CONNECTIONS BETWEEN DEVELOPMENT OF LANDSCAPE AND SETTLEMENT STRUCTURES IN THE CZECH AUSTRIAN CROSS-BORDER REGION „THE NOVOHRADSKÉ MOUNTAINS" – RESEARCH PROJECT AND FIRST RESULTS

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Abstract: *Actual dissimilarities in the horizontal landscape structure and in the character of settlement system between the Czech and Austrian parts of the model cross-border region „the Novohradské hory" are given by different social development (development of settlement, population, agriculture, forestry, ...) after the Second World War, because the initial status in the year 1945 was similar long both sides of the Czech Austrian state border.*

Objectives of the research described in this article are mainly analysis of the population development between 1869 – 2001 in the seats of different types, these seats are situated in the model Czech-Austrian cross-border region „the Novohradské Mountains", and analysis of development of horizontal landscape structure (land use/cover change) in different territorial types inside the model region during the 20th century, and furthermore detection and explanation of connections between development of settlement and landscape, and also a comparision of our results with the development tendencies in other marginal regions of Czechia and Europe.

Another research aim is an evaluation of impact of changes in land use and landscape structure (also of changes in settlement) to the biodiversity and ecological landscape stability. Presented research project has an interdisciplinary character (social geography, physical geography, landscape ecology, agricultural sciences, history), European dimension (cross-border regions) and its results are exercisable in issues of regional policy and regional planning of marginal mountainous and highland regions.

In this article, we present – besides theoretical research grounds, bibliographical overview, data sources, aims and hypotheses – research results that relate to possible ways of evaluation plot types development in types of Cadastral Units and of evaluation development of number of inhabitants in seats situated in the Czech part of the study model region. Also our following article which covers more detailed analyses, statistical database evaluation, explanation and comparison of detected facts in the development of population and seats on the Czech and Austrian sides of the cross-border region, issues from here described research.

Key words: *development of land use and land cover, development of population, rural settlement system, mountainous cross-border regions, the Novohradské Mountain*

Introduction

After crossing the frontier from the Czech Republic to Austria or Germany in the area of border mountain ranges, also a layman can perceive essential differences in the character of actual rural settlement (e.g. population density, number, area and visual stability of seats) and

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in the character of surrounding culture mountainous and highland landscape (proportion of plot types, character of land cover spot patterns, care about plots, occurrence of uncultivated meadows and pastures) along both sides of the frontier. Actual double form of the rural settlement and culture landscape in these areas reflects different social and political development on the opposite sides of the frontier in the period since the Second World War till now, because the initial status of the settlement and landscape before the war did not show major differences.

In the present era we come to be a part of the „integrated Europe", and boundaries between states slowly stop to fulfill their function. Eventually, the present different social and economical system would level, and that would turn out into rural settlement and land use and landscape character of the above mentioned areas. The question rises on what line will develop settlement and landscape of mountainous and highland border areas of the Czech Republic with Austria and Germany.

Monitoring of changes in the horizontal structure of culture landscape during a long historical period or in a short time of some years belongs to the frequent research themes in a field of landscape ecology and historical geography. Programs of scientific international conferences organized, for example, by the IALE (International Association for Landscape Ecology), the ESEH (European Society for Environmental History) or the IGU LUCC (International Geographical Union, Study Group on Land Use and Land Cover Change) exemplify this meaning. Programs of these conferences are, among other, specialized in registration of land and plots use changes, in changes of landscape mosaic, in analyses of driving forces that cause these changes, and also in ecological, social and environmental impacts of detected changes, for example, influence of them on the ecological landscape stability, biodiversity, water regime, processes of energy and material flow in landscape.

In principal, two possible data sources for analysis of outer (horizontal) landscape structure changes exist, strictly speaking there are two possible approaches for analyses of this structure. The first one (land use change analysis) utilizes data from the historical and actual land ownership registers where are documented beside the owner also records about plot types and plot areas. The second one (land cover change analysis) comes out from the analysis of historical and current aerial photos or satellite images or maps. Some authors in their research succeeded to connect bouth data sorts, i.e. bouth methods for analysis of changes in the horizontal landscape structure (Lipský, 1995; Cousins, 2001).

