Cultural landscape as a mirror of the development of the society

Structure, physiognomy (scenic views) and functions of cultural landscapes in Central Europe result from a long-term development, marked by longlasting permanent interactions of nature and society. As to the structure and physiognomy, two layers are among characteristic features of the cultural landscape:

1. The first, primary layer (primary structure) is identical with the natural structure of the landscape. It is represented by natural (or physical geographical) conditions and expressed for example on maps of natural landscape types.

2. The secondary landscape layer (secondary structure) has been created and shaped by man during historical development. Simplified, the secondary landscape structure is expressed by land use/land cover maps.

Even the third landscape layer (terciary structure) is spoken which is marked and formed by the history of the landscape, its memory, historical, social and cultural events. This tertiary structure has not been usually directly reflected in landscape physiognomy and scenery. That is why this is the most difficult to catch, to quantify and to display exactly in maps.

Czech rural landscape like the cultural landscape of the Central Europe has undergone a long historical development under a dominant anthropogenic influence. Cultural landscape, especially land use is a mirror of the society status. Any change in the secondary landscape structure is a reflection of economic, techno-logical, social, political or demographic changes and developments of the society. Changes in land use and landscape structure take place all the time. Each period carves its characteristic shapes, features and general scenic views in the landscape. Some of these shapes and features sustain and preserve, despite the changing way of cultivation and management, most of them, however, pass away and vanish.

The cultural landscape is permanently influenced by both natural and cultural (anthropogenic) processes. However, ratio of the power and influence of these two categories of processes changes during different historical periods and in different
regions (Fig. 1), anthropogenic pressure on landscape usually grows during historical development. Anthropogenic processes have been gradually prevailing as to the power and intensity. They have grown into vital and necessary in the cultural landscape to maintain it productive and stable. Changeable intensiveness and features of the processes result in general changes of the cultural landscape.

Since the fundamental change of landscape structure, flows and processes in the Neolithic time (when virgin forest stands started to be turned into agricultural steppe), three characteristic phases have been repeated in the historical development of the Czech rural landscape (Lipský, 1991):

1. Disturbance of the ecological equilibrium resulting from an expanded anthropic pressure on land (relative overcrowding) caused by the changes in the way of production (technological, economic changes, property relations). As examples - extension of the area of arable land in the Late Bronze Age caused by a relative overcrowding and accompanied by the accelerated soil erosion and floods, culminating medieval colonization in 13th-14th centuries with disastrous surface and gully soil erosion, substantial changes in the agricultural system at the end of the 18th century connected with a tilling of abandoned lands and a removal of ponds and wetlands in landscape or deep dramatic changes in landscape structure with many adverse ecological consequences during the socialist collectivization since the fifties and during the intensification of socialist large-scale agriculture in the seventies, and eighties of .... century.

2. Establishment of the secondary ecological equilibrium in the landscape responding to a temporary stabilisation of a given way of production, with relatively stable land use and fixed inputs and outputs (flows) of energy and materials into and from the rural (agro) ecosystem. As examples - primitive Neolithic shifting cultivation on small fields, agriculture of old Slavonians with a diversity of planted crops forming a varied mosaic of small fields bordered by grass strips (6th - 10th centuries), successful and developed feudal agriculture of the 16th century or successful small-scale private agriculture of the 19th and the 1st half of the 20th centuries, sustaining a varied mosaic of patches in the small-scale rural landscape.

3. Temporary and at some localities even permanent change in the hitherto development of the cultural landscape characterized by a significant decrease in anthropic loads and pressures on rural landscape. These shorter periods have been usually caused by an economic and social disruption accompanied by a decrease in the number of inhabitants (wars, revolutionary movements etc.). Ecological consequences are usually positive because of more space for natural stabilising processes, especially natural and seminatural succession. As examples - a period of nation migration in the 1st half of the 1st millennium, the 30-Year War in the 17th century (characterised in Bohemia by 30 percent decrease in the number of inhabitants, a destruction and disappearance of many villages and a half of the cultivated land temporary left aside) or a period after the World War II. (an evacuation of the Germans from the borderland (Sudeten) after 1945, a persecution of land owners after 1948). Afforestation and grassing on less fertile soils, extension of shrub communities and woodlands on steep slopes and wetlands in undrained alluvial floodplains are among main landscape ecological changes.
But the development of the rural landscape has not been so simple and at the same time we can find different phases and developments in different regions of the country. This fact has been accepted both for the entire period of the socialist agriculture and for the present time in the nineties.

According to the historical development and to the length of the presence and influence of the man in the landscape, it is possible (very generally) to distinguish different types of the Czech rural landscape:

1. Old agricultural landscape settled by the man, deforested and used as agricultural land for food production since the Neolithic Age for at least 6 000 years. It corresponds to warm climatic regions of the country - Bohemian and Moravian lowlands and low loess hilly lands till 300 - 350 m a.s.l. with the most fertile soils. People always empirically used the natural potential of soils for agricultural plant production. Present ratio of forest stands is about 10 percent or less.

2. Cultural landscape formed in the 12th -14th centuries during the Medieval colonization of the wild landscape. Prevailing agricultural production on less fertile soils has been combined with forestry. Cultural landscape has been formed by a mosaic of arable lands (matrix), forests and grasslands on an undulated relief, under a moderate climate till 600 - 700 m a.s.l. The present proportion of forests is about 25 - 40 percent.

3. Young cultural landscape in low mountains of the Central Europe settled mostly by dispersed settlements during the 16th - 18th centuries. Forestry, aimed at growing spruce monocultures under a cold humid climate, prevail as the main economic activity. The present ratio of forest stands is about 50 percent or more and spruce forests function as a matrix of the landscape. Deforested land is covered mainly by grasslands on slopes. Dispersed (scattered) settlements and domestic animals on pastures are among typical features influencing the scenery and attractivity of the landscapes. Winter sport areas, hotels and recreation facilities recently changed the face of this type of natural/cultural landscape.

Present trends in development of Czech rural landscape

For the long time of historical development, agriculture played the main role in self-sufficiency in foods in all regions of the for at least the last 160 years country for at least the last 160 years, you can precisely follow up land use and landscape structure changes and development using detailed cadastral maps and statistical data since the first half of the 19th century. The share of arable lands increased gradually until the end of the 19th century. The share of fallow (temporary unused) arable lands decreased from 28 percent at the beginning to 1 percent at the end of the 19th century. The area of used arable lands increased by 50 percent during the whole 19th century. At the same time, permanent grasslands, especially pastures, rapidly decreased. The decrease in forest area was stopped in the first half of the 19th century.

At the beginning of the 20th century, arable land represented more than 75 percent of the agricultural land in the Czech lands – more than in any other comparable country in Europe that time. Agriculture occupied two thirds of the country and in the
most productive regions the share of agricultural lands reached over 80 - 90 percent. The area of forest remained historically stable at about 30 percent (1900: 29 percent, 1990: 33 percent - Lipský, 1995). Many fishponds and most pastures were changed into arable lands. Meadows remained to a limited extent in wet alluvial floodplains, along water streams etc. This situation was moderated and compensated by the small-scale landscape structure formed by small fields with a varied mosaic of planted crops. Besides the traditional forms of agricultural production, the variety of landscape structure, formed by a mosaic of little patches separated of linear elements, played a decisive role in the stabilization of agricultural landscape.

Traditional character of the Czech landscape with tiny patches of fields, thick web of country roads lined with fruit trees, so admired by painters and photographers, survived till the half of the 20th century. Although it has vanished, its appearance has been preserved in the old cadaster maps and archive aerial photographs.

Recent developments in land use, investigated with the help of statistical data, show - in contrast to the development in the 19th century - the continuous decrease in the area of arable lands and also total agricultural land during the whole 20th century (Table I). The low share of permanent grasslands continued decreasing till 1989. But the total change of the landscape structure in the last 40 years was much more significant.

Table I: Statistical development of main land use categories in the Czech Republic 1845 - 1999 (in percent)

<table>
<thead>
<tr>
<th></th>
<th>1845</th>
<th>1900</th>
<th>1948</th>
<th>1989</th>
<th>1999</th>
<th>Change in 1989-99</th>
</tr>
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<tbody>
<tr>
<td>Arable Land</td>
<td>47,5</td>
<td>51,7</td>
<td>44,8</td>
<td>41,1</td>
<td>39,3</td>
<td>-1,8</td>
</tr>
<tr>
<td>Permanent Grasslands</td>
<td>17,7</td>
<td>14,3</td>
<td>13,6</td>
<td>10,4</td>
<td>11,3</td>
<td>+0,9</td>
</tr>
<tr>
<td>Total Agricultural Land</td>
<td>66,2</td>
<td>67,5</td>
<td>60,2</td>
<td>54,5</td>
<td>53,6</td>
<td>-0,9</td>
</tr>
<tr>
<td>Forests</td>
<td>29,2</td>
<td>28,6</td>
<td>30,5</td>
<td>33,3</td>
<td>33,4</td>
<td>+0,1</td>
</tr>
</tbody>
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Note: In 1999, vineyards 0,2 %, hopfields 0,1 %, gardens & Orchards 2,7 %.

There have been many land use and landscape structure changes throughout history, but those that have occurred since the fifties have no equivalent in terms of their speed and extent. During the transition to a large-scale socialist production, landscape structure changed rapidly resulting in significant simplification (Fig. 2). The agricultural landscape only was considered a productive area. It was „cleaned” and subordinated to the requirements of heavy mechanization. According to official government instructions, parcels of arable land were unified so as not to be interrupted by meadows, pastures, shrubs or other elements hampering efficient cultivation. The
size of agricultural holdings increased 50 fold and most of the stabilising elements in the large-scale open landscape have been removed (Lipský, 1995).

The result of this recent development has been the origin of the large-scale landscape formed by large collective open fields regardless of the fine natural structure of the landscape. As mentioned above, it has been accompanied by many ecologically negative consequences. Characteristic features and specific regional differences between landscapes were wiped out, and specific regional small-scale landscape types vanished. A striking decrease in the length of landscape boundaries (ecotones) corresponds to a strong decrease in landscape diversity and stability. But on the other hand, the natural structure of the rural landscape, its experience and memory could not be entirely forgotten. The tendency towards an absolute loss of dispersed greeneries in the agricultural productive area compensate an increase in its amount in localities and areas not suitable to modern, large-scale agriculture and heavy mechanisation. Many areas which had been managed before, like small strips of meadows and pastures along forests, pathways, water streams, grassy balks and old orchards on slopes, have been abandoned. Self-seeding trees, shrubs and other seminatural communities began to grow and expand in these localities which became a refuge for endangered plants and animals pushed out of the monotonous agricultural landscape of collective open fields. Investigations in several Bohemian agricultural regions demonstrated a significant increase both in woodlands and dispersed shrub vegetation (Kubeš et al., 1992).

Revolutionary changes in landscape (micro)structure towards its significant simplification are not reflected in the ratio of agricultural lands and forests which has remained roughly the same. This was caused by the strong protection of arable and agricultural lands supported by the planned system of state grants to agricultural production. The system was aimed at achieving self-sufficiency in basic foodstuffs and in fact it stimulated agricultural overproduction. Recently, non-productive functions of agriculture and cultural landscape like recreation and tourism, landscape and nature conservation or drinking water accumulation and supply have gained more and more importance. The present development of the Czech landscape corresponds to the European trend of decrease in arable and agricultural land and increase in forestland. The decrease anthropic pressure on the landscape is certainly positive from the view of landscape ecology. There are, and in the future certainly will be considerable regional differences between regions of intensive agriculture in the fertile lowlands with primary productive functions on one hand and highlands, mountains and foothills on the other hand. Farmland in these regions being not able to compete in food production can be expected to get released for other land use and other functions. Afforestation offers first, however it cannot be considered as a universal solution and the only use of the land unsuitable for intensive agricultural production. Afforestation and grassing will certainly represent a positive feature in the areas declared as zones of water source protection and protected water accumulation areas which cover more than 20 percent of the country territory.

Also a space for necessary landscape stabilisation, for establishing and complementing ecological networks in the landscape formed by protected areas, biocentres and biocorridors opens. A certain problem and controversy stem from the fact the most land
free for non-producive functions of the rural landscape is available in economically marginal regions (mountains and highlands) characterised by a relatively higher ratio of forests, grasslands and other landscape stabilising segments, while the utmost need for ecological stabilisation arises in intensively used and deforested areas.

Another topical problem comes from a risk of elemental abandoning of agricultural land cultivation in marginal regions, which intrinsically promotes the danger of rural region depopulation, breakdown of historical settlement structure, extinction of characteristic features and aesthetic values of the traditional cultural landscape (Jongman et al., 1995).

In the nineties, the system of state subsidies and grants directed to agriculture have also changed in the Czech Republic: from the subsidies to agricultural (over) production to the support and improvement of polyfunctionality, i.e. at the strengthening the non-productive functions of the rural landscape (aesthetic, cultural, social, hygienic, recreational). Within the state programme of Landscape Management these activities are supported above all:

- Grassing and maintenance of permanent grasslands,
- Special management of protected biotopes,
- Establishment and management of ecological networks, riparian stands and grass strips along water courses,
- Sustainable management of agricultural land in national parks and landscape protected areas,
- Recovery of water reservoirs (ponds) and wetlands in the framework of revitalisation of water courses,
- Keeping of the rural landscape(s cultural conditions (namely in economically marginal regions).

From past to the future of the landscape

Knowledge of the historical development of the rural landscape and its structural elements is necessary for their present or future landscape stabilisation. It should not be omitted to respect so called memory of the landscape and the length of different structures and elements persistence in the landscape in planning any change in land use and landscape structure.

It is evident that we need knowledge partly about landscape segments with long-term natural or semi-natural development (for example with spontaneous succession of communities), partly about segments and communities dominantly and systematically influenced and transformed by anthropogenic activities since long ago. Their real identification is possible with help of series of detailed maps, historical documents and old aerial photographs.

Many archive maps, statistics, and also aerial photographs applicable for landscape studies exist in a unified form for the entire territory of the Czech Republic. A precise and detailed reconstruction of the past landscape structures can be carried out for the last 200 years on the basis of detailed maps existing since the end of the 18th century. For investigating the youngest period – some 40-50 recent years – the series of aerial photographs interpreted in a common visual way are the most proper (Fig. 3).

Methods of using historical documents and knowledge of historical development
of the landscape for its present ecological stabilisation were examined in a common forest and agricultural landscape in the Central Bohemia. An analysis of the historical development of the landscape and its structural segments allows to distinguish

(a) Localities with a stable agricultural use (mostly as arable land) during the whole historical period.

(b) Localities with many rather rapid changes in land use and its intensiveness (intensiveness of anthropic pressure on the landscape).

(c) Localities with permanent low intensity of agricultural using (in border zones, bad soil conditions etc.).

(d) Localities permanently excluded from the agricultural using during the whole historical period (waters, wetlands, forests, rocks etc.).

Several specific examples are given in Figure 2 and described below. Pictures illustrate the development of land use and landscape structures in several model squares, each one of 25 ha. Selected squares represent different but typical natural and agricultural conditions of the examined area in the Central Bohemia.

Square 1 shows a border of the forest complex Brník, which was used as a forest for the whole examined period. This forest represents a stable macrostructure of the landscape for hundreds years and can be designated as an important local biocentre preserving local genepool of plants and animals. This hypothesis was confirmed by a special forest research. Wet meadows in the source area of the Chotýšský brook partly afforested in the 1st half of the 20th century can also be considered as a stabilising element of the landscape and as a segment of the local ecological network.

The forest on the left side of the Square 2 forms part of the forest complex Brník (square 1) with the same ecological importance as a local biocentre and a segment of the local network. On the contrary, the forest on the right side of the Square 2 is only a poor pine monoculture planted in the place of former pastures, and of little ecological importance. The meadow in the middle of the square has preserved its identity of semicultural grassland communities, therefore it is considered as a valuable segment of local ecological network.

The Walley of the Chotýšský brook (upper right side of the Square 3) with typical meadows in alluvial floodplains functions as an important local or regional biocorridor during the whole historical period. Grassy balks and grassy or recently afforested ancient erosion forms (from the Middle Ages) are important interactive elements stabilising surrounding agricultural landscape with prevailing arable lands.

The broad alluvial floodplain in the lower part of the Chotýšský brook valley (Square 4) has undergone rather quick and dramatic changes in land use and landscape microstructure during the last 200 years. Lands were drained and artificial ponds and wet meadows were changed into arable lands. Recently, a spontaneous succession of seminatural shrubs and forest communities comes on sites unsuitable for modern agriculture (steep slopes and wet floodplains in the lower part of the square 4). But only one little island of the grassland communities can be considered as a refuge of local genepool; it urgently needs a special care and management.

Cultural landscapes of the Central Europe from result of a long historical development, whose traces and consequences are all the time reflected in the present land use and landscape structures. Knowledge of the dynamics of the landscape
development, the constancy, the age and the stability of the structural elements and the respect for past experience help purposefully to select and design segments of the territorial systems of landscape ecological stability on the local level.

References


Fig. 1. Cycles in development of the area of agricultural land in Europe (after Rabbinge et al., 1996)
Fig. 2. Land use and landscape structure changes in model squares 1 - 4
Fig. 3: Small-scale rural landscape of the model area in Central Bohemia on the aerial photography ad June 1954 (1 - forest complex Brník as an important biocentre, 2 - small strip fields with a varied mosaic of crops in the water source area of the Bylanka river).
Fig. 4. Large-scale landscape of the same area 20 years later (aerial photography April, 1974). Forest complex Brník (1) has remained roughly at the same extent but its inner structure has changed by many clearings. Turn to the large-scale agriculture in the water source area (2) was accompanied by significantly increased soil erosion and catastrophic floods in 1987. New industrial mining area (3) was built in the landscape.