavá, 2 in Hradiště, 1 in Boletice)
- Creation of protected landscape area (PLA) Brdy

Existing/recently abandoned MTAs in the CZ



Predominantly German population – expulsion after 1945
Establishment of MTAs

Březina – no permanent inhabitants until 1961



Military personel, people connected with military and MTAs (e.g employees of Military Forests and Farms authority)

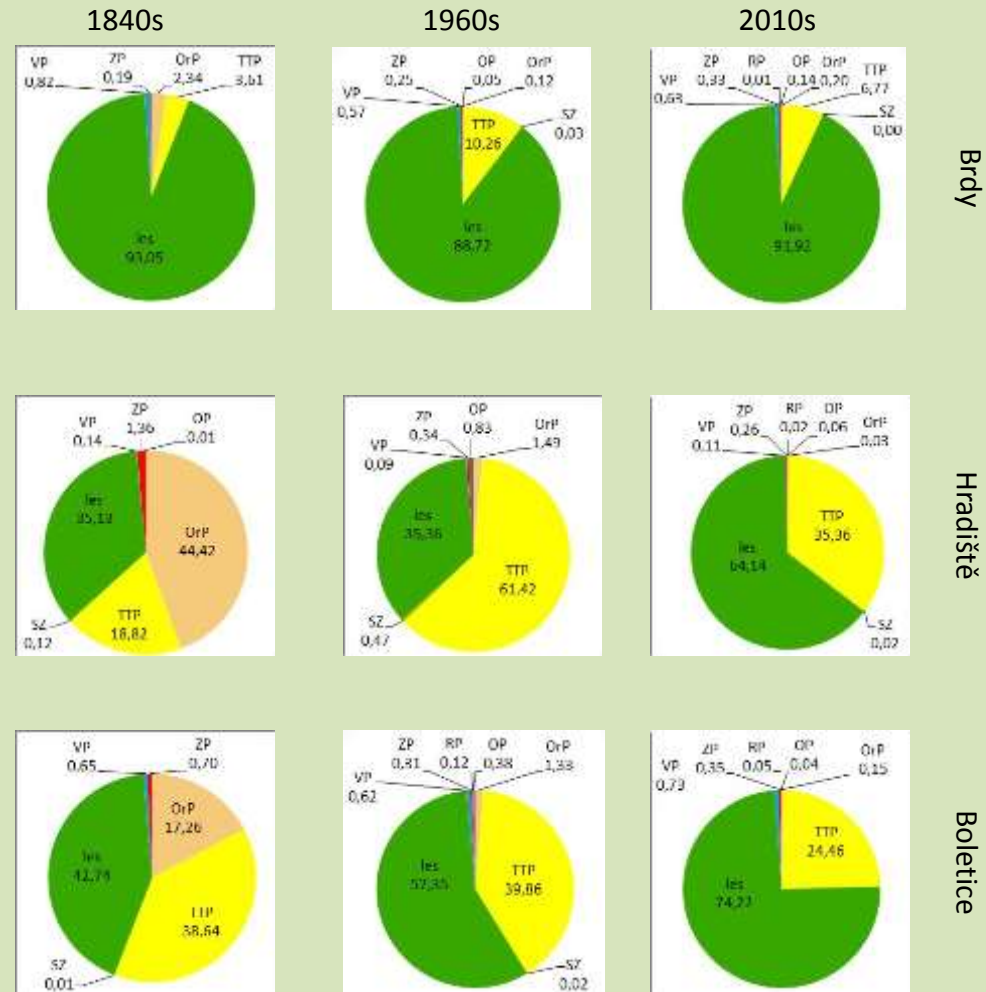
Materials and methods

period abbreviation	source	scale	period captured
1840s	2nd Austrian Military Survey	1:28 800	1836-1846
1870s	3rd Austrian Military Survey	1:25 000	1876-1879
1940s	revised Austrian Military Survey	1:25 000	1922-1938
	Mestischblatten	1:25 000	1944
	Provisional Czechoslovak Military Survey	1:20 000	1928-1930
	Definitive Czechoslovak Military Survey	1:20 000	1948
1960s	Czechoslovak military topographic maps	1:10 000	1955-1966
1990s	Czechoslovak military topographic maps	1:25 000	1988-1995
2010s	orthophoto	1:5000	2014

- On-screen digitization
- 8 land cover classes: arable land, permanent grassland, orchards, woody vegetation, water areas, built-up areas, other areas (quarries, ruins, impact areas)
- Minimum mapped unit 0.8 ha
- Principal component analysis (PCA) identified differences in land cover among the MTAs
- ANOVA revealed significant changes in the development of land cover
- Tukey's post hoc identified where these changes occurred