Biobliographical overview

A lot of papers dealing with analyses of horizontal landscape stucture development in different regions within states were published in scientific journals. In that case e.g. García-Ruiz et al. (1996); Kučera, Guth (1996); Fjellstad, Dramstad (1999); Moreira, Rego, Ferreira (2001); Novotná (2000); Olsson, Austrheim, Greene (2000); Zemek, Heřman, Bufková (2001) or Kubeš, Mičková (2003) attended to the mountainous and highland European regions. But none of them observed development in cross-border regions, they was not engaged in the mutual relationship between settlement and landscape, and also in the majority of these articles the time period for evaluation of changes was relatively short. There are methodologically inspirative primarily such analyses of land cover development that are not describing only differences between initial and actual status, but that they are monitoring character of the change (what has turn into what), so they help to detect causes of land cover changes, e.g. White, Mladenoff (1994); Hulshoff (1995); Poudevigne, Alard (1997); Pärtel, Mändla, Zobel (1999); Cousins (2001). In the renowned journals the articles analysing land use/cover development

of mountainous and highland regions in Germany or Austria, exception Bastian (1987), have been missing, indeed the authors from these states assist at the conferences dealing with this topic (e.g. IALE).

-Articles describing depopulation development in rural mountainous and highland Central European regions is possible to find in older geographical literature (by us Korčák, 1929; Korčák 1972; Pohl (Doberský), 1932) or in some recent pilot project composed for the needs of regional planning and focused at stabilization of problem regions. Problems of population development is not broadly solved in the current Czech, Austrian or German scientific geographical literature, publications dealing with this theme are published only exceptionally – in Austria e.g. Tazi-Preve, Kytir, Lebhart, Münz (1999), or some articles in regional scientific journal – Hitz (1994), Klein (1992). The articles from Huba (1989) and Huba (1990) are dealing with this topic in Slovakia.

Series of current historical or politological papers and treatises discuss the dislodging of German inhabitants from the area of the Czech border mountain ranges. But, they describe only a short time period between 1945-1950, they do not look at connections in settlement and landscape changes (landscape for certain time persists in its original form), they do not accordingly operate with the space, and a tendentious (pay-offing) approach sometimes appears in these articles.

Contemporaneous small knowledge of settlement and landscape transformation in the border mountainous and highland Central European regions, interdisciplinary character of the presented project, its bilateral and European dimension, an interest in the results of the project from the community and bodies of the public administration by us and in the other side of the frontier, are factors which should significantly support realization of our project and its following practical utilization.

Model region, aims and research hypotheses

We realize the length research of settlement and landscape development in the model cross-border mountainous and highland region, which is located to the Novohradské Mountains and their Highland area and is limited by the seats Dolní Dvořiště, Kaplice, Trhové Sviny, Nové Hrady, Weitra, Langschlag, Kaltenberg, Freistadt (approximately 1400 km^2, 185 Cadastral Units and 443 seats). Working name of the model region is „the Novohradské Mountains".

Between main research aims belong: analysis of population development in seats of the study region since 1869 (in more datails since 1930) till 2001 (according to the particular population census), respectively in seats encountered in different physical- and sociogeographical conditions (I); analysis of horizontal landscape structure changes in the study region since the 1930 till now, according to the particular Cadastral Units that are encountered in different physical- and sociogeographical conditions (II); analyses of connections between population development in the seats and changes of the horizontal landscape structure in the Cadastral Units of the study region (III); comparision of our results with results of other, similar oriented researches and based on this comparision formulate prognosis of further population, settlement and landscape development in the monitored region (IV); inventory of some former and expected impacts of the population, settlement and landscape development in the mountainous and highland cross-border regions to the biodiversity, ecological landscape system, landscape scenery, recreation potential of landscape, socioeconomical conditions of people's life, etc. (V).

