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ISBN 978-80-7623-085-9

The book was supported by the Faculty Development Project of the Faculty of Architecture of the Brno University of Technology in support of publishing activity No. AD152012010 and PC152201002 “Rural Landscaping and its Tools” and it was also supported by Institutional Development Project of Brno University of Technology No. RV90210100501

Thanks to everyone who knowingly
or unknowingly contributed to
the creation of this book, and
especially to the first Neolithic farmer
in our country, probably a woman
from the East.

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INTRODUCTION

Presented publication seeks to map the possibilities of interventions into the landscape and the laws that must govern these interventions. The careful definition of the content of the book reflects our belief that the landscape is not a distinctive work of art or an engineering ‚food machine', but a complex environment for the life of inhabitants in given natural conditions. The way of living in a given landscape has evolved over thousands of years of coexistence, with sufficient feedback (all changes have always been tested by time, the suitability of the arrangement of functional areas in the landscape is determined only by their long-term use - the fulfilment of their function). It is not the author - the professional - but the users of the landscape who are the true creators. With a certain degree of exaggeration, it can be said that the more and faster professionalism in the landscape is promoted, the more mistakes, punished by nature, we are threatened with.

However, the relatively harmonious long-term coexistence of the rural landscape and its inhabitants has been affected by two major social revolutions in the last and present century. The first, the communist one, took the countryside away from its peasants and turned it into an area for production technologies (the peasants had to leave their countryside and it left them). The second, more subtle revolution is linked to the growing leisure time of broad sections of society and the search for ways to fill it. The search for ways of ‚cutting the long run' gave rise to tourism, which often degraded the landscape into a short-lived backdrop for entertainment. The origins of this trend can already be traced in the pretentious, short-lived compositions of castle parks, full of structural imitations and false compositional backdrops and contents. However, it is only in recent times, when the fulfilment of leisure activities has become a common societal need, that it is increasingly dominating and threatening even our ordinary rural landscapes (just as ‚revolution eats its children', tourism ‚eats its landscapes'). The ‚truce' between the forces of nature, the needs of people's livelihoods and the needs of their spiritual life, selected over many centuries, is now being broken, and the restoration of this balance (albeit on a newer basis) is seen as a crucial task in shaping not only our landscapes but also the society that uses them.

The publication deals with the principles and context of the holistic concept of landscape. It is not intended for specialists to expand their, certainly much deeper, knowledge of the field. It contains only basic knowledge of the functioning of landscape and its main aim is to highlight the often complex, interacting links between disciplines and their synergistic interaction within a single area.

Landscape (orbis terrarum, paysage, Landschaft) as an object of our interest needs to be defined. For us it is:

„a part of the Earth's surface with a characteristic relief, consisting of a set of functionally interconnected ecosystems and civilizational elements" (according to the Nature and Landscape Protection Act)[1].

1 Act No. 114 /1992 Coll., on Nature and Landscape Protection, as amended

The landscape can be roughly divided into urban (cities, towns) and rural (countryside) one.

In the **urban landscape**, economic and psychosocial systems predominate, while only rough conditions for construction and protection of biotic singularities are applied from natural systems. These systems are therefore largely dependent on our will, and due to the predominance of short-term economic, administrative and residential needs, their arrangement is also significantly governed by creative intentions, both artificial and aesthetic.

We can therefore create urban landscape, which we do with the tools of urbanism, using all compositional means (there is even talk of building cities). The urban environment is made up mainly of buildings, which are manifested in it not only by their material-functional action but also by their artificial construction, which is why we can recognise and modify many more compositional elements and their relationships than in the rural environment. The urban landscape is primarily concerned with urbanism and its ancillary disciplines. In this book they are of rather marginal importance and are dealt with only in terms of their relationship to the rural landscape.

In the **rural landscape**, natural systems and associated primary economic systems predominate. The psychosocial system is limited to design refinement and accompanying singularities. The overall structure of the rural landscape has long been determined by economic laws and is practically invariant, depending on the georelief, the suitability of the soils and the technical needs of cultivation. Since every function in a rural environment has an unchanging structure and appearance, artificial compositional interventions are very limited, even impossible.

The rural landscape was, and to some extent still is, the home of rural people, who were not only nourished but also culturally shaped. Rural culture has always been different from urban culture, but not inferior - just as anonymous folk music is not inferior to professional, classical music. Most design interventions have been and still are done with non-professional self-help techniques and fall into the category of folk art and architecture (now more loftily referred to as vernacular).

The author of the content of the book is Jiří Löw, a classical architect, but influenced by postgraduate studies in natural sciences, who has been working on the creation and protection of rural landscapes since the late 1970s. His knowledge and experience are based on dozens of research tasks and hundreds of direct projects in the field of geoecological, urban and sociological applications in environmental protection, landscape character and spatial planning. A special contribution, however, is particularly his thirty years of systematic field surveys of mainly South Moravian landscapes (from 1976 to 2006). There is perhaps not a single hectare of territory, from Znojmo to Luhačovice, which he has not walked and explored on foot. This theoretical and practical experience is partly shared by the younger generation of scientists within their expertise. Maxmilian Wittmann, Associate Professor at the Faculty of Architecture of the Brno University of Technology, is a prominent teacher and researcher especially in the field of classical urbanism, i.e. the creation and protection of urban landscapes. Tomáš Dohnal, Master of Environmental Studies, strengthens the weight of natural science disciplines in the team.

The book is intended to provide a general understanding of what makes and moves the landscape, and therefore what are the real tools of its creation and what are the ways of using them, i.e. what must be taken into account by everyone who interferes with it. In particular, the text works with insights from applied ecology, landscape systems, landscape development and planning, urban planning, and architecture, and also draws on design practice and research projects. The book is divided into eleven chapters and one appendix in line with the topics discussed.

Chapter 1 is devoted to methodological specifics of synthetic design of landscape changes.

Chapters 2-8 introduce purposefully selected technologies and techniques, i.e. tools that need to be considered and can be used in landscape design.

Chapters 2 and 3 deal with the primary (natural) set of tools and their technologies. Chapters 4 and 5 focus on the secondary (economic) set of tools and their technologies. Chapter 6 develops the theme of landscape composition and landscape character.

Chapters 7 and 8 describe the tertiary (psychological) toolkit and its technology, with an emphasis on naming and fulfilling psychological expectations in landscape design.

The following three chapters (9 to 11) trace the history of landscaping in the interaction of all three toolkits and their technologies, as expected responses to our proposals as well. They introduce a fourth and quite fundamental dimension in the landscape, that is, the evolution over time in terms of changes in its form and the reasons that led to them.

Chapter 9 outlines the origins of our cultural landscape.

Chapter 10 from the medieval period onwards describes the stabilization of our rural landscapes at a basic renewable energy level.

Chapter 11 describes the energy revolution (the use of non-renewable energy sources) and subsequent revolutions – the industrial, chemical and globalisation revolutions.

The book is accompanied by a description of the megatypes of European landscapes as the wider environment of our European homeland.

Obr. 1
Rural agricultural landscape

1. SPECIFICS OF RURAL LANDSCAPING

1.1 A short history of landscaping attempts

Artificial, purposefully shaped landscapes have always been and continue to be rare, beyond the corporate creation of anthropogenic landscapes (polders, agricultural terraces, deltas, irrigated areas, etc.). In Europe, however, anthropic landscapes (agricultural exploitation, pond areas, mountain pastoralism, etc.) have been created predominantly. In the 19th century, the landscape was supplemented by linear systems of canals in floodplains and plains, railways in valleys. However, complex monster projects changing the functional use of rural landscapes are unknown in history.

Ideas of the created landscape are limited to anthropogenic standards of "beauty" = parks and ornamental gardens (Versailles), or from coastal pastoral landscapes ("English" parks). However, only solitaires (follies, imitations, monuments, memorials) and rare lines of paths (avenues, passages in fields) entered the free, anthropically conditioned landscape.

