GEOGRAFIE – SBORNÍK ČESKÉ GEOGRAFICKÉ SPOLEČNOSTI
ROK 1996 • ČÍSLO 2 • ROČNÍK 101

IVAN BIČÍK,
ANTONÍN GÖTZ, VÍT JANČÁK, LEOŠ JELEČEK,
LUCIE MEJSNAROVÁ, VÍT ŠTĚPÁNEK

LAND USE/LAND COVER CHANGES IN THE CZECH REPUBLIC 1845 – 1995

I. Bičík, A. Götz, V. Jančák, L. Jeleček, L. Mejsnarová, V. Štěpánek: *Land Use/Land Cover Changes in the Czech Republic 1845 – 1995.* – Geografie-Sborník ČGS, 101, 2, pp. 92 – 109 (1996). – The article presents basic information on the long-time research programme dealing with long-termed land-use changes. This research programme is based on the land-use data of 1845, 1948, 1990, and 1995. It deals with issues marked by the International Geographic Union in 1995 as important part of the interdisciplinary research. Apart from the methodological process the article also outlines the evaluation of land-use structural changes at the district level by the index of change. This is an overall index reflecting all changes in the respective region. The case-study of Semily District verifies the methodology used at the cadastral level and shows possible applications in detailed studies of the nature/society relations.
KEY WORDS: land use/land cover changes – Czech Republic.

This article has been compiled as part of the research project No. 205/95/0611 backed by the Czech Grant Agency.

1. Introduction

1.1 Opening Remarks

In 1995 the International Geographic Union (IGU) emphasized the support of interdisciplinary projects. In this very sense the project of Land Use/Land Cover Change (LUCC) has been launched in May 1995. It is focused on changes of land-use and land-cover over the time. As such, it brings the concept of time into land-use studies that belong among traditional socio-geographical issues mostly focused on spatial relations only. The link between spacial and time concepts much enriches the traditional land-use research. The Land Use/Land Cover Methodology is applied as a modern synthetic approach to landscape studies where the history of nature/society relations in a certain area should be documented. Thus, the land-use analysis becomes an important and conclusive method documenting the intensity and structure of human influence on the landscape. The land-use analysis can either be based on existing land-use categories that can be well recognized in the open air (arable land, meadows, etc.) or on functional categories (recreational, transport, water supply functions, etc.).

How can one examine the land-use development and the nature-society relations? The analysis of detailed scale maps is the basic method which gives simplified information on the state of the landscape in different years depending on the availability of maps.

The second method is based on remote sensing and on the use of satellite images from different years. This method is quite efficient since it includes

computers and automatic drawing machines. It is limited, however, to the period of last fifty years. In future it will undoubtly be widely used as part of analyses, projects, and prognoses.

Archive records reflecting changes in small regions are the base of the third method. Irregular written records, notes, and other pieces of evidence inscribed by owners and administrators can be analysed. However, such an analysis is a time-consuming process requiring highly qualified labor force and the structural trends obtained can neither be generalized nor applied to other regions.

The fourth method deals with the land-use data recorded in different periods by official survey organizations. Land use surveys have a long tradition on the Czech territory as well as in the whole western part of the former Austro-Hungarian Empire. Land-use data by cadastral units since 1845 are available.

In legal terms, cadastral unit is "a technical unit with clear boundaries consisting of immovable property described in a common record. Each cadastral unit is marked by a numeric statistical code." (Kuba, B., Olivová, O., 1993). The average size of cadastral units in Czechia is 600 hectares. They are usually associated with one settlement and have precisely defined boundaries.

Currently there are ca. 13,000 cadastral units in the Czech Republic. Each record includes data on at least ten land-use categories available from different years. Such an amount of data requires computer facilities; establishing of a specialized geographical information system (GIS) seems inevitable. This method allows to cover the whole area by useful data and to carry out land-use analyses in any region where basic data is available. Some other socio-economic and natural data are available at the cadastral level, too: altitude, land fertility, population, number of houses and apartments, etc. As a result, one can analyse relations between the state and development of land-use on the one hand and selected characteristics on the other hand.

One might find even more approaches towards the evaluation of the long-termed land-use and land cover changes. It seems that field work – that primarily brings current data – could also characterize the development of at least some landscape elements. Field work – though time consuming and costly – is important and often necessary. It is usually a part of case studies in small regions where also other methods are applied.

We strongly believe that each of the above mentioned methods of long-termed land-use and land cover changes brings valuable results. A real picture of landscape development can be drawn and future trends can be compiled, however, only if various methods are combined.

1.2 Data Sources and Their Origins

Detailed land-use data was on the Czech territory first collected more than 180 years ago as part of cadastral records (initally called stable cadaster). It was necessary to create a base on which land tax – main source of the state budget – would be calculated. As a side result, precise triangulation network came into existence and cadastral maps (scale 1:2,880) were created. Maps were later transformed to the scale 1:2,000. The actual plot areas were calculated from these cadastral maps and all maps of medium scales were derived from them, too (Mašek, F., 1948).

Preparatory works started after the Emperor's edict dealing with "stable cadaster and land tax" had been issued on December 23, 1817. Taxation was based on plots and net income from each plot was defined. Each plot received

a plot number. Each cadastral unit (cadastral settlement) had its own map where all plots and boundaries were shown.

The main portion of work started in 1824 in Bohemia. Detailed mapping was carried out in 1826 – 1830 and 1837 – 1843. 12,696 cadastral units with 15,359,513 plots were delimited in Bohemia, Moravia, and the Czech part of Silesia. It covered 49,967 map sheets. After the maps were finished, plot areas were calculated and plots were evaluated on the grounds of land-use and land cover. Each plot was given a soil value (Mašek, F., 1948). The structure of land by cadastral units was also recorded; altogether 54 (!) land-use categories were recognized. Land-use records date back to 1845 and have survived in archives.

There have been many changes in the cadastral records over the decades. Later revisions dating from 1869 and 1882 brought new cadastral units into existence and resulted into new land summaries. Next revision was done in 1896; the revisions of 1902 and 1930 were already based on judicial districts. At the moment cadastral records from 1930s onwards are kept in some district Cadastral Offices. Simplified land-use data for ca. 13,000 cadastral units were summarized in 1948 by the Central Survey and Cadaster Archive in Prague. The work was based on district summaries and on the cadastral records. Data of 1990 and 1995 come from the computer database of the Czech Land Survey. Altogether there is a unique and extensive set of land-use data hardly to be found wherever in the world. It contains the size of all land-use categories in all cadastral units. For the sake of historical comparisons so called Basic Territorial Units (BTU) were created; these contain data of 1845, 1948, and 1990. The 1845 and 1948 BTU data were taken from the Central Survey and Cadaster Archive and modified; the 1990 and 1995 data come from the Database Centre of Czech Land Survey in Prague.

2. Methodological Overview

Land-use and land cover changes are highly topical issues in social geography.

Land-use data by the smallest areal units (cadastral units) from different years are the basic source. Different land-use categories, however, were surveyed in different years. As a result, the comparative research is based on eight basic land-use categories. Arable land, permanent cultures (gardens, orchards, hop-gardens, vineyards), meadows, and pastures form the agricultural land fund. Forests come next; water bodies, built-up areas, and "remaining" areas make up so called "other" areas. This basic structure is for specific investigations simplified to three supra-categories: agricultural, forest, and "other" land. Land-use structure by eight basic categories is available for key years (1845, 1948, 1990, and 1995) that separate periods with different nature-society relations and different land-use development.

Detailes on the methodological background have been published by Bičík, I. (1995) and Bičík, I. et al (1995) and also by other authors. Only basic priciples will therefore be mentioned now and the methodological process itself will be explained in further text.