These several hypotheses relate with the research aims: it could be expected a greater increase of population number and a deterioration of demographical structure in smaller seats,

in the seats situated near the state border and farther from the border crossing, in the seats with more secluded position in the traffic and settlement systems, in the seats with smaller economic and service facilities systems and in the seats located in worse physical geographical conditions. Changes in the intesity of depopulation relate with changes in society (break years mainly 1938-1939, 1945-1947, 1969-1970, 1989). Differentiations in size, course and sometimes in the conditionality of depopulation exist between the Czech Republic on one hand and Austria on the other hand (I). We expect increase of meadows, pastures and mainly forest and on the contrary rather great decrease of arable land, furthermore enlargement of dispersed tree and shrub vegetation in the non-forest (open) landscape. But on the other hand we presume „croarseness" of landscape patterns. These processes will be more intensive in areas with more difficult physical- and sociogeographical conditions for agriculture production, and also in the Czech part of the study region. Some distinctions will exist between data about landscape structure detected from the aerial photos and field mapping (land cover) and data extracted from the land documentation and registry (land use). They will be given by different methodological approaches to the data gathering and by the behindhand recording of real changes in the horizontal landscape structure to the land registration (II). Withdrawal of inhabitants from the mountainous and highland borderland manifests in the landscape through the increase of agricultural utilization intensity that is post-manifested means increase of meadows, pastures, uncultivated grasslands, dispersed tree and shrub vegetation and forest areas. But also other processes influence this correlation, e.g. new agronomical practices, changes in the market with agricultural products, state agricultural policy, state policy towards rural and peripheral areas, increase of employment in agriculture, locally more or less favourable regional and local development activities, etc. (III). We suposse that in the „integrated Europe" development tendencies of settlement and landscape use in analogous region types situated in particular coutries within the European Union will step by step level and rectify namely by influence of the common regional and ecological policy and by influence of common economic market. Such expected development could weaken actual trends of depopulation and extensification of agricultural landscape utilization whithin the border mountainous and highland areas of Czechia. Nevertheless, demographical development, people's interest and ask for living in the rural and peripheral areas and other social factors, set up in particular coutries and in the whole Europe, will be also play an important role (IV). Population drain and following extensifications of agriculture and of agricultural landscape structure in the mountainous and highland Czech border areas with Austria and Germany in the second half of the 20th century favourable affected biodiversity and landscape stability of these areas. According to the subjective and temporal perception of the aesthetic landscape qualities, it will not be aesy to evaluate impact of changes, in landcape structure into the landscape scenery. Downsizing of the population base undoubtelly has deteriorated service availability for remain inhabitants and also conditions for conservation and amplification of technical infrastructure in seats have been worsen (V).

Data and methodology

Research concept, methodology and database unwind from the above-written research aims and hypotheses. We analyse population development in seats according to the population census data. We had methodologically and practically modificated basic data about population and settlement into the homogenous form, so that it was possible to compare data from different statistical census and from both neighbouring countries (the Czech Republic and Austria). Landscape structure changes are evaluated primarily according to the changes of plot types

(land use) proportionwithin Cadastral Units. We especially watch changes in the proportions of forest, arable land, meadows and pastures, and in the rest plots. In the Czech part of the study region, for the database needs, we have spatially unified Cadastral Units (because of some changes in their delimitation between the years of monitoring), according to the reason compare data from different land registers and years.

In selected Cadastral Units and landscape segments we will get and compare, using GIS and remote sensing methods for analyses of aerial photos from different years, data about proportion of types of landscape cover elements (land cover) and data characterize mosaics of these elements. This more detailed and demanding research of changes in the horizontal landscape structure is needfull because it helps to show changes in spot patterns inside Cadastral Units and it also makes possible to find out basic character of such changes. Other data necessary for the research are extracted from basic maps and will be acquire by the field mapping and investigation of every Cadastral Unit and seat.