In fact, the main works were created inadvertently, as an accompaniment to economic activities = **synanthropic landscapes**. Landscapes are generally known:

- **Mining** – e.g. mining subsidence, heaps, mining pits (Ostrava, Most, Hodonín, Sokolov), floodplains with flooded sandy areas (Tlumačov, Ostrožsko), brickworks sources of clay (Novosedly), abandoned quarries (Český kras, Pálava, Javornicko), etc. The landscape is transformed strictly by production interests. It was not until the 20th century that we see attempts to regulate the movement of masses with compositional intent (Ruhrland, reclamation in Most).
- **Water management** – changes in outflow conditions (dam systems, ponds, irrigation, drainage, regulation of streams and floodplains, etc.).
- **Transport** – (dominant arterial roads and their crossings, ports, railway stations, logistics centres and "residual areas" near them).

Economically motivated activity in the territory can also create cultural landscapes of high aesthetic impact. However, it must be stressed that even the wealthiest feudal lord – the patron of creation – did not have the resources and power to transform the landscape as a whole, and the values we find in them are rather speculative.

A necessary condition for the creation of new landscapes would be, in addition to the unification of ownership, that one "*knows what will happen*", i.e. there is a clear intention and certainty of the landscape's response for a long enough time ahead. Under socialism this was simple – the State Planning Commission set the future and people pretended to believe it. Thus, on paper, a whole series of never realised documents for rural landscapes were produced. Exceptional here was the Spatial Plan of the Catchment Area of the Centre of Settlement of Local Importance (Czech abbreviation as

UPSSOMV), which, together with *land improvement*, was supposed to provide an all-encompassing and innovative solution for each landscape.

In the 1980s, the so called "Comprehensive Model Landscape Project of the Cooperative Farm in Luhačovice" was developed within the framework of the EcoProgramme – a monstrous *"all-inclusive solution"* whose main problem was the obsolescence of input information about the landscape, even before its creation was completed.

Even the new law after 1989 (the Act on Planning and Building Regulations[2]) declares its comprehensive solution as a user agreement. But practice is different and spatial planning is slowly turning from an instrument of territorial democracy into an instrument of bureaucratic violence – comprehensive solutions are replaced by sectoral, departmental documents, which are often not in harmony with each other.

After the year 2000, pretending of *landscape planning* started following the German model, which, however, does not have an institutional *implementation phase* in our country (it does not belong to the building authorities, and we do not have any other planning system).

Added to this is the institutional protection of landscape character, often coupled with a desire to change into creation. All-encompassing spatial studies of municipalities with extended competence are created (methodologically, nobody knows *"what it should be"* = geographers with endless typification and gardeners with park ideas take it over).

There was a certain departmental and professional dilettantism in the field of landscape planning, where each department and specialist consider those systems that they understand to be the leading ones (decisive for the whole arrangement). What they do not understand does not appear to be relevant.

Thus, the main types of landscape creation today have a sectoral character:

Landscaping. It is an instrument used since Maria Theresa (raabisation). Its strength is that the solution is approved by the owners, but only on *Agricultural Land Fund* (ALF). Originally, land management was used only for the exchange and reorganisation of land for better cultivation, later, under the so-called *common facilities*, it included linear erosion management, and nowadays also Territorial System of Ecological Stability (TSES) and other related phenomena. The principle is that all owners share proportionally in the area required for these facilities. The proposal therefore has all the implementation tools but lacks uniformity for the whole landscape and non-economic interests.

- **Forest management plans**. The solution is again approved by the owners, but only on *Land Designated for Forest Functions* (LDFF). Forest planning is ancient but has been growing in scope since the 19th century. The key is the period of coppicing and the resulting ‚forest management', with the aim of planting consistent stands of the same age (spruce trees) and ensuring continuity of yield (areas for different age stages). To this are added timber access facilities – roads, slopes, navigation channels with reservoirs, damming of streams, etc., now often loosely conceived. We are also seeing a shift towards more natural management practices (the bark beetle has taught us a lesson).
- **River Basin Management Plan and flood risk management**. Everything is comprehensively dealt with, but only from the perspective of water management: water extraction, water rising, bathing, pollution sources and their elimination, including accidents, improvement of water ecosystems and ecological stability, adverse effects of drought – but mainly to make it profitable for the stream managers = it is beautifully elaborated, but not implemented.
- **Municipal spatial plans**. According to the law, they deal with the territory comprehensively and consistently, but they do not have active, implementing tools for open countryside. Spatial plans regulate functional use (exercised by a network of building authorities), but they do not deal with energy transformation (intensity and type of production, ecosystem production, technology); there is a complete absence of instruments. Therefore, there is also a lack of detailed functional areas in the rural landscape (compare the set of residential functions in the legends of the spatial plans with the set of functions of the undeveloped landscape for illustration).

2 Act No. 183/2006 Coll., on spatial planning and building regulations (Building Act), as amended

Instruments to regulate energy-material transformations are slowly being developed by the EU – e.g. through agricultural subsidy policy – EU nature-based payments and grant-type subsidies (varieties, erosion, water, etc.). However, these are not comprehensive and coherent and are often abused in our country.

1.2 National landscape protection

1.2.1 Landscape character

Doubts over purposefully composed landscapes in our country do not, of course, mean doubts over the existence of landscape compositions "out of the blue", creating the distinctiveness of our landscape. The distinctiveness of landscapes corresponds with the widely used category of **genius loci**.

This value is also recognised by the Nature and Landscape Protection Act under the term landscape character. According to Act No. 114/92 Coll., on the Protection of Nature and Landscape[3], Section 12:

(1) ... particularly the natural, cultural, and historical characteristics of a place or area, is protected from activities that diminish its aesthetic and natural value. Interference with the landscape character, in particular the siting and permitting of buildings, may be carried out only with regard to the preservation of significant landscape features, specially protected areas, cultural landmarks, harmonious scale and relationships in the landscape.

(2) The consent of the nature conservation authority is necessary for the placement and permitting of buildings and other activities that could reduce or change the landscape character. Details of landscape character protection may be determined by the Ministry of the Environment by generally binding legal regulation.

(3) In order to protect a landscape character with significant concentrated aesthetic and natural values which is not specially protected under Part Three of this Act, the nature protection authority may, by generally binding regulation, establish a nature park and impose restrictions on the use of the area which would result in the destruction, damage or disturbance of the condition of the area[4]

The landscape character is therefore determined by a certain typical combination of natural, cultural, and historical characteristics. However, we are only able to perceive these with our limited senses, identifying these characteristics more as signs. Characteristics are thus **perceived by people through their typical signs** that identify a particular landscape feature for them. We thus perceive the landscape as a picture made up out of them.

Landscape character is a **unified image**, i.e. the **texture** (= cover = surface) of the primary, secondary and tertiary landscape structure. This image speaks to us precisely through typical features.

It is useful to divide typical features in landscape composition into dominant, main, and complementary. It is crucial to identify a set of *dominant features* that determine the distinctiveness of the landscape in broader, superordinate (supervisual) units, and *main features* that determine the distinctiveness of individual basic (convisual) units and identify them. *Complementary features* complete the landscape character. **The distinctiveness of the landscape is thus a reflection of the real landscape in our minds.**

Landscape compositions, forming the character of our landscape, are the main object of our artistic interest, while the technique of completing spontaneous compositions and its tools are extremely cumbersome and complex.

3 As amended

4 The provisions of the Act are based on the European-wide accepted standard that there is an overarching interest in preserving the landscape character as part of the cultural heritage of the past and a favourable environment for present and future generations.