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



Land cover development and significant changes

1840s – 1870s

- Březina & Brdy – high amount of woody vegetation (WV)
- Rest – predominance of open landscape

1960s

- Big drop of AL, extensive grassing, abandonment of settlements → ruins

1940s

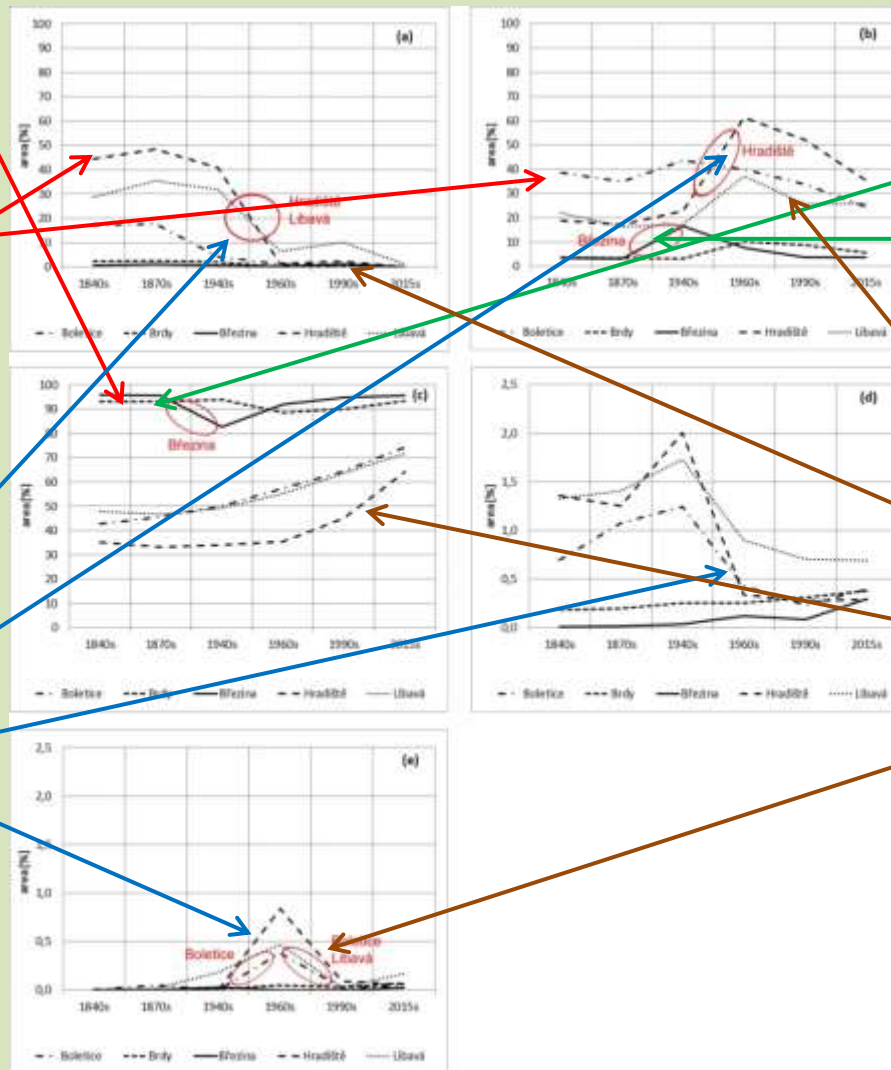
- Březina – large clear cut of WV – due to military camp Dědice → significant increase in PG

1990s

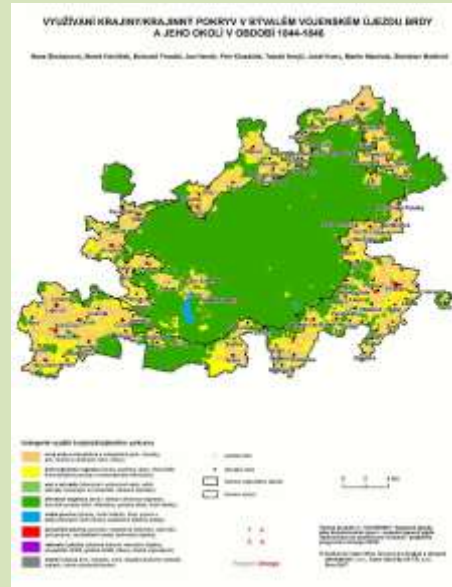
- Decline of PG
- Almost non-existent AL (except Libavá)
- Increase of woody vegetation
- Disappearance of ruins

2010s

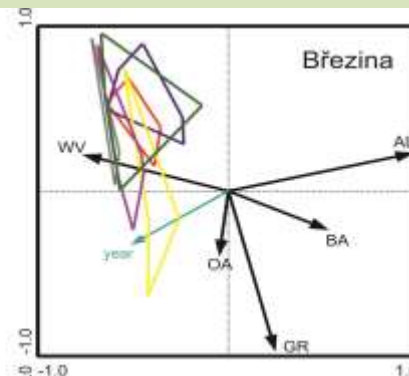
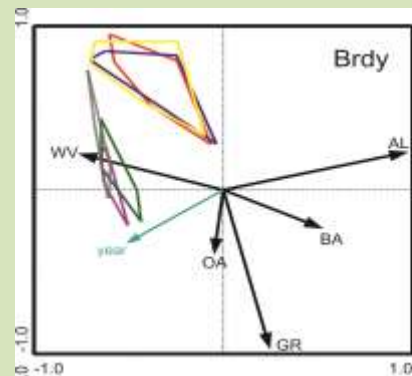
- Continuous process from 1990s



Comparison of land cover development - Brdy, Březina



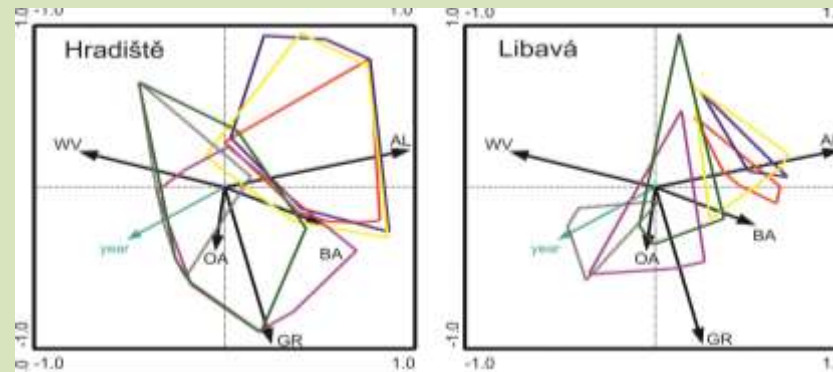
Different environmental conditions
Similar trends



Comparison of land cover development – Hradiště, Libavá



Similar environmental conditions
Similar trends



Population changes and land cover

	Boletice	Brdy	Březina	Hradiště	Libavá
arable land	0.54	0.95	0.11	0.34	0.85
permanent grassland	0.49	0.03	0.02	-0.15	-0.21
woody vegetation	-0.63	-0.38	-0.04	-0.19	-0.63
built-up area	0.71	0.22	0.37	-0.03	0.71
other area	-0.20	-0.25	-0.07	-0.12	-0.26

- Population increase → increase in arable land
- Population increase → increase in built-up areas
- Population increase → decrease in woody vegetation
- Population increase → increase in permanent grassland – mainly Boletice

Causes of land cover differences

- Different environmental conditions
- Early establishment of military camps in Brdy & Březina
- Different population density – low for Brdy & Březina, high for Libavá & Hradiště
- Similar land cover during the 19th century (Brdy, Březina vs. Libavá, Hradiště)

Potential future development

- Optimization in 2016 → reduction of size, establishment of PLA Brdy
→ increase in military activities in the remaining parts
→ Restricted landscape management by managing authorities
 - ↙ further afforestation
 - ↘ deforestation of the actively used training sites
- In newly accessible territories
 - promotion of recreation and tourism (remnants of former settlements, high biodiversity, „unspoiled“ nature)
 - sustainable/ecological agriculture, focusing namely on cattle breeding (continuity)
 - establishing game reservation (deer, European bison, aurochs, wild horses) – already occurred in other former MTAs (Ralsko, Milovice)

Potential future development



Potential future development



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***Abstract:** The paper focuses on land cover development in five military training areas (MTAs) in the Czech Republic during the past 180 years and tries to find answers to causes of similarities or differences of this development. Land cover development was researched on the basis of old military topographic maps and aerial photographs. The results show that there are two groups of MTAs that show similarities in land cover development up to the 1960s. These are Březina and Brdy, and Hradiště and Libavá. In the first group, woody vegetation dominated while in the second group open landscape was prevalent. Also the first group was characterized by little population and establishment of military camps already in the 1920s-1930s while the second group was characterized by rather dense population and similar environmental conditions. All MTAs experienced drop of population after WWII which resulted in drop of built-up area and open landscape and increase in woody vegetation area. With the optimisation of MTAs the parts where intensive military training occurs will likely stay preserved while the rest of the areas will be used for ecological agriculture or so called soft tourism.*

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>

Thanks for listening!