All modified input data are registered in electronic database system and they are evaluate among others by statistical methods, methods of mathematical statistics (factor analysis), of GIS and remote sensing and of the thematical cartography. During data analyses particular seats, Cadastral Units and subregions of model region and mainly different types of seats and Cadastral Units are compare. These findings are confronted with data form other areas. Results of the landscape changes analysis in the monitored mountainous and highland cross-border region „the Novohradské Mountains" will be commented on the base of land use development in the Czech Republic (see also Jeleček, 1995; Bičík, Götz, Jančák, Jeleček, Mejsnarová, Štěpánek, 1996).

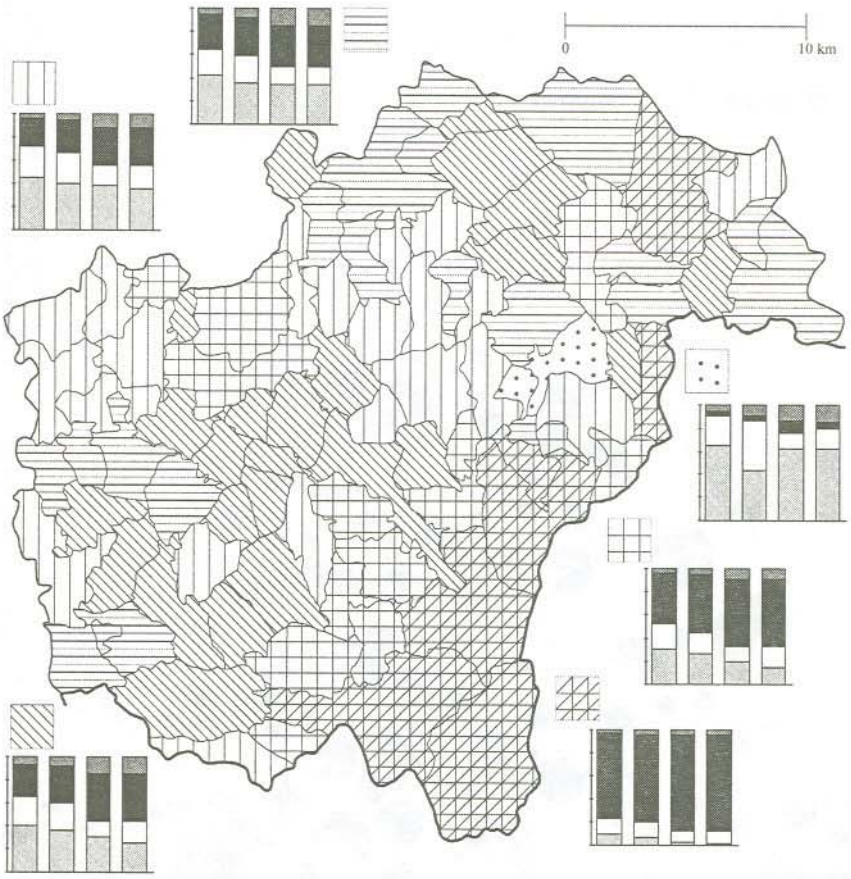
Degree of project completion and partial outputs

In the actual phase of project solving, we have completed database of population development in seats and we have also finished basic modification of this database – see the following paper Kubeš, Mičková (2005). First we created, based on statistical items from the population census in 1930 for the Czech side of the study model region „the Novohradské Mountains" and in 1934 for the Austrian part of the region, territorial structure of so called „geographical seats". It means seats which are in landscape separated and which are objectively existent settlement units (broad at actual basic territorial units level, indeed at status of settlement in the thirties of the 20th century). For each „geographical seat" (altogether 443 seats), data about number of inhabitants in particular years of population census in the period 1869-2001 were succesively collected and calculated. Mainly acquisition of data about seats that in the Czech side of the study area disappeared after 1947 and in further statistical census were not returned was very problematic.