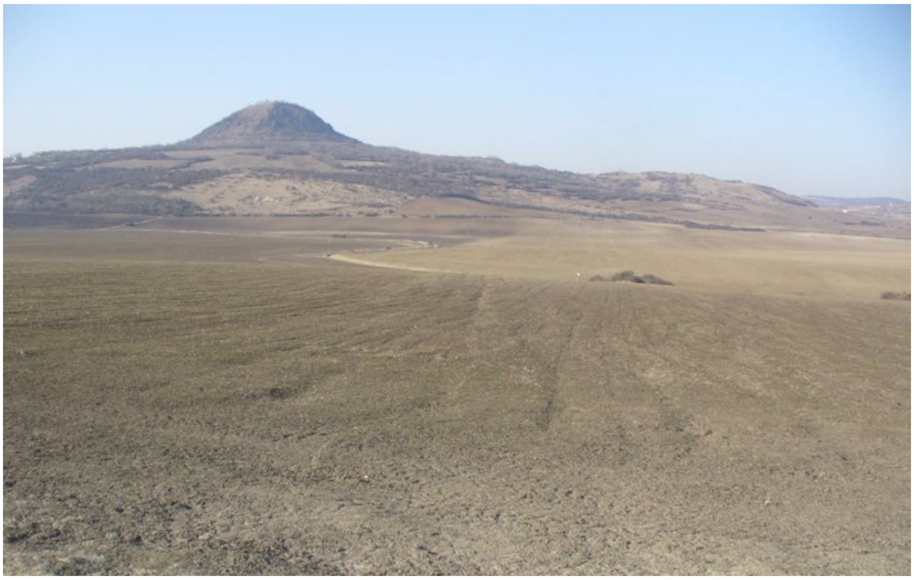


Fig. 2

The distinctiveness is a reflection of the real landscape in our minds

1.2.2 Where to protect landscape character to a greater extent

In general, it makes sense to protect the landscape character only in unified frames, in view-related units (supervisual and convisual – see Chapter 6 – Composition).

1. We protect landscape character mainly where it is **well preserved**. In general, this is where current ways of life do not differ too much in their landscape requirements from the past. This is primarily where the natural conditions are so unsuitable that it is not worthwhile or worthwhile to make intensification changes, i.e. in economically marginal areas (e.g. Šumava). However, there are also areas where the potential of the landscape is so strong that intensive economic use has been common since time immemorial but is limited in some way (e.g. Haná).
2. We protect the landscape character where the preserved landscape character is an advantage for a **current way of life** or at least where it does not interfere with it. The preserved landscape character is, for example, an important prerequisite for tourism and can be important for housing. It may not be a problem in forest landscapes. On the contrary, it can be an obstacle in the case of mineral extraction, intensive urbanisation, the introduction of new special agricultural crops, etc.
3. Landscape character is protected where a landscape type that is rare elsewhere (framework landscape type) occurs. In some areas of our country, the landscape character is unthreatened and well preserved, but in others only the last remnants of the landscape type remain and even these may be threatened. In some areas, the traditional landscape character has been almost completely eradicated. In general, the landscape character of **any significant landscape type** should not be completely lost and forgotten.
4. We also protect the landscape character where the **local population wishes** to protect the character. We know from experience that landscape character is not an academic concept, and its protection is not just a matter for experts. Especially in rural areas, the awareness of the belonging of people and their landscapes is still strong (despite all the nationalisation efforts of the past) and the willingness of the users to protect the character of their landscapes is in fact the main hope for the future.

1.2.3 How strictly to protect landscape character

The highest to absolute protection of landscape character is provided by *nature parks*, but also by *some parts of national parks, protected landscape areas (with declared landscape protection)*[5] and *landscape conservation zones*. This level of protection means that all typical landscape features, i.e. dominant, principal, and complementary, must be protected as a priority and is therefore highly conservative.

High protection of landscape character can be ensured in particular in the form of other specially protected landscapes, outside the area of highest protection, and *significant landscape features*. Although the vast majority of significant landscape features are protected by nature and landscape protection, there are also frequent cases where the subject of landscape character protection is far from being only natural or nature-like communities (in Haná and Polabí, this will include large fields of grain in typical parcels, and selected parts of settlements). High protection of the landscape character means that the typical dominant and main features must be strictly protected, but some additional features, which hinder the current life in the landscape, can then be omitted. Even this level of protection is still very conservative, but it already allows for some changes.

Above-average protection of the landscape character is ensured by the nature protection authority based on other interests resulting from the territorial consensus, i.e. from the Municipal Act (local protection of the landscape by municipal decree) or the Act on Spatial Planning and Building Regulations (suburban forests, recreational areas, etc.). In spatial planning, they can be defined as zones of increased landscape protection. In this case, only the dominant features are strictly protected; some of the main typical features may be omitted if they hinder the development of the area. The additional typical features are only inspiration for creation.

The basic protection of landscape character is left to the discretion of the nature conservation authority. Here, a society-wide minimum of protection of those values is to be established, which will always be required but never exceeded. This minimum protection can be considered to be the protection of the dominant typical landscape features. Everything else has only an inspirational function. At this level of protection, the creation of a new landscape character already prevails in principle over its protection, and the protected features only define broad frameworks for creation.

Landscape character and individual buildings (SWOT analysis in terms of character)

Every new building, even in an urban landscape, is situated within the framework of landscape characteristics – natural, economic, and compositional. It should be a given that the designer identifies the context in which his building will be placed before the design process begins. A classic SWOT-analysis can be compiled from these. First, he or she identifies the framework landscape type in which he or she is located from the maps, and within the super- and conceptual units concerned, he or she divides their typical features into positive – negative aspects and the resulting opportunities – threats. On this basis, he or she builds a structure to reinforce the positives and eliminate the threats[6].

1.2.4 National protection of "composed" areas in the Czech Republic

In addition to the general protection of the landscape character by the Act on Nature and Landscape Protection, this Act, and the Act on State Landmark Conservation[7] designate areas that are particularly strictly protected. These are landscape conservation zones according to the Monuments Act, which de iure protect just the evidence of landscape creation, and according to the Nature and Landscape Protection Act they are nature parks, which protect landscape character in general, protected landscape areas and national parks, which protect landscapes mainly for their natural values.

5 On the issue of spatial development in the protected landscape area also the project of the Ministry of the Environment VaV 620/16/03.
6 On the issue of assessing the impact of the project on the landscape character see also Vorel a kol., 2004
7 Act No. 20/1987 Coll., on State Landmark Conservation, as amended

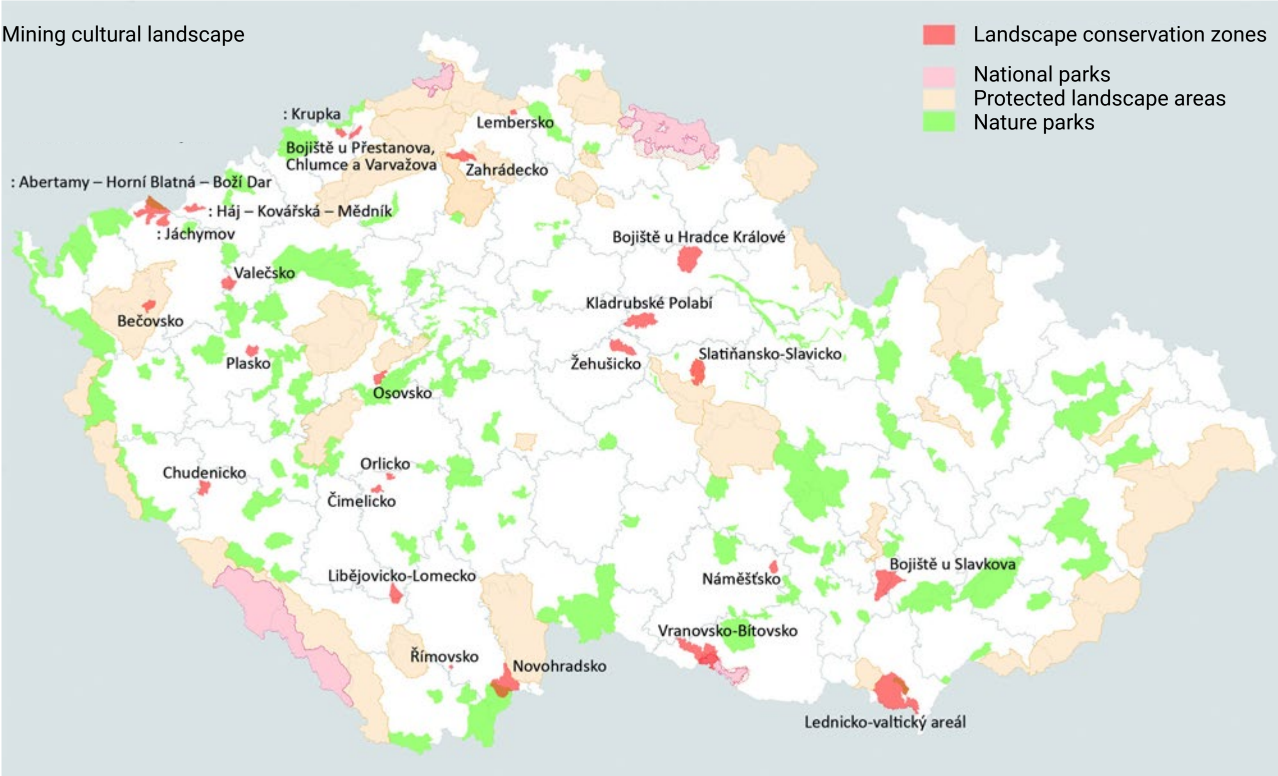


Fig. 3 Compositionally valuable, particularly protected landscapes in the Czech Republic (Kuča, 2016)

Often strongly exaggerated claims about the compositional values of protected landscapes can, for example, be substantiated by a simplified assessment of landscape conservation zones.

The following have been declared landscape conservation zones (LCZs):
- three-part castle park with alleys into the landscape, a game preserve and building imitations – Lednice-Valtice region
- four castle parks with alleys into the landscape – Osovsko, Libějovicko, Zahrádecko, Bečovsko
- five castles with a park – Novohradsko, Orlicko, Valečsko, Chudenicko, Plasko
- two castles with a game preserve – Žehušicko, Náměšt'sko
- two pilgrimage complexes – Římovsko, Lembersko
- three castle complexes with follies – Slatiňany, Čimelicko, Vranovsko
- stud farm and equestrian landscape of the floodplain – Kladrubské Polabí
- four mining zones in the Ore Mountains (remains of the tin mining)
- three memorial battlefields (near Hradec Králové, Slavkov, Přestanov + Chlumec + Varvažov)

Thus, out of 25 LCZs, 5 are castle parks with alleys and the other 12 are castle parks in themselves. This also shows that wider, purposefully composed landscapes do not really exist.

This is also true for other landscapes of the same quality as the LCZs, but not protected. Practically all the areas around baroque castles are affected, in particular: Wallenstein's Jičín, Špork's Kuks, Schwarzenberg's Libějovicko, Chotek's Novohradsko-Kačinsko and others. Here, too, although monumentally protected landscaping, outside the parks it is only avenues on connecting roads (one axis and enough), rarely baroque tridents.

1.2.5 Systems in the landscape

Rural landscape differs from urban landscape not by completely different functional systems, but by changing their relevance for a solution. Some aspects of these functions are of fundamental importance in rural landscapes and require different solutions than in urban landscapes. Awareness of this difference is essential for proper landscape planning and creation.

The systems for the use of built-up areas, transport services, urban engineering in general become inferior in rural landscapes. The systems of natural ecosystems, agroecosystems (agriculture), forestry, soil erosion, water retention, flood passage, transport accessibility of areas, extraction of raw materials, outdoor recreation, heritage sites, etc. are the main systems of the rural landscape[8].

However, these are joined, especially in rural landscapes, by energy-material transformations, which are nuanced and naturally variable, but sometimes very dynamic (see ecological disasters – bark beetle, logging, catastrophic droughts, voles, etc.). Time passes differently. The open landscape is a much more complex system than the city.

1.3 Landscape as three layers of relationships

The processes and phenomena occurring in the landscape and shaping it are very complex and multiply interconnected, both in space and functions, as well as in time and in energy-material (including information) transformations. However, for purpose, this complex system of relationships and linkages in the landscape can be simplistically divided into three basic system layers, according to their process dependence on the basic characteristics of the environment and on the human population living in them, but mainly according to **the nature of the regularities governing these relationships** [Löw, 1995].

The primary system is governed by **ecological** (natural) regularities and forms the basis of our existence. Our goal in this system is a balanced ecosystem distribution of solar energy to all organisms.

The secondary system is governed by **economic** regularities. The aim is to satisfy the physical needs of man.

The tertiary system is then governed by **psychological** (mental and social) laws. Our goal here is the satisfaction of our mental needs.

In each landscape, according to these laws, some characteristics are dominant (e.g., in many megatypes of European landscapes, climatic characteristics, depending primarily on latitude, altitude and proximity to the ocean, in others depending on the intensity of agricultural use, technical buildings, etc.). However, when dealing with landscape issues, we cannot exclude any of the systems.

Above all, we must always find out what landscape-ecological relationships shape the landscape and limit other activities. Within these limits, we have to find out how fertile and suitable the landscape is for meeting our material needs according to economic laws and how we would like to live in this landscape according to psychological laws.

Each of the systems can be divided according to the spatial-functional laws into *platforms – habitats* (topos) *with certain functions*, determined by common properties and types of transformations taking place in them, and *transport systems* that connect them and mediate the movement of matter and information between them. The movement between the surfaces is governed by the movement of a given "carrier" – the transport medium. The complexity and professional differences within landscape systems logically lead to their most autonomous, individual solutions.

Capturing these parts of the solution can be done autonomously in a form of a comprehensive solution to specific aspect (hereafter generel)

8 On landscape planning issues – Miklós, 1990; Růžička, 2000; Sklenička, 2002; Kozová, Pauditšová a Finka, 2010

For the primary system, these are mainly:
1. Generel of biogeographical units, their natural potentials and risks
2. Generel of transport by geological processes
3. Generel of transport by flowing water and air and their regulation
4. Generel of transport by actively moving biota and their regulation

For the secondary system, these are mainly:
5. Generel of primary production (agriculture and forestry)
6. Generel of settlement functions
7. Generel of transport service (transport of raw materials, products and people)

For the tertiary system, these are in particular:
8. Generel of spirituality in the landscape
9. Generel of festivities in the landscape
10. Generel of hunting, fishing and conservation
11. Generel of alternative agriculture
12. Generel of tourism and hiking
13. Generel of temporary nature residency
14. Generel of compositional links and landscape values

In addition to these mandatory generels, there are of course local systems that can also be supported by generels.

The basis of landscape creation is not an attempt to create a work of art, but to create an environment for our lives – both tangible and intangible, and often by means that are completely non-compositional. We must not forget that the landscape is a space shared by all, and changes in it must be made by a broad consensus of all.

Even architectural and urban design within these frameworks must respect all the given features, both at the level of a visually continuous place and at the level of entire landscapes.

The scale at which the landscape is created is important for the manner and detail of the solution, and the detail of the solution is practically determined by it.

1.4 Basic creative methods for creating rural landscapes

There are basically four methods of creating rural landscapes, significantly different from those of urban landscapes:
- modular system of generel solutions,
- framework vetoing the definition of regulations,
- teamwork of specialists,
- participation of users.

1.4.1 The building block system of generel solutions

As already stated, comprehensive understanding of the landscape context is very time and labour consuming and there is a risk of input data becoming outdated before the draft plan is completed. This requires a modular, generel solution, which is also partly used in today‘s spatial planning (e.g. spatial technical documents). Thus, landscape planning documentation can be divided into comprehensive and independently interchangeable blocks – generels (see previous paragraph) and their synthetic processing.

It is a set of autonomous generels of individual subsystems (they are independently functional and independently administered by departments), which should be harmonized and compositionally managed to create a modular system according to the laws of relationships.

The following stages of the procedure can be defined according to the individual generels:
- surveys and analyses of current conditions – limits, regulations of generels;
- partial proposals for solutions – **generels of interests.**

Then it is necessary to find the consistency of the generels with each other – to determine the concept of the solution:
- By **superposition** of the individual generels, we can identify points of consistency or conflict between existing and proposed interests.
- When evaluating spatial-functional conflicts – **evaluating** generels, we look for possibilities of alternative localization of conflicting functions. Priority in the solution is given to the leading phenomena, i.e. those that are spatially limited (and there is no alternative solution) or must be spatially fixed for a long time (otherwise they are not worth creating – see the time dimension below), or other functions are existentially dependent on them. These leading phenomena (determining the layout) are not only of the longest term and part of the public interest, but above all the skeletal systems to which the rest of the landscape is spatially and functionally linked. These are necessarily: the continuity of the TSES, the drainage conditions (hydrological network), the slope and erosion hazard, the concept of transport services (local) and the dominant compositional relationships. They determine not only the preferred location but also the setting and orientation of landscape modules. Other phenomena are derived and can only partially modify the solution (sorted into landscape modules). Thus, a landscape layout concept emerges.

The result is a comprehensive solution proposal, the essential condition of which is the use of a framework vetoing definition. When a master plan becomes obsolete, it is replaced by a new, updated one, and only the comprehensive design needs to be amended according to its new facts (if it needs to be amended), while the rest remains valid (as a response to disproportionately large projects).

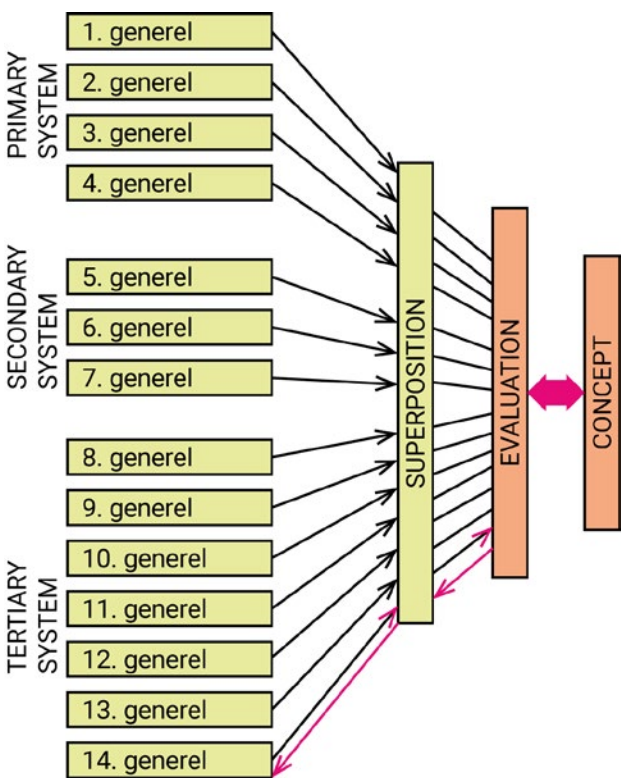


Fig. 4 Schematic of the modular solution of the landscape layout concept (reversibility of the process in case of obsolescence of the master plan is marked in red) [by J. Löw]

The essence of the regularity of functions in the generels, i.e. the “tools of landscape creation”, is the subject of Chapters 2 to 8.

1.4.2 Framework vetoing the definition of regulations

This is driven by the need to deal with the landscape from the top (in the context of whole landscape generels at scales of 1 : 10,000 and above) down (to the landscape complex details at scales of 1 : 2,000 and below) [Löw, 1995].

The framework vetoing regulatory delineation refers to two types of regulations:
- framework (negative) spatial demarcation (a),
- vetoing (negative) functional demarcation (b).

a) Framework (negative) spatial demarcation

The main principle is to predetermine the next solution as little as possible – only what is clear and immovable at a given level of solution within various spatial frameworks is defined. The consequence is that the landscape cannot be created and "built" in one go. Its solution takes place at different levels of detail – the more complex, the larger the scale and vice versa, with everything evolving over time.

In general, there are three levels of spatial certainty:
- **unambiguously** determinative, where the specification is clear and unchanging;
- f**rame-determining**, where a broader area is defined where the need is to be met and within which the location can be further refined according to other needs;
- **directional**, where there is a clear indication of the direction or space to be connected or defined, no matter how or by what means.

This means that we will only draw a precise boundary where it is clear and unambiguous that it cannot be otherwise. Each more detailed stage of the solution thus refines the demarcation within the given framework, up to the basic stage, which is today the municipal master plan.

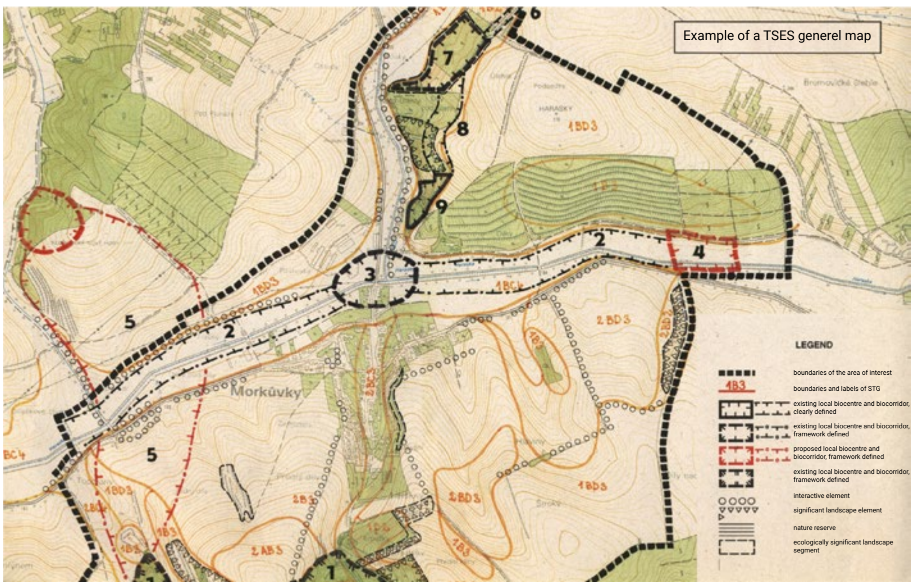


Fig. 5
Example of a TSES generel [Löw, 1995] with three levels of certainty showing elements clearly (No. 9, 6), tentatively (No. 1, 2, 3, 7, 8) and directionally certain (No. 4, 5)

b) Vetoing (negative) functional demarcation

The given functional zone only defines what is clearly unacceptable from a given perspective and scale. Everything else is possible, unless further restricted in a more detailed landscaping. This delimitation is done by means of framework regulatory zones.

Table 1
Example of the framework regulatory zones in the Pálava Regional Plan [Löw & spol., 2000]

type of restriction = prohibition \ number of the regulatory zone where the restriction applies										
prohibition of	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
fertilisation and other nutrient enrichment		*	*							
application of fertilisers and slurry										
fertilisation above the technological minimum				*	*	*		*	*	
use of biocides		*	*	*				*		
use of biocides outside special crops						*				
agricultural use of soil, unless it is part of the management of protected areas		*	*							
agriculture outside grassland and pastures										
expansion of areas of special cultures						*		*		
holoculture forms of forestry										
recognised game reserves and pheasantries		*	*							
terracing	*				*					
landscaping outside the needs of nature conservation		*	*		*					
activities lowering the groundwater level		*		*	*	*	*	*	*	
cancellation of paths and land consolidation	*								*	
mineral extraction		*			*					
surface mineral extraction			*	*				*		
all constructions								*		
construction of above-ground structures		*	*							
construction of residential and recreational buildings										
construction of above 1 storey buildings	*			*		*				
construction of above 2 storey buildings					*		*		*	
construction of above 4 storey buildings										
operation of waste disposal sites	*	*	*	*	*	*	*	*	*	
introduction of geographically non-native wild species	*	*	*	*		*		*	*	
disturbance of preserved landscape features	*							*		

This method is also developed for a top-down planning system and only at the level of municipal plans do we get to the final form of land regulations.

1.4.3 Teamwork of specialists

Obviously, no single person can perfectly understand so many professions and their generels (the Renaissance is over), so landscaping is a team effort, requiring the involvement of a number of specialists. At the very least there is a need for:

The coordinator or also the spatial planner (fulfilling the main essence of the profession of landscape-urban planner), who cannot understand everything, must however be able to understand the "professional languages" of the specialists and to interpret for each other. Therefore, he or she must know at least roughly the subjects of interest of the specialists. The landscape coordinator is thus a potentially new and important profession[9].

Obligatory specialists:
- biogeographer, biologist, landscape ecologist;
- agricultural engineer – agrotechnician, meliorator, forester;
- traffic engineer, urban and landscape engineer, water engineer;
- urban planner.

Specialists mainly work individually on individual generels (see chapter 1.4.1) and in teams

9 Some university disciplines fight for it (gardeners, geographers, meliorators), others get rid of it by mistake (urban planners).

participate in the superposition of generels and their evaluation, they also co-author the overall concept.

Local experts

- needed especially in tertiary systems, they are in fact experts of the local landscape, whose knowledge eliminates mistakes and omissions of the design team.

1.4.4 User participation

Landscape is also defined by the European Landscape Convention[10] as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*". It is important to note that it is ‚as perceived by the population'. This means that the landscape is not primarily a matter for experts, but mainly for those who live in the landscape and sense it in some way. However, in our state concept, there is a shift from participation to officialdom, which is a mistake – the values of the landscape and its character *should be owned by the inhabitants*. While SEA (Strategic Environmental Assessment) and EIA (Environmental Impact Assessment) provide a platform for all views to be expressed, the real views on the values of the landscape must be sought from the indigenous people.

Participation has two basic aspects:

Participation of users and owners – the guiding principle is to seek consensus even with the smallest interests in the area by personal discussion with key residents (the most affected owners), both by personal contact at home, and by public discussion during any debate, even in the pub over a glass of beer.

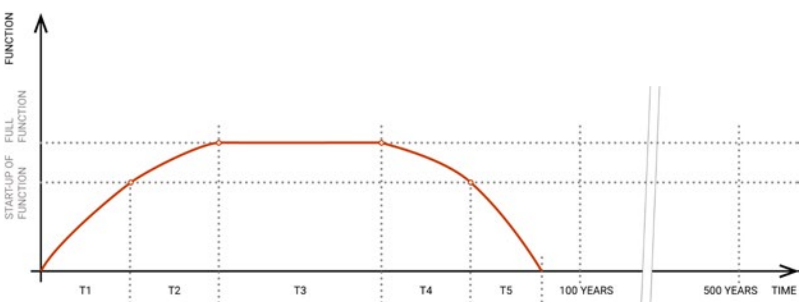
Participation of group spokespersons (mayor, parish priest, chairmen of associations – those who are generally respected by their fellow citizens). When exploring the views of the population, it is sensible to use group spokesperson interviews, exploring what the spokesperson thinks about their fellow citizens (i.e. not themselves) opinions. In collaboration with them, decisions are made about their perceived values of the distinctiveness of their landscapes. The basis for this is primarily a master plan – an analysis and creation of the landscape composition.

1.5 Specific methodological aspects of landscaping

1.5.1 Time dimension

Every function in the landscape is subject to time. Both natural formations and our buildings are subject to the ageing. If the passage of time manifests itself in the city in a sort of distinctiveness (most buildings have a similar lifespan), it is much more complex in the rural landscape. Fluidly, one function begins, another is in full force and a third is just dying [Löw, 1985]. Moreover, cyclic ecological succession means that different successional stages keep repeating, but the same ecosystem can look completely different at each stage.

Basic general characteristics of the development cycle (function lifetime)



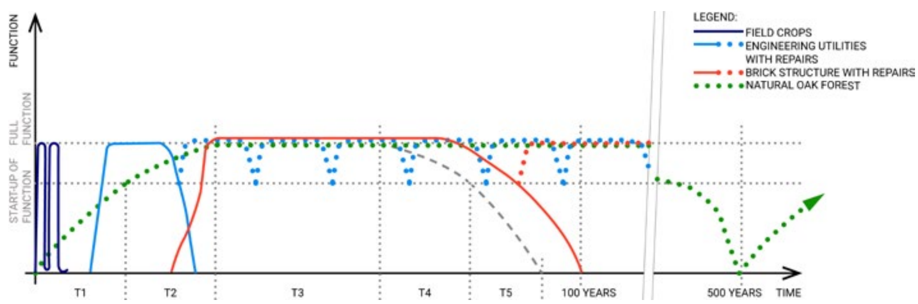
Graph 1
Duration of function in the landscape [after Löw, 1985]

10 The European Landscape Convention, Florence 2000, also the results of the Czech Ministry of Environment (MoE) research project (VaV) 640/6/02 *Ensuring the implementation of the European Landscape Convention in the further activities of the MoE.*

The total duration of function (T1–T5) in the landscape ranges for each function from months (field crops) to **years** and decades (orchards, vineyards, steppe fallows, drainages, light structures) and **centuries** (all structures, short-aged forest cultures) to **many centuries** (natural forest ecosystems, but also oak woodlands, peatlands, etc.)

Individual time periods are also important when considering the functional use of the territory, e.g.:
- *T1* indicates how long after the implementation of a project it will begin to function (for houses it is even 1 month, but for forests from 10 to 50 years).
- *T1+2* indicates how long it takes for the function to start to be fulfilled (for a house again in 1 month, but for a forest in 50-120 years!). So, it is not worth creating a function if we cannot keep it in place for at least the same length of time.
- The period *T1+2+3* tells us what time is economically optimal for the duration of a given function at the same location.
- The period *T4+5* indicates the duration of the gradual weakening of function until its natural extinction.

The landscape is thus a mosaic of functional areas, each of which not only has very different T-characteristics, but these are of course also shifted in time relative to each other. In the landscape, some functions are constantly "dying", some are "in full force" and some are just emerging.



Graph 2
Comparison of the duration of selected functions in the landscape [after Löw, 1985]

Thus, there are **functional areas with very different "spatiotemporal stability"** (another parameter of ecological stability). This co-determines the importance of a good and long-term localisation of the function.

Paradoxically, the lifetime of buildings is determined in the Income Tax Act (depreciation)[11].

These characteristics are applied in landscaping mainly in three aspects:
- changes in the action of the function in the area,
- the lifetime of the function and changes in its location,
- design periods.

a) Changes in the effect of the function in the area

The most common example is the economic cycle of forest cultivation – four basic growth stages of forest:
- young, unconnected forest covers aged 0–30 years – does not form a forest environment (stage T1);
- Engaged forest covers of younger and middle age 20–80 years – starts to act as a forest (stage T2),
- developmentally mature forest covers 60–150 years – clearing period – 40 years willows, poplars, 80–160 years spruces, 120 years beeches, 140–160 years oaks (stage T3);
- forest decay stage of 120–180 years or more – it is preserved only in the countryside where no timber is harvested (stage T5).

The whole cycle of repeating stages in a natural forest is therefore up to 450 years, but in a normal

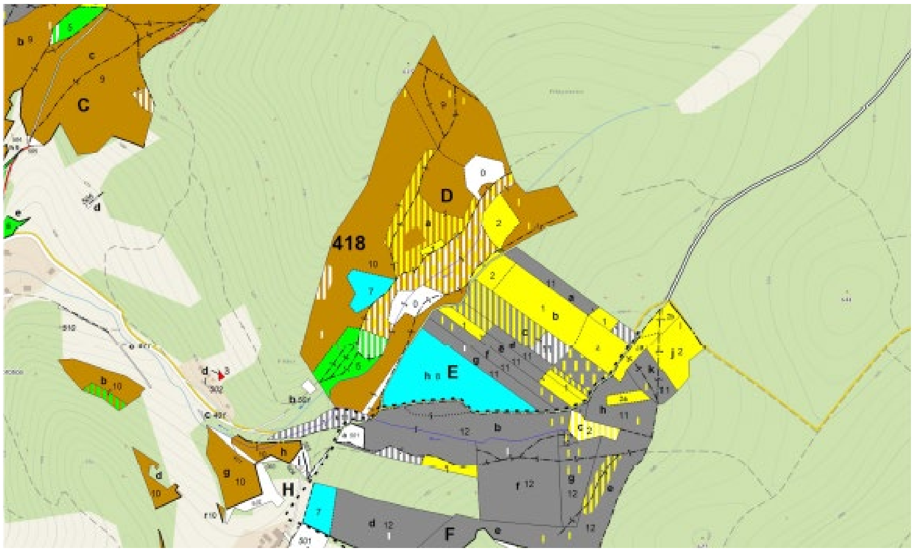
11 Act No. 586/92 Coll., on Income Taxes, as amended

economically cultivated forest it is only 160 years – without the decay stage!

The appearance and other uses of the forest area change naturally. However, most of our politicians do not know this and ridicule themselves (see the decay stage in the Šumava National Park). It used to be common that someone built a hut by the forest, but in a few years the forest was cut down and they lived in a forest glade.

And even greater consequence can be brought in time by the completion of a previously built house in the vicinity, which will significantly affect its price (view of the apartment blocks instead of the landscape).

Fig. 6
Example of a forest age structure map (ÚHUL, 2020): the blue-green areas will be in the territory for decades to come, the grey areas will probably be harvested within a few years



The ageing of houses, changing their functional effect, is a completely architectural case. Houses change – they get older and are repaired (the materials used should allow an easy maintenance), extensions are frequent (the layout of the house should allow additive changes), they adapt functionally (ease of changes in layout – skeletal construction, easily replaceable material, etc.).

b) Lifetime of the function and changes in its location

In terms of time, the landscape (including the urban one) appears as a "building with load-bearing (long-term) walls", with dividing walls, partitions, and furnishings in between. However, the load-bearing walls of the landscape in this case are not the houses and roads (lifetime of only 90 years) or utility networks (10–30 years), but the forest communities of protected areas and the TSES (120–600 years!), the relief, the river network, etc.

The most long-term functions are thus:

In the scale of millennia:
- georelief (slopes, slope faults and valley shapes) – for our case geological time
- soil – soil-forming processes
- specific natural communities, e.g. peatlands

In the scale of centuries:
- natural forest communities (but also some other communities of specific habitats), spontaneously developed in reserves and TSES – 100 years (soft meadow), up to 600 years (oak woodland)
- long-established forest cultures – from 80 years (spruces) to 160 years (oaks)

These are virtually unchanging, fixed boundaries, defining the space for all other proposals. It is not sensible to propose these changes for less than the full period of function (the well-known housing estate paradox – prefabricated houses are built and then trees are planted, so that when the trees grow up and start to fulfil their function, the buildings are ripe for redevelopment or reconstruction).

In the scale of decades or less:
- all types of permanent structures (brick and concrete) – houses and transport structures – 70–90 years (without additional repairs and maintenance)
- lightweight buildings (steel, wood) – 30–40 years
- utilities, land reclamation – 10–30 years
- intensive orchards and vineyards – 10–30 years
- turf restoration in pastures and meadows – 6 years
- field cultures – 1–2 years

The aforementioned functional land uses are the subject of the specific landscape management proposals.

Thus, as with hall buildings, the responsible designer tries *to limit the load-bearing structures as much as possible in terms of space (as much span as possible)*, so that they do not unnecessarily block the development of other functions (as with a building skeleton)! On the other hand, long-term facilities are high on the hierarchy of values. For example, a regional bio-corridor is often relatively free when it is traced, but once it is definitively delineated, it must be protected in that location for centuries.

c) Design periods

Architects sometimes mistakenly think that they are building "for eternity" and that their proposed state is final. For example, to locate a regional biocentre in an oak woodland means to ensure its existence for at least 600 years! This is completely beyond any forecast. To get a better idea of the accuracy of our ideas about this period, it is useful to compare the present with the ideas of scholars about the present world and the city 600 years ago (in the 15th century). Our estimate of the future will be equally probable. Likewise, note the unpredicted but natural development of houses built even recently.

At present, in the spatial planning system, the spatial plan is reviewed every two years, but in fact the actual design period is longer and more complex. The basic scheme is as follows:
- *the design period is 20 years* – it is a proposal for a "target" state of the landscape, which reflects the views of the time when the plan was created, but it will never be completely fulfilled, because "life changes"
- *a new plan is made after 10 years* – by the middle of the design period it is already clear how much reality deviates from the ideas and a new plan is made again with new (learned) objectives
- *in the meantime, corrections are made to the outdated parts of the generels* (as is now the custom), continuously correcting both the respective generel and the comprehensive creation.

Longer-term proposals must therefore be taken as a recognised necessity (in response to this, for example, we will make the biocentres as small as possible and their network as sparse as possible, yet functional).

1.5.2 Energy-material transformations

While in urban, built-up areas, the intensity and use (i.e. what happens on site) for a given function is automatic, in vegetated areas it is different and the main process, i.e. the transformation of different forms of energy in ecosystems, is highly variable. Processes at two energy levels take place in vegetated areas:
- at the basic energy level (without additional energy – only with renewable resources), depending on the potential of the place (the energy of the relief is determined by water, air currents, biomass production, muscle power), natural ecosystems are formed, including their production
- at the subsidised energy level (with additional energy in the form of conserved hydrocarbons, nuclear heat, artificial energy distribution) the process always involves importing additional energy

and depleting it:

- in construction/technical areas (industrial production, housing, services, culture, etc.) where additional energy and raw materials are always present
- in animated areas, where the flow of energy and nutrient cycling creates anthropically conditioned ecosystems – endowed with nutrients for production and energy for cultivation (fields, forests, permanent grasslands, orchards, etc.).

The overall sustainability of ecosystems is indicated by the production of greenhouse gases, most commonly by CO_x, creating a carbon footprint through the amount released into the atmosphere.

At the basic energy level of an ecosystem, there is always a slight excess of oxygen over CO_x in the balance, and at various times carbon has been gradually conserved in the ground as fossil fuel. A significant proportion has also been and is bound as $CaCO_3$ in the shells of animals, particularly aquatic ones (limestone).

At the subsidized level, CO_x is in excess, due to the rapid and massive burning of fossil reserves (i.e., the huge return of CO_2 to the atmosphere), as opposed to the slow deposition earlier.

The consumption of the Earth's productive area for our economic activities (the so-called ecological footprint) can be calculated by area (there is 1.5 ha of productive area per person in the world). In the Czech Republic, however, it is 0.752 ha of production area per person. Our ecological footprint is therefore double that of the world (there are twice as many of us as there should be). Our, mainly agricultural and industrial, land use is therefore not sustainable.

However, we are only interested in transformations if they affect spatial solutions, especially in ecosystems!

Intensity of primary production use

The link of biomass production to the development of producers – it depends on the natural fertility of the soils and their use (e.g. natural composition of trees in forests, ponds). This includes determining which areas must not be subsidised by nutrients or foreign substances (TSES, nature conservation, water sources, eco-farms, etc.). The natural fertility, determined by the local climate and the nutrient supply of the soil, is expressed by the categories of soil ecological unit. The lower the numbers, the better the conditions for energy and material transformation – the four best soil ratings are still protected today. The most common soils in our country are moderately fertile – Cambyses (brown soils) (45 % of the area), the most fertile are black soils, brown soils and fluvis soils (30 % of the area). Their fertility (yield of black soil is 18,000 CZK/ha) is many times higher than that of infertile soils (yield 1,200 CZK/ha)! *There are significant differences among the types of arable land.*

Linking biomass production to nutrient cycling – production of plants and associated phytophagous organisms, especially livestock. Biomass production by producers in the landscape determines food sources for phytophagous plants – for our livestock (especially ruminants) and eventually for us. It also determines their overall profitability. Given the notoriously nutrient-poor cropping practices, the return of nutrients from biomass to the soil in the organic form of manure is equally important. Adequate soil loading with phytophages is thus as important as the amount of production. The phytophagous load of the soil and the extent to which it meets its nutrient requirements is expressed in terms of the number of "livestock units (LU)" per area. LU is related to the weight of the herbivore (1 LU = 500 kg), so that cattle and horses represent 1 LU, young cattle 0.6 LU, foals 0.4 LU, calves 0.2 LU, and sheep and goats 0.15 LU. A reasonable average phytophagous soil load in our country is about 1 LU/ha – this provides sufficient field yield and return of the necessary nutrients back to the soil. It is important to note that the return of nutrients to the soil is also associated with the excreta of litter-free pig and poultry farms, etc. If the concentration of animals exceeds 500 LU relative to the average, total agricultural land area of a rural settlement (in the ploughland), the concentration of nutrients in the manure is too high (the crops would burn) and thus distribution distances of tens of kilometres must be established around higher concentrations! The issue of nutrient return to the soil is therefore complex and goes well beyond the boundaries of individual areas.

In the spatial creation of rural landscapes, these non-spatial relationships are fundamentally important and must be considered.

Fig. 7
Landscape modules dividing the landscape

1.5.3 Landscape modules

Different subsystems in the landscape often have different but reoccurring spatial demands. Similar to urban development (e.g. block development), different modules exist for different facilities in the rural landscape. These are mainly based on the natural relationships and characteristics in the landscape and the necessary density of their presence in the landscape.

These subsystems include in particular:

TSES, in which the basic spatial module is the distance of biocentres and biocorridors determined by the maximum possible length of the biocorridor. The latter is 700 m for a regional biocorridor (length of a single biocorridor) and 8,000 m (length of a composite biocorridor with inserted local biocentres). For a local biocorridor, it is 2,000 m (length of the biocorridor) and for interaction elements 200–1,000 m (the range of its potential impact on the surrounding field). The basic module is thus approximately 2 x 2 km.

Heterogeneous living territories of fauna, where different species of organisms have a different range of their territory from the interaction element to the surrounding landscape (from tens of meters over 200 m, 500 m, 1,000 m, 2,000 m to tens of kilometres). The basic module of a field landscape from this perspective is about 1 x 1 km-

The density of watercourses in the landscape is determined by the distance of permanent drainage lines. However, it is also determined by the changing georelief and ranges from 200 m to 3000 m, but mostly around 1 km.

Wind erosion in an open field landscape is usually limited by a network of windbreaks. Their efficiency perpendicular to the wind is a maximum of 200 m in front and 400 m behind them, i.e. 600 m in total.

The distance to rural settlements, which is determined by the extent of the pluvial (ploughed landscape around a rural settlement) is (outside of dispersed settlements) approximately 1 200 m. The average distance between settlements in the rural landscape is therefore about 2.0–2.5 km.

Transport access to land is provided by a network of main and access roads to fields and approach roads in forests, where the distance in fields is determined by their size, in forests by the accessibility of individual departments. The length between the edges of the fields with roads ranges from 1,000 m to 2,000 m.

The size of agricultural land is now of a national average of 10.8 hectares, but this hides a large number of very small remnant plots, allotments and gardens. However, most of the cultivated area is made up of 100 hectares and larger plots. In terms of cultivation, the actual optimal plot size is 20–30 ha (varies according to fertility).

The effective length of *the farmland cultivation* is from 560 m to 1 500 m depending on the site and the machinery used. For shorter lengths, the machines are constantly turning, for longer lengths they compact the soil unbearably. A length of 1,000 m appears to be a reasonable cultivation module.

Separate farming units can be derived from the holdings of larger farmers ("kulaks") representing 2 "láns", i.e. about 35 ha. When divided into a minimum of four parts of an alternating farming system, these are 4 nine-hectare plots with optimum dimensions ranging from 600x150 m to 1,500x60 m.

Human perception of space – physiological parameters of human perception are of great importance for the perception of landscape. Perspective vision includes a distance of 1,000 m, colour vision 3 km (at a distance of 2–5 km convisual units are obvious) and visibility itself about 30–40 km (supervisual units are obvious).

- If we adopt a large but acceptable generalization, *we get the multiplicative modules of different landscape edges* – lines:
  - **250 m** – the edge/line enlivens the landscape, identical to a change of field crop and means an increase in the biodiversity of the production areas, but also in the infiltration of surface water into the soil.
  - **500 m** – the edge/line introduces a range of less mobile species of organisms into the landscape through interaction features, for which it provides essential components of their ecological niches. It is also a module of windbreaks. It consists of linear vegetation of narrow boundaries, alleys, and service roads. It is therefore a detailed module of erosion protection of fields and territorial protection of ecological stability.
  - **1,000 m** – the interaction elements here provide essential components of ecological niches for well-moving species of organisms, which also participate in the food webs of agrocenoses. It is also a module of the permanent water network, maximum length of fields and access roads. The lines are accompanied by belt vegetation, wider mesas, terraces, stream bank vegetation, etc. It is therefore a relief module of erosion protection and supporting pillars of territorial support for ecological stability.
  - **2,000 m** – the component parts of the local TSES here ensure at least a minimum level of biodiversity and preservation of the local gene pool. This is also the limit of the maximum size of the coniferous units. It is therefore a relief module of biodiversity of our landscape and its perception.
  - **8,000 m** – spacing between the component parts of the regional and supra-regional TSES and other regional structures. These are the Europe-wide supporting pillars of biodiversity!

To achieve the greatest possible variability of further development, the degree of necessary spatial stability of landscape modules must also be considered. Centuries-old cycles concern natural communities and their areas – their functional areas are important for the regional TSES and the network of specially protected areas. Their module is at least 8,000 m. This module of the landscape layout is the main and largest one, but it varies according to the arrangement of biochoras, where the location, i.e. the spacing of regional biocentres in the landscape, is crucial.

The spatial orientation of the modules is governed by the compositional axes of the macrorelief (in particular the valley floor), the prevailing wind direction, the directions of the biogeographic continua and the main access routes.

1.6 Methods of comprehensive landscaping in spatial planning documents

The scale at which the landscape is created is important for the manner and detail of landscaping in spatial planning documents, and the levels of landscaping are practically determined by this scale.

1.6.1 Scale of landscaping

The solution scale is an automatic expression of the level of detail of the solution:

- 1 : 100,000 – these are mostly state maps, which are simplified, but they show land registry.
- 1 : 10,000 – again, these are state maps representing the basis for a comprehensive landscaping. The scale is so detailed that it allows detailed recording for the design of important facilities. However, a full division into parcels is lacking. Therefore, reduced 1 : 5,000 parcel maps are also used.
- 1 : 5,000 – these are state maps intended for the extravillan of the municipality, the land plots are marked in them.
- 1 : 2,000 – these are maps of the real estate registry intended for the intravillan, they are very detailed.

It can be concluded that the small scale provides a general overview without any detail. The large scale is detailed but can be unclear. In small scale maps (1 : 200,000 or more) it is possible to work with so-called watershed phenomena such as roads, rivers, forests, and entire settlements. Medium scale maps (1 : 5,000 and above) show houses and their blocks, the road network, watercourses, major crops, land blocks). Large-scale maps (1 : 2,000 and above) show land boundaries.

Today, maps can be obtained digitally, for example, from the website of the Czech State Administration of Land Surveying and Cadastre (ČÚZK)[12].

1.6.2 Level of solution

In terms of concept and scale, several levels of rural landscaping can be distinguished.

The global level is represented by the Spatial Development Policy of the Czech Republic, a document that decides on the future direction of individual areas of the state (designates development areas and corridors, marginal – specific areas). The document effectively divides the landscape into urban or rural and productive or marginal or natural landscapes.