3. Land-Use Changes in the Czech Republic and Thier Assessment

3.1 Bohemia and Moravia

Land-use changes over the past 150 years undoubtly reflect the overall changes of economic and social conditions. The development of Czech society

and its historico-geographical periodization in between 1845 and 1990 has been examined by Jeleček, L. (1995). Apart from other aspects he has also researched the consequences on land-use patterns. Historical periods are characterized as follows:

1845 – 1882 Intensive changes in the framework of agricultural land.
1882 – 1897 Minor changes of land-use structure.
1897 – 1921 More intensive changes in the framework of agricultural land.
1921 – 1948 Minor overall changes only.
1948 – 1970 Great decrease of arable and agricultural land. Built-up areas and "remaining" areas increased.
1970 – 1990 Arrangements to reduce the agricultural land losses. Minor changes within the framework of agricultural land.

The above mentioned trends have general validity at the national level only and do not reflect regional inequalities. In order to quantify these trends the index of change has been used. (See Figure 1).

3.2 Land-Use Changes by Districts 1860 – 1896 – 1930

The methodology tracing land-use changes requires to compare territorial units (districts) of similar size. There have been, however, several changes of territoral administration over the period of 1845 – 1995. Comparisons are always made by units that were in effect in the period of interest. As soon as the analysis carried out by cadastral units (basic territorial units) is finished, comparisons of any kind of administrative units that existed between 1845 – 1990 will be possible. It will also allow comparisons of areas delimited on different bases: urban agglomerations, National Parks, etc.

Judicial districts came into existence in 1850 and remained basic administrative units until 1949. Compared with the current districts (76) there were almost three times more (218) of them. Judicial districts, abolished by administrative reforms after 1948, were very homogeneous areas. The delimitation

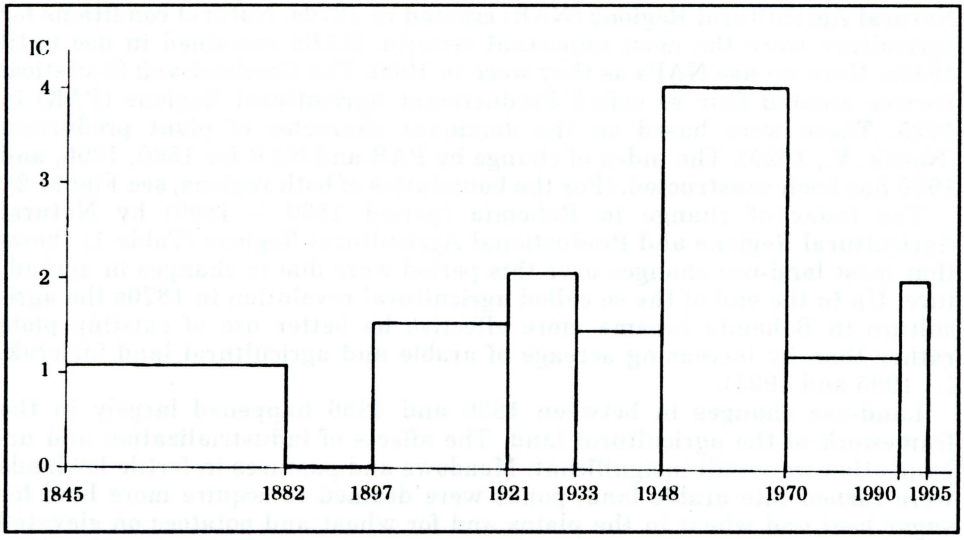

Fig. 1 – The average annual index of land-use change (1845 – 1990, Czech Republic). Axis x – years; axis y – the average annual index of land-use change.

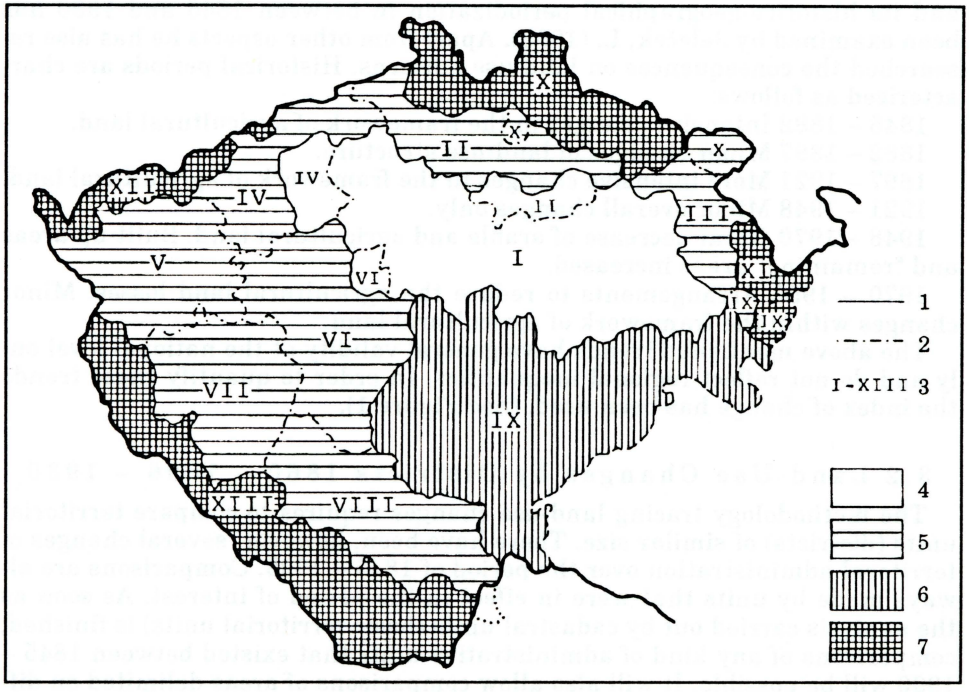

Fig. 2 – Natural Agricultural Regions (NAR; 1900) and Productional Agricultural Regions (PAR; 1930). 1 – PAR boundaries; 2 – NAR boundaries; 3 – NAR; 4 – Sugar Beet PAR; 5 – Grain PAR; 6 – Grain and Potato PAR; 7 – Fodder PAR. Source: Novák, V. et al., 1925.

of Natural Agricultural Regions (NAR) and Productional Agricultural Regions (PAR) has been based on judicial districts, too.

Agricultural records under the Austro-Hungarian Empire were based on Natural Agricultural Regions (NAR) created in 1870s. Natural conditions for agriculture were the most important criteria. NARs remained in use until 1940s. Here we use NAPs as they were in 1900. The Czechoslovak Statistical Service created four so called Productional Agricultural Regions (PAR) in 1925. These were based on the dominant character of plant production (Novák, V., 1925). The index of change by PAR and NAR for 1860, 1896, and 1930 has been constructed. (For the boundaries of both regions, see Figure 2).

The index of change in Bohemia (period 1860 – 1896) by Natural Agricultural Regions and Productional Agricultural Regions (Table 1) shows that most land-use changes over this period were due to changes in agriculture. Up to the end of the so called agricultural revolution in 1870s the agriculture in Bohemia became more effective by better use of existing plots rather than by increasing acreage of arable and agricultural land (Jeleček, L., 1985 and 1995).

Land-use changes in between 1860 and 1896 happened largely in the framework of the agricultural land. The effects of industrialization and urbanization were still insignificant. Meadows and pastures in fertile lowlands were turned into arable land; ponds were drained to acquire more land for sugar beet and wheat in the plains and for wheat and potatoes on elevated plateaus. More potatoes started to be grown in Bohemian-Moravian Highlands. In less fertile mountainous regions pastures became mostly

Table 1 – Index of Change in Bohemia 1860 – 1896 – 1930

Territory \ Period	1860-1896	1896-1930	1860-1930
Bohemia	2,85	3,80	4,77
Productional Agricultural Regions :			
Sugar beet	5,02	4,54	5,63
Grain	2,42	4,14	4,05
Grain and potato	3,12	3,10	3,99
Fodder	2,73	4,94	5,34
Natural Agricultural Regions:			
I. Bohemian Lowlands	5,48	4,41	6,37
II. Western Part of Southern Krkonoše Foothills	2,89	5,23	3,99
III. Eastern part of Southern Krkonoše Foothills	4,57	5,77	7,55
IV. Lower Ohře and České Středohoří Mts.	2,22	5,71	5,18
V. Upper Ohře	1,30	5,07	5,95
VI. Berounka and Brdy Range	2,90	3,44	3,31
VII. Plzeň Basin	2,47	5,08	5,87
VIII. South Bohemian Basins	3,87	3,75	4,73
IX. Bohemian-Moravian Highlands	3,12	3,22	3,93
X. Krkonoše Mountains	2,69	7,15	7,09
XI. Orlické Hory Mountains	1,94	11,17	11,17
XII. Krušné Hory Mountains	1,73	15,82	16,75
XIII. Šumava Mountains	3,59	2,91	5,21

aforested but some were also converted into arable land by part-time farmers. Afforestation was frequent in South Bohemia, especially in the Šumava Mts. Local landowners who managed large plots (Schwarzenberg family, etc.) transformed their businesses to more effective forest industry.

The more intesive use of agricultural land became apparent in the period 1896 – 1930. The index of change decreased in fertile regions – this was the case of Sugar Beet PAR or Bohemian Lowlands NAR. Large non-agricultural investments had not yet been allocated there. On the other hand, increase of barren land and conversion of less fertile arable land into meadows and forests already started in the highly industrialized and densely populated Sudetenland. The index of change in the Fodder Producing PAR almost doubled and it increased up to seven times in the NAR Krušné, Orlické, and Krkonoše Mts. The Šumava Mts., dominated by forestry and scattered farms, had almost no industry and show even decrease of the index. The largely rural NAR VIII where industry stagnated also shows decrease. Only a modest increase of the index of change was recorded in the NAR Bohemian-Moravian Highlands which had similar economic structure. The index of change increased in all other regions; apart from those quoted above the most significant increase was recorded in the industrial areas of Plzeň and environs (NAR VII) and around Sokolov and Cheb (NAR VII). Due to the limited

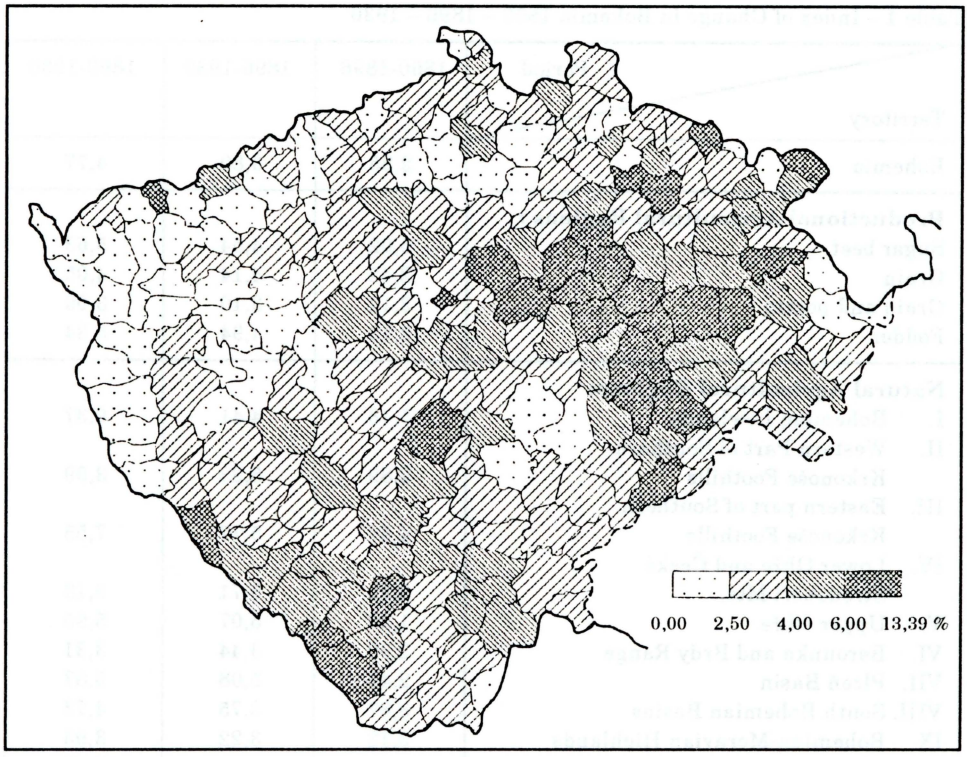

Fig. 3 – The index of land-use change by judicial districts (1860 – 1896, Bohemia; f=218)

availibility of data the index of change by districts (period 1896 – 1930) has been calculated on the base of six land-use categories only. Built-up areas, water bodies, and "remaining" areas were grouped into "other" areas.

Figure 3 shows the regional differences of the index of change between 1860 and 1896 in a more detailed manner. The indexes in judicial districts in the fertile Elbe Lowland (especially in the eastern part with the best soils) and in the Šumava Mts. exceed 6.0. On the contrary the densely populated border districts and mining, textile, and glass regions in North-West Bohemia have quite low indexes.

3.3 Land-Use Changes by Districts 1961 – 1970 – 1980 – 1990 – 1995

In contrast to the previous analyses this chapter deals with land-use changes by the current districts. 76 districts existed in the end of 1995.

Analyses are based on the complete land-use structure (i.e. eight categories) used also at the cadastral analyses. Though there have been some changes in district boundaries, these have not exceeded 1 % of district area in most cases. For technical reasons it has not been possible so far to make recalculations in areas where more significant changes occurred. It is the case of districts Prague (treated as one unit), Prague-East, Prague-West, Beroun, and Příbram. Nevertheless, data shown in cartograms may be considered as accurrate ones.

Land-use changes are described by the overall index of change that indicates the share of land where any land-use chage occurred over the given period of time. Though changes of all eight land-use categories in all periods could be shown, due to the limited capacity of this issue only the indexes of change for periods 1961 – 1970 – 1980 – 1990 – 1995 are presented.

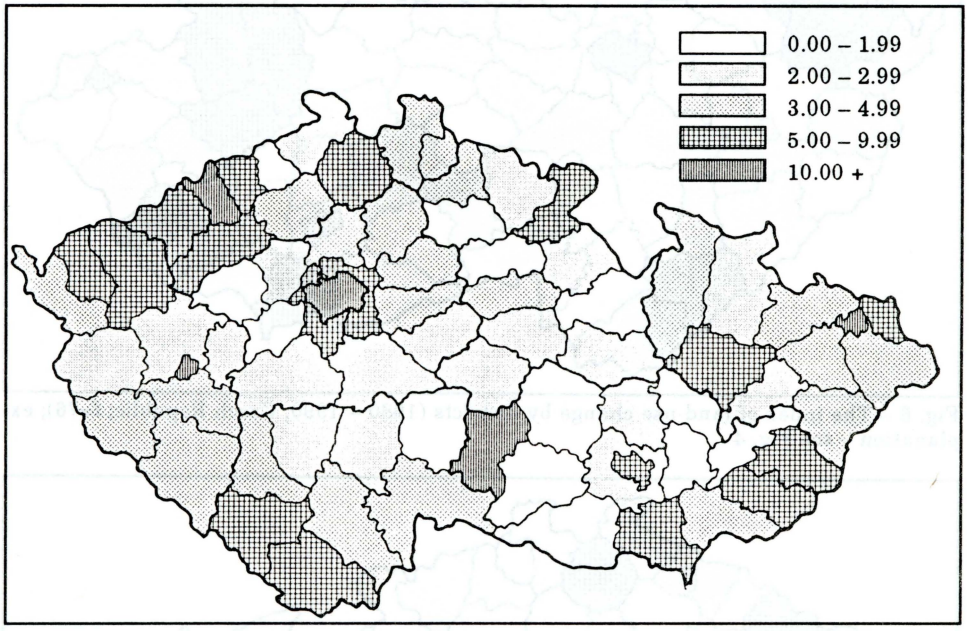

Fig. 4 – The index of land-use change by districts (1961 – 1970, Czech Republic; f=76)

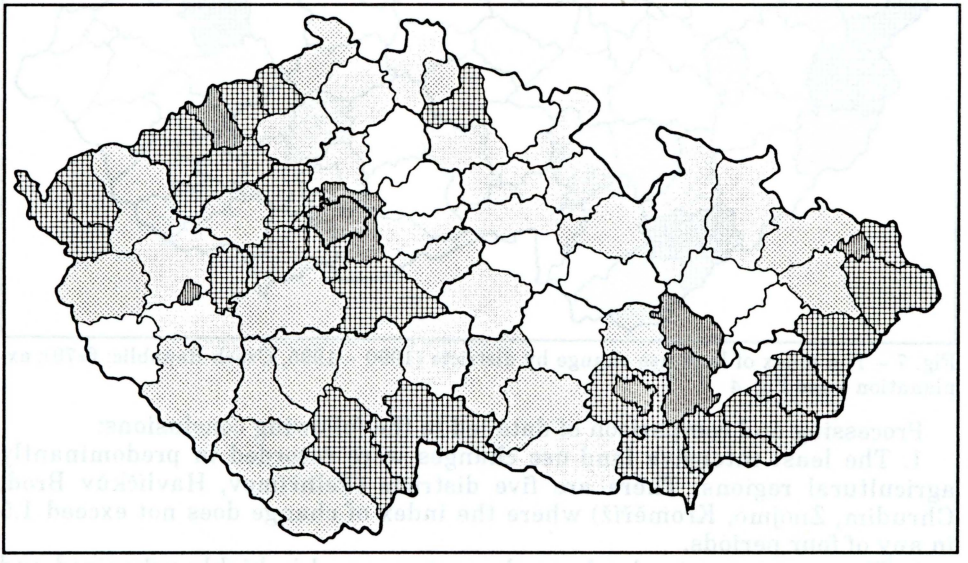

Fig. 5 – The index of land-use change by districts (1970 – 1980, Czech Republic; f=76); explanation – see Fig. 4

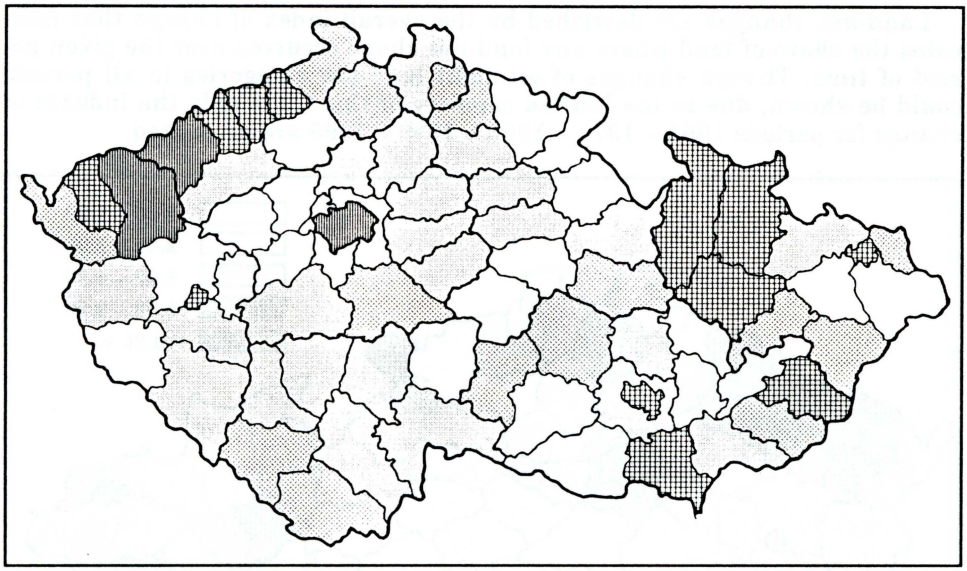

Fig. 6 – The index of land-use change by districts (1980 – 1990, Czech Republic; f=76); explanation – see Fig. 4

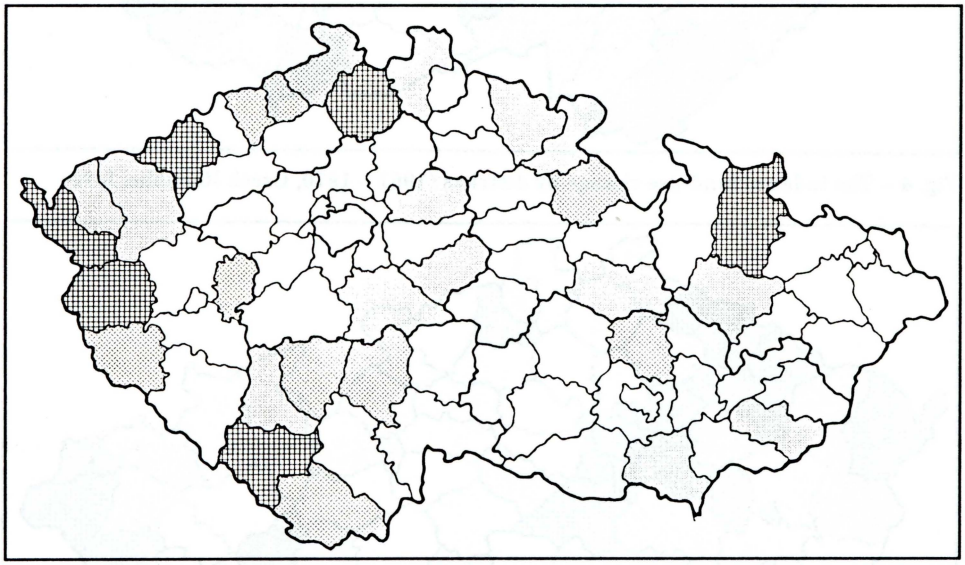

Fig. 7 – The index of land-use change by districts (1990 – 1995, Czech Republic; f=76); explanation – see Fig. 4

Processing and comparison of data led to the following conclusions:

1. The least intensive land-use changes were recorded in predominantly agricultural regions. There are five districts (Pelhřimov, Havlíčkův Brod, Chrudim, Znojmo, Kroměříž) where the index of change does not exceed 1.5 in any of four periods.

2. The most intensive land-use changes occurred in highly urbanized and industrialized districts (Prague, Plzeň, Teplice, Ostrava, Karviná).

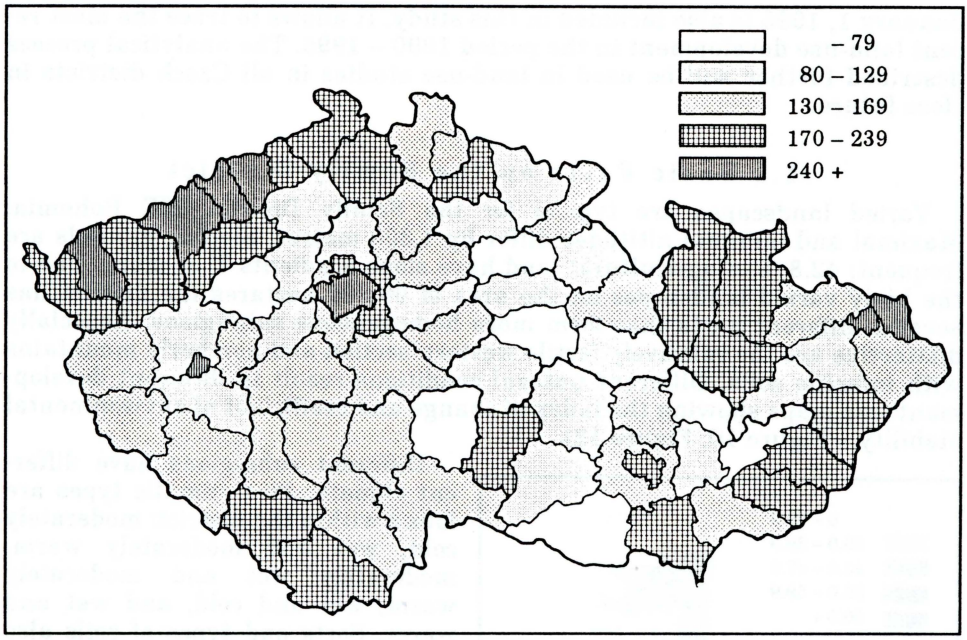

Fig. 8 – Summed ranks by the index of change in four periods (Czech districts 1961 – 1970 – 1980 – 1990 – 1995)

3. Quite important land-use changes were also recorded in districts adjoining the western and south-western boundary.

4. Figures 4-7 show the large regional differences of land-use development. Districts where indexes exceed the value of 10 are regions with the most damaged environment. Land-use changes affecting more than one tenth of the total area are supposed to much contribute to the overall environmental imbalance. However, the vice-versa scenario might make sense, too: intensive land-use changes as the result of damaged environment? The same figures also show intensive changes in most Moravian districts as well as relatively stable conditions in the Bohemian-Moravian Highlands.

Different approach has been used in the case of Figure 8. Ranks by the index of change in all four periods are summed up; each district is given one number. In our opinion this figure shows best the land-use changes over the whole period 1960 – 1995. The most intensive changes are recorded in districts with the most damaged environment and in big cities – Prague and Plzeň.

4. Land-Use Changes at Detailed Scale: Case Study Semily District 1845-1995

The above mentioned methodology of assessing land-use changes has been applied in the Semily District. In this case study more attention has been devoted to parameters indicating the environmental quality of cadastral units. (For details on coefficients of environmental stability and recreational suitability see further text.) Land-use data by cadastral units of

January 1, 1995 is also included in this study. It allows to trace the most recent land-use development in the period 1990 – 1995. The analytical process described further will be used in land-use studies in all Czech districts in close future.

4.1 Basic Facts on the Semily District

Varied landscapes are typical for the Semily District, NE Bohemia. Maximal and minimal altitudes differ by 1,300 metres. Sloping grounds are frequent; 42.8 % of agricultural land have slope gradients 7° or more. Due to the higly varied landscapes on the area of 69,887 hectares the district has several different parts that form more homogeneous subregions. Especially distinctive are the relatively fertile western section and northerly mountains with infertile soils. Different natural conditions result in different development (see maps showing the index of change and coefficient of environmental stability – Figure 10, Figure 12).

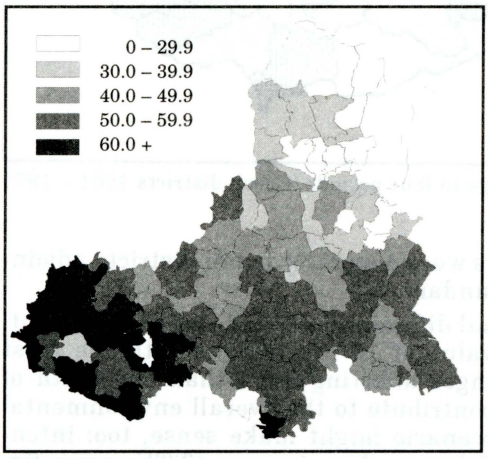

Fig. 9 – Productional ability of soils in the points (% from most productiv soils in the Czech Republic; (case: Semily region)

Different subregions have different climate. Five climatic types are found within the district: moderately cold, wet and moderately warm, moderately wet and moderately warm, wet and cold, and wet and warm. Sorts and types of soils also vary. Brown soils on crystalline and Permian rocks are most frequent. Soils are of medium density mostly, thickness vary from medium to low, with medium share of gravel and stones. The low quality of soils results in low productional ability of agricultural land. This ability has been calculated as the average value of all Soil Value Units (SVU) by cadastres compared with the most fertile SVU in the state. Using this method the Semily District got 43.5 points and ranks to the 64th position out of 76 Czech districts. The average soil value in financial terms amounts to 35,480 CZK per 1 hectare only (the national average is 55,096 CZK/1 ha). The share of arable land out of agricultural land is only 59 %; the same figure for Czechia, however, is 81.6 %. There are some restrictions that contribute to the low share of arable land: National Park Krkonoše manages 11.1 % of agricultural land, and 22.6 % of land is under special treatment due to protection of underground water.

4.2 Development of the Land-Use Structure in the Semily District

General land-use changes are described by the index of change. Indexes for the periods 1845 – 1948, 1948 – 1990, and 1990 – 1995 are shown in Figure 10. It is apparent that changes that occurred over one hundred years between 1845 and 1948 were far less intensive than changes in the second half of the 20th century.

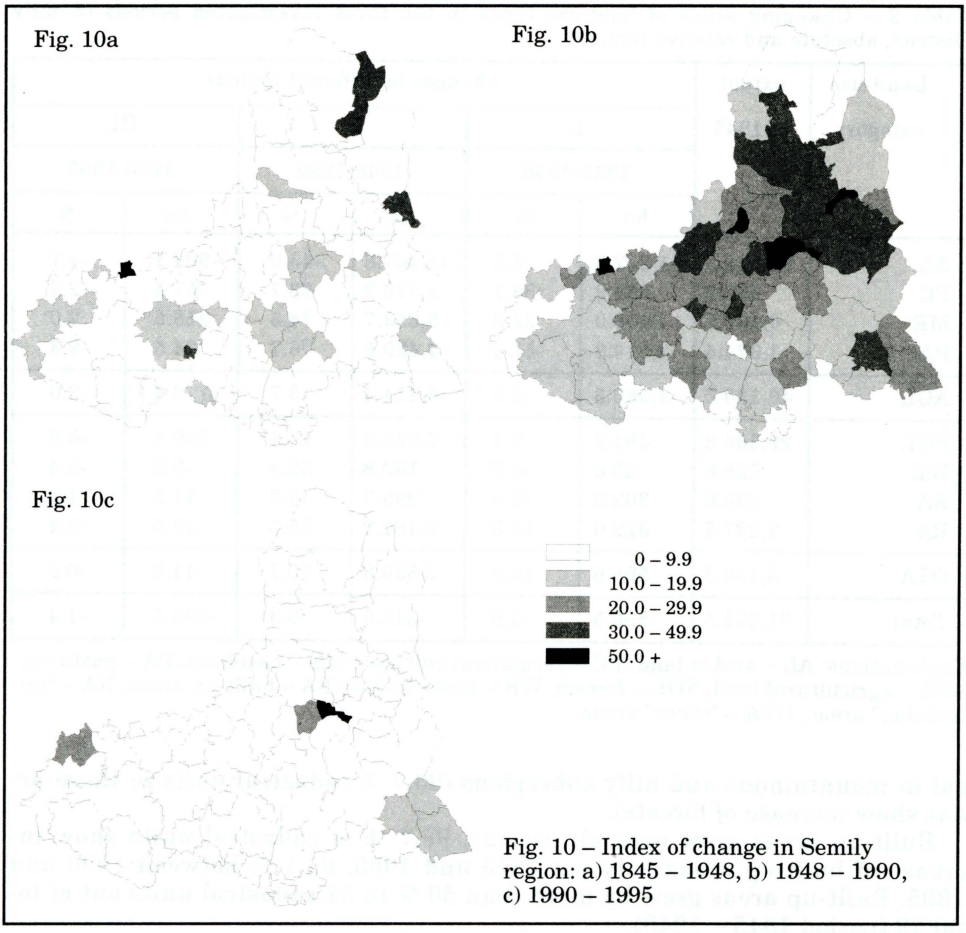

Fig. 10 – Index of change in Semily region: a) 1845 – 1948, b) 1948 – 1990, c) 1990 – 1995

4.3 Changing Patterns of Individiual Land-Use Categories

Following a slight decrease in the first period (by 3.6 %), the extent of agricultural land has much decreased after 1948 (by 13.7 %). Only arable land, however, was decreasing in the framework of agricultural land. Intensive increase of meadows, pastures, and permanent cultures was recorded in the period 1948 – 1990. Nevertheless, pastures still occupied less land than in 1845. In the most recent period subsidies encouriging the conversion of arable land into meadows and pastures have already been effective. It was expected that the extent of meadows and pastures would rise. This conversion, however, was only modest in the Semily District and did not exceed 5 %; pastures even decreased. At the national level the Semily District was below average in this respect (See Figure 11a). The extent of permanent cultures has decreased between 1990 – 1995 – first time since 1845. This was due to the decrease of orchards in the southern part of the district.

Forests grew in terms of size slightly only in the first period and significantly in the second period (by 14.1 %, i.e. 3229 ha). Slight decrease has been recorded recently. The expansion of forests between 1948 and 1990 was typi-

Table 2 – Changing areas of land-use types in the three investigated periods (Semily District, absolute and relative figures)

Land-use category	extent of 1845	changes in different periods					
		I.		II.		III.	
		1845-1948		1948-1990		1990-1995	
		ha	%	ha	%	ha	%
AL	34,883.3	-1,212.3	-3.5	-14,467.8	-43.0	-902.1	-4.7
PC	690.9	664.2	96.1	1,270.2	93.7	-57.5	-2.2
ME	6,182.2	1,408.0	22.8	5,653.7	74.5	258.6	2.0
PA	4,374.4	-2,510.3	-57.4	4,429.6	76.7	-74.5	-2.3
AGL	46,130.9	-1,650.3	-3.6	-6,114.4	-13.7	-772.4	-2.0
FOL	22,364.3	461.2	2.1	3,229.6	14.1	-210.1	-0.8
WB	528.8	-25.8	-4.9	162.8	32.4	-2.9	-0.4
BA	380.0	302.3	79.6	295.7	43.3	11.5	1.2
RA	2,227.7	322.0	14.5	2,181.2	85.5	-19.5	-0.4
OTA	3,136.3	598.6	19.9	2,639.8	70.7	-11.0	-0.2
Total	71,631.5	-590.5	-0.8	-245.0	-0.3	-993.5	-1.4

Explanations: AL – arable land; PC – permanent cultures; ME – meadows; PA – pastures; AGL – agricultural land; FOL – forests; WB – water bodies; BA – built-up areas; RA – "remaining" areas; OTA – "other" areas.

cal in mountainous and hilly subregions (93.7 % cadastral units in these areas show increase of forests).

Built-up areas grew over all periods. 98.7 % of cadastral units show increase of built-up areas between 1845 and 1990, 91.1 % between 1990 and 1995. Built-up areas grew by more than 50 % in 51 cadastral units out of total 79 (period 1845 – 1948).

So called "remaining" areas consist of different types of plots. Increases in terms of size were recorded between 1848 – 1990; recently there has been a slight decrease.

4.4 Environmental and Recreational Potentials Over the Time

The coefficient of environemtal stability has constantly grown within the Semily District over all investigated periods (see Figure 12). The coefficient of recreational suitability shows similar development, though the increase is somewhat slower.

It is important to emphasize that calculations are based on the recorded extent of land-use categories. Areal increase of land-use types that are in theory environmentally valuable does not necessarilly mean that environmental quality is really improving. Let us take forests as an example. Forests are regarded as the land-use category with the highest environmental quality. In practical terms, however, many forests especially in elevated parts of the Semily District are much damaged. As a result the recorded size of forest land is not automatically covered by quality forests. Increase in size may not be increase in environmental quality.

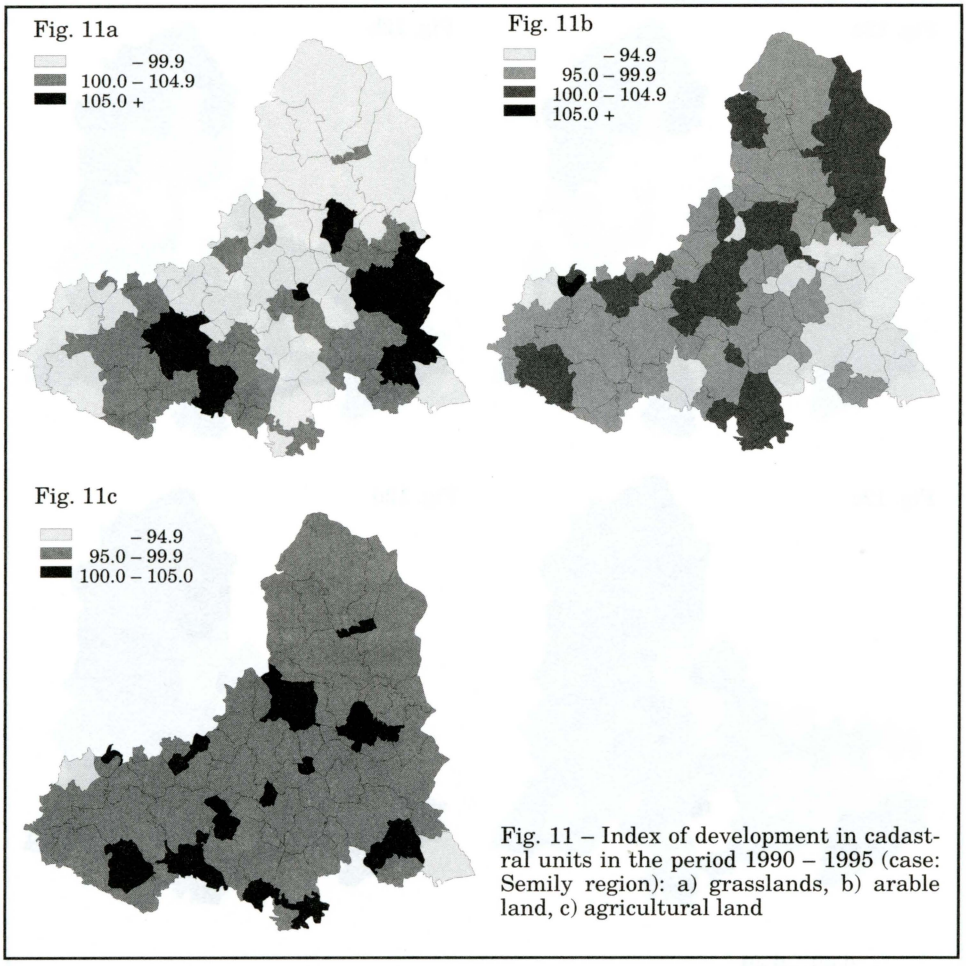

Fig. 11 – Index of development in cadastral units in the period 1990 – 1995 (case: Semily region): a) grasslands, b) arable land, c) agricultural land

4.5 Conclusions

The analysis of long-termed land-use development in the Semily District reveals some important trends. Development of three land-use categories show clear tendencies over all investigated periods:

The extent of arable land has been decreasing constantly. The most intensive relative decrease has been recorded between 1948 and 1990 (in average 344.4 ha per year). The average annual decrease between 1845 and 1948 amounted only to 11.7 ha and the same figure for the most recent period was 180.4 ha.

On the contrary, constant increse has been recorded in the case of built-up areas and meadows.

Built-up areas grew fast especially in the period 1948 – 1990 (in average by 7 ha per year). The mean annual increase between 1845 and 1948 is almost identical with the recent period 1990 – 1995 (3 ha and 2.3 ha respectively).

Also the extent of meadows has increased most in the period 1948 – 1990 (in average by 134.6 ha per year). At present (i.e. between 1990 and 1995) meadows still tend to grow in terms of size. This recent increase is four times

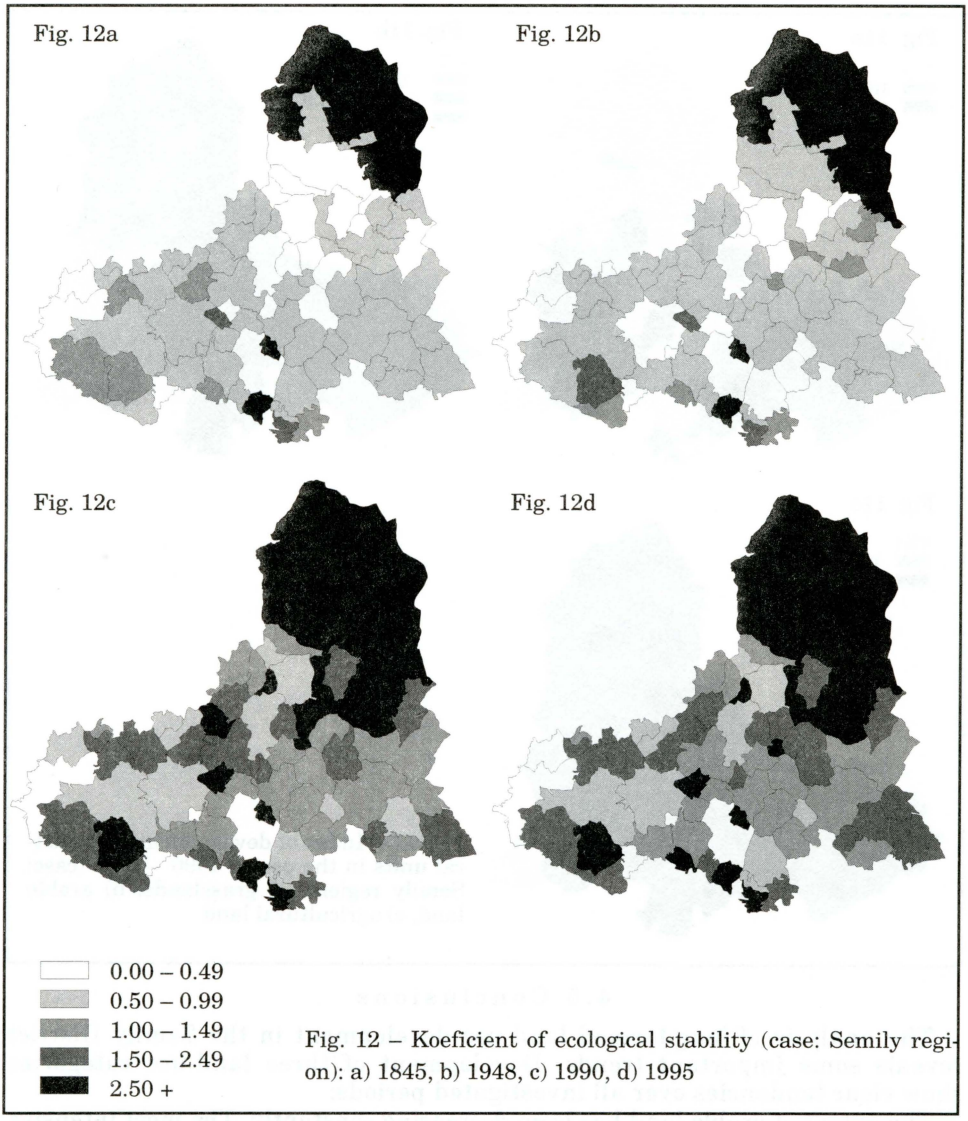

Fig. 12 – Koeficient of ecological stability (case: Semily region): a) 1845, b) 1948, c) 1990, d) 1995

faster than in the earliest recorded period, but three times slower compared with the period 1990 – 1995.

The above mentioned tendencies provide a sound base which allows us to describe all three investigated period. The earliest period (duration over 100 years) is typified by slow and slight land-use changes that have altered the landscapes of Semily District at a modest scale only. On the contrary, the 42 years long period after 1948 was a "fast" one resulting in fundamental changes of land-use patterns and landscape on whole. Consequences of these fast processes are apparent everywhere.

The period 1990 – 1995 is a relatively short one. Important political and social changes, however, have taken place recently. In our opinion they could result into faster landscape changes. The most recent land-use changes seem

to be generally infavourable (for instance the decrease of forests which has never before been recorded); in most cases, however, reasons and motives are not yet clear. Since land-use records show some inertia the current data may still reflect processes that have happened before 1990. Landscapes changes are for sure slower that social changes. If one takes the Semily District as an example, at least some new tendencies in the use of land can be observed. Let us quote the significant increase of meadows which is probably linked with the decrease of arable land and with the increase of "remaining" areas. Only land-use analysis from other districts, however, could prove whether these tendencies have general validity or not.

References:

BIČÍK I., ŠTĚPÁNEK V. (1994 a): Post-War Changes of the Land Use Structure in Bohemia and Moravia. GeoJournal 32, 3, pp. 253-259.

BIČÍK, I., ŠTĚPÁNEK, V. (1994 b): Long-Term and Current Tendencies in Land-Use: Case Study of the Prague's Environs and the Czech Sudetenland. Acta Universitatis Carolinae – Geographica, XXIX, No. 1, UK, Praha, pp. 47-66.

BIČÍK, I. (1988): Areas structure development in the Northern Bohemia Region as the Reflection of Society – Environment Relation. In: Historical Geography, Vol. 27, Praha, ICWH CSAS, pp. 199-223.

BIČÍK, I. (1992): Long Term Tendencies of Land Use in the Czech Republic. In: Acta Universitatis Carolinae – Geographica, XXVII, No. 1, UK, Praha, pp. 59-63.

BIČÍK, I. (1995): Possibilities of Long-Term Human-Nature Interaction Analysis: The Case of Land-Use Changes in the Czech Republic. In: Simmons I. G., Manion A. M. (ed.): The Changing Nature of the People – Environment Relationship: Evidence From a Variety of Archives. Proceedings of the IGU Commission on Historical Monitoring of Environmental Changes Meeting. Praha, pp. 79-91.

de BIE C. A., ZUIDEMA P. A. (1995): The Land Use Database. A Knowledge Based Software Program for Structured Storage and Retrieval of User – Defined Land Use Data Sets. Paper presented at the conference of the IGU :Global Changes and Geography.

Československá statistika, Vol. 87, Part I, Praha, 1932-1933.

Ergebnisse der Katastralrevision auf Grund des Gezetzes vom 12. Juli 1896. Reichsgesetzblatt 121, Wien, 1900.

GÖTZ, A. (1994 a): Regional Diferences in Transformation of Czech Agriculture after 1989. Sborník ČGS, 99, No. 2, pp. 93-100.

GÖTZ, A. (1994 b): Regional Inequalities in Agricultural Transformation in the Czech Republic. Acta Universitatis Carolinae – Geographica, XXIX, No. 1, UK, Praha, pp. 19-29.

HÄUFLER, V. (1960): Evidence of the Land Use in Czechoslovakia. Sborník ČSZ, 65, pp. 268-272.

JANČÁK, V. (1995): Dynamic of Land-Use in the Southern Outskirts of Prague – Case of Příbram District. In: Simmons I. G., Manion A. M. (ed.): The Changing Nature of the People-Environment Relationship: Evidence from a Variety of Archives. Proceedings of the IGU Commission on Historical Monitoring of Environmental Changes Meeting. Praha, pp. 73-79.

JELEČEK, L. (1985): Zemědělství a půdní fond v Čechách ve 2. polovině 19. století. Academia, Praha, 283 p.

JELEČEK, L. (1984): Main Historical Changes in Spatial Organization of Agriculture in Bohemia in the 2nd Half of the 19th Century. In: Historical Geography, Vol. 23,ICWH CSAS, Praha, pp. 171-218.

JELEČEK, L. (1995): Changes in the Production and Techniques in the Agriculture of Bohemia 1870-1945. In: Havinden, M. A., Collins, E. J. T. (ed.): Agriculture in the Industrial State. University of Reading, Rural History Centre, Reading, pp. 126-145.

JELEČEK, L. (1993): The Land Fund Structure Changes in the Czech Lands 1845-1990: Some Historical and Environmental Consequences. University of Kansas, Rockefeller Program in Nature, Culture, and Technology 1993. Lawrence, 11 p., 7 app. (Mimeographed).

JELEČEK, L. (1994): Long Term Land Use Changes in the Czech Republic 1845-1990: Some Historical and Environmental Connections. IGU Regional Conference Prague 1994 Proceedings on CD ROM, Praha.
KOTLYAKOV, V.; MESSERLI, B.; VERSTAPPEN, H. T. (1995): Global Changes and Geography. Conference of the IGU Keynote Address, Moscow, August 14-18, 1995, 4 p.
KUBA, B., OLIVOVÁ, O. (1993): Katastr nemovitostí. Nakladatelství Vilímek, Jihlava, 149 p.
MAŠEK, F. (1948): Pozemkový katastr. Soupis, popis a geometrické zobrazení pozemků ČSR. Ministerstvo financí, Praha, 223 p.
NOVÁK, V. et al. (1925): Přirozené zemědělské krajiny a výrobní oblasti v republice Československé. Čs. statistický věstník 6, part 2-6, pp. 5-214.
POKORNÝ, O. (1959): Obraz Čech v polovině 19. století v díle stabilního katastru. Sborník ČSZ, 64, pp. 222-231.
POKORNÝ, O. (1970): Výzkum vývoje životního prostředí srovnávací historicko-geografickou metodou. Sborník, ČSZ 75, pp. 23-31.
POKORNÝ, O. (1972): Einige Aspekte über die Historische Entwicklumg der Bodenausnützung in Böhmen. Symposium of agricultural typology. Szeged-Pécs 1971, Papers, Szeged, pp. 316-328.
RADA, J. (1971): K některým otázkám vztahů mezi přírůstky lesní půdy a úbytky zemědělské půdy. Čs. ochrana přírody, 11, pp. 75-99.
Stabilní katastr. Obraz zemědělství v Čechách v polovině 19. století z pohledu oceňovacího operátu. Praha, Geodetický ústav ÚSGK 1979.
Statistická ročenka o půdním fondu v ČSSR podle údajů evidence nemovitostí. ČÚGK, SÚGK, Praha, 1970.
Statistická ročenka Republiky Československé 1934. Státní úřad statistický, Praha.
ŠTĚPÁNEK, V. (1992): The Iron Curtain and Its Impact on the Environment in the Czech Republic. In: Acta Universitatis Carolinae – Geographica, XXVII, No. 1, UK, Praha, pp. 59-63.
Tafeln zur Statistik der Land und Forstwirtschaft des Königreiches Böhmen. Auf Grundlage amtlicher Quellen. Band I., Heft 1-13, Praha, 1861-1881.
Ústřední archív zeměměřictví a katastru Praha. Výpisy úhrnných katastrálních hodnot druhů pozemků v k.ú. ČR pro roky 1845 a 1948; sumární výpis pro r. 1882.

Shrnutí

ZMĚNY VYUŽITÍ PLOCH ČESKÉ REPUBLIKY V LETECH 1845 – 1995

Článek řešitelů projektu grantové agentury ČR je zaměřen na presentování základních myšlenek projektu "Dlouhodobé změny využití ploch v ČR". Krátce seznamuje s datovou základnou a metodologií projektu (dříve publikované podrobněji Bičík, I., 1995) a využívá rozpracovaného postupu ve dvou úrovních.

Především analyzuje pomocí jednoho ukazatele – indexu změny – intenzitu změn struktury ploch v různých časových horizontech po úroveň okresů. Nejprve jde o okresy z let 1860 – 1896 – 1930 (f=218) a jejich seskupení do tzv. produkčních zemědělských regionů. V tabulce 1 jsou zachyceny změny ve třech obdobích a dokumentují opoždění v prosazování tržních vztahů v jednotlivých oblastech. Oblast Orlických a Krušných hor vykazuje nejvyšší index změny, v letech 1896 – 1930 hodnoty dosahují 11,17 % a 15,82 % ploch, na nichž se změnil způsob využití. Vzhledem k délce období jde o poměrně výrazné změny, jejichž ekologický dopad lze hodnotit jako příznivý (zvětšení rozsahu lesních ploch a drnového fondu především!). Dále jsme analyzovali okresy (f=76) v období 1961 – 1995 po deseti letech, resp. po pěti letech, podle stejného ukazatele – indexu změny. Tím byly určeny okresy s nejmenším a největším indexem změny, který chápeme jako zprostředkovaný obraz interakce společnost – příroda. Nejnižší změny na úrovni pod 2 % za desetiletí vykazují agrární okresy (Pelhřimov, Havlíčkův Brod, Chrudim, Znojmo, Kroměříž), naopak nejvyšších hodnoty pak vykazují územní jednotky s těžebním a dalším průmyslem (Teplice, Ostrava, Karviná) a jádra metropolních oblastí (Praha, Plzeň). Série kartogramů podává podrobnější regionální informace o tomto jevu po jednotlivých obdobích a jejich souhrn.

Druhou úroveň představuje detailní rozpracování metodiky analýzy dlouhodobých změn struktury ploch v okrese Semily. Série kartogramů podává informace o vývoji rozlohy jednotlivých ploch v letech 1845 – 1948 – 1990 – 1995, o vývoji celkové struktury a dalších statických i dynamických charakteristik za tzv. základní územní jednotky. Základní územní jednotky představují srovnatelné jednotky z hlediska neměnné celkové rozlohy ve všech sledovaných letech. Jsou to buď jednotlivá katastrální území, či spojené dvě a více původních katastrálních území (mezi nimiž došlo k výměně části ploch, které není možné zjistit) z důvodů srovnatelnosti. Tato ukázka na příkladě jednoho okresu představuje nejen analýzu vývoje struktury ploch daného území podle základních územních jednotek, ale naznačuje širokou škálu možností využití této datové základny k podrobným mikro– a mezoregionálním analýzám. Řešitelský kolektiv představeného projektu pracuje na zpracování dalších okresů ČR s perspektivou zpracování a vyhodnocení vývojových tendencí v celé ČR. Právě tímto způsobem chceme využít zcela ojedinělé základny dat v ČR a připojit se k projektu Land Use/Cover Change – LUCC. Ten byl schválen Mezinárodní Geografickou unií jako významný mezioborový projekt v roce 1995.

Obr. 1 – Vývoj průměrného ročního indexu změny struktury ploch v letech 1845 – 1990 v České republice. Osa x – roky; osa y – průměrný roční index změny.
Obr. 2 – Přirozené krajiny (rok 1900) a výrobní zemědělské oblasti (rok 1930). 1 – hranice oblastí; 2 – hranice krajin; 3 – krajiny; 4 – oblast řepařská; 5 – oblast obilnářská; 6 – oblast obilnářsko-bramborářská; 7 – oblast pícninářská. Pramen: Novák, V. a kol., 1925.
Obr. 3 – Index změny struktury ploch Čech v letech 1860 – 1896 podle soudních okresů (f=218)
Obr. 4 – Index změn struktury ploch mezi lety 1961 – 1970 (podle okresů ČR; f=76)
Obr. 5 – Index změn struktury ploch mezi lety 1970 – 1980 (podle okresů ČR; f=76)
Obr. 6 – Index změn struktury ploch mezi lety 1980 – 1990 (podle okresů ČR; f=76)
Obr. 7 – Index změn struktury ploch mezi lety 1990 – 1995 (podle okresů ČR; f=76)
Obr. 8 – Souhrn změn struktury ploch za čtyři sledovaná období podle součtu pořadí okresů v jednotlivých letech (f=76)
Obr. 9 – Produkční schopnost půdy v bodech (vůči nejúrodnějším půdám v ČR; okres Semily)
Obr. 10 – Index změny v okrese Semily: a) 1845 – 1948, b) 1948 – 1990, c) 1990 – 1995
Obr. 11 – Indexy rozlohy vybraných kategorií využití ploch podle katastrálních území okresu Semily v období 1990 – 1995: a) trvalé travní porosty, b) orná půda, c) zemědělský půdní fond
Obr. 12 – Koeficient ekologické stability v okrese Semily: a) 1845, b) 1948, c) 1990, d) 1995

(Authors are with Dpt. of Social Geography and Regional Development, Faculty of Science, Charles University, Albertov 6, 128 43 Praha 2.)

Arrived to the editor's office on February 16, 1996
Recommended for publication by Václav Frajer and Václav Gardavský