We also aggregated items about structure of plot types in Cadastral Units of the study region in the years 1938, 1955, 1989, 2002 (respectivelly in the years 1955, 1989, 2002 for the Austrian part of the study region). Data for the Cadastral Units situated in the Czech part of the study region are now modified (elimination of changes in limitation of some Cadastral Units) and evaluated. One of possible evaluation of these data shows Map 1.

We had also visited all Cadastral Units and „geographical seats" along both sides of the state border in the research region and we compiled by visual evaluation for every seat number of marks. These marks mainly describes aesthetical-compositional features of built-up area and of surrounding landscape. Till the year 2007 should be, as we supposed, realized all main project aims.

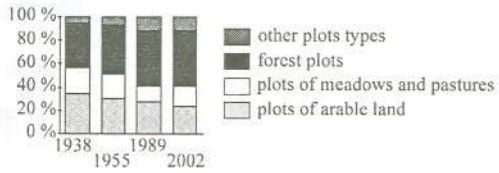
Map 1. Location of Cadastral Units types in the Czech part of the cross-border region "the Novohradské Mountains" and development of proportion of main plots categories in these types between 1938-1955-1989-2002



Types of CUs according to the proportion of agricultural and forest plots in the year 2002

- with strong proportion of agricultural plots
- with prevailed proportion of agricultural plots
- with balanced proportion of agricultural and forest plots
- with prevailed proportion of forest plots
- with strong proportion of forest plots
- with other proportion of plots

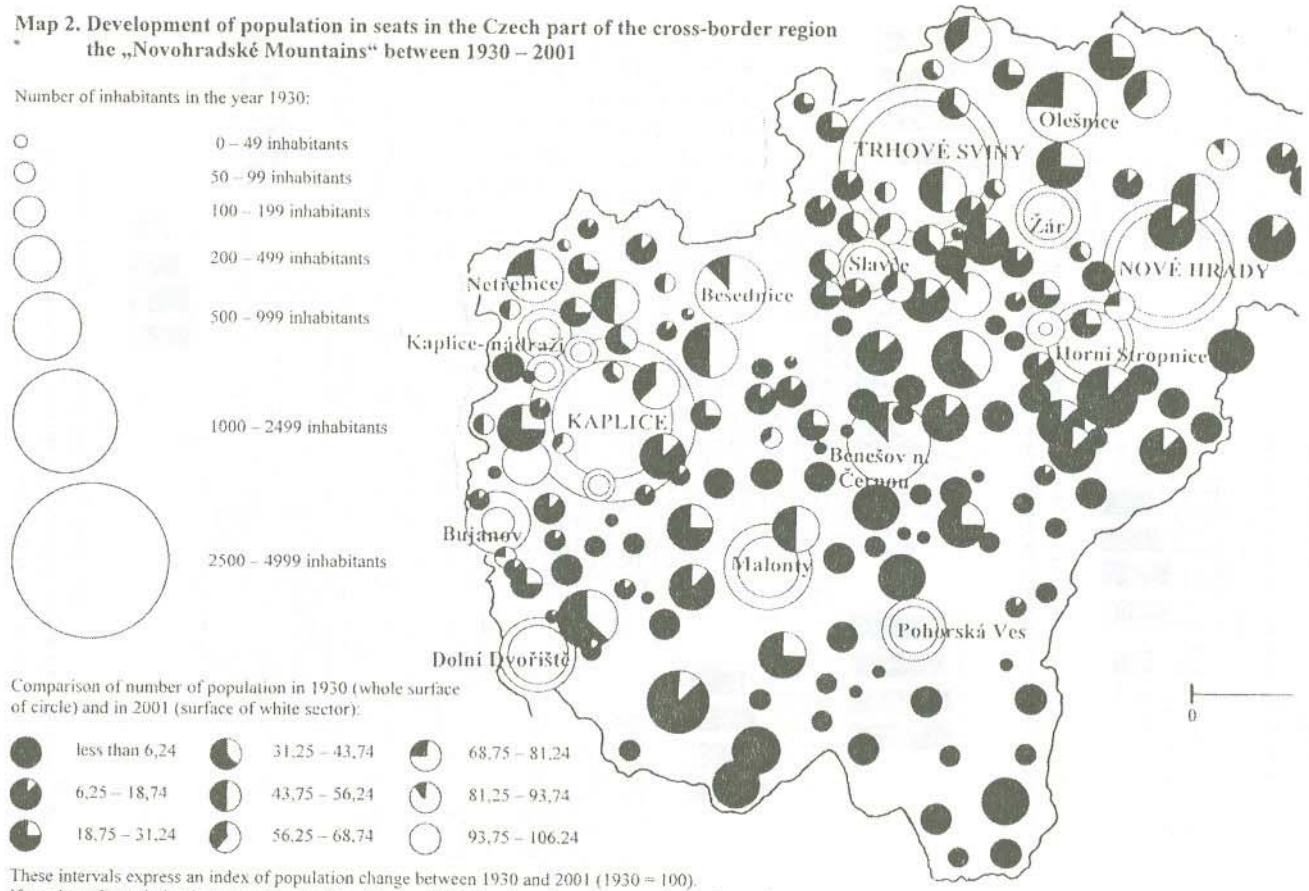
Development of proportion of main plots categories in CUs types between 1938-1955-1989-2002:



This graph shows data for all CUs as a whole.

- the Czech Austrian state border
- border of the Czech part of cross-border region (study area)
- border of Cadastral Units (CUs)

Map 2. Development of population in seats in the Czech part of the cross-border region the „Novohradské Mountains" between 1930 – 2001



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Summary

Současná rozdílnost horizontální struktury krajiny a charakteru osídlení v české a rakouské části přeshraničních horských a podhorských regionů je dána rozdílným společenským vývojem (vývojem osídlení, obyvatelstva, zemědělství, lesnictví, ...) těchto oblastí po druhé světové válce, neboť výchozí stav v roce 1945 byl na obou stranách hranice podobný.

Cílem v článku popsaného a námi řešeného výzkumu je zejména analýza vývoje obyvatelstva v sídlech různých typů, která leží v česko-rakouském přeshraničním regionu „Novohradské hory", mezi lety 1869 – 2001, analýza vývoje horizontální struktury krajiny (land use/cover changes) v různých typech území uvnitř tohoto regionu v průběhu 20. století, dále hledání a vysvětlování souvislostí mezi vývojem osídlení a krajiny a také srovnávání předchozích zjištění s vývojovými trendy v dalších periferních regionech Česka a Evropy (konfrontace s jinými podobnými výzkumy). Cílem výzkumu je i hodnocení dopadů změn ve využívání a struktuře krajiny (a i změn v osídlení) na biodiverzitu a ekologickou stabilitu krajiny. Výzkumný projekt má interdisciplinární charakter (sociální geografie, fyzická geografie, krajinná ekologie, zemědělské vědy, historie), evropskou dimenzi (přeshraniční regiony) a jeho výsledky naleznou v praxi uplatnění v problematice regionální politiky a regionálního plánování periferních horských a podhorských území.

V článku předkládáme – kromě teoretických východisek výzkumu, základní literatury, charakteristiky řešeného území, datových zdrojů, cílů a hypotéz – výsledky výzkumu, které se týkají možných způsobů hodnocení vývoje druhů pozemků v typech katastrálních území a vývoje počtu obyvatel v sídlech v české části řešeného modelového regionu. Ze zde popsaného výzkumu pak vychází také náš následující článek, který pak obsahuje podrobnější analýzy, statistické vyhodnocení datové základny, vysvětlení a porovnání zjištěných skutečností ve vývoji obyvatelstva a sídel v české i rakouské části přeshraničního regionu.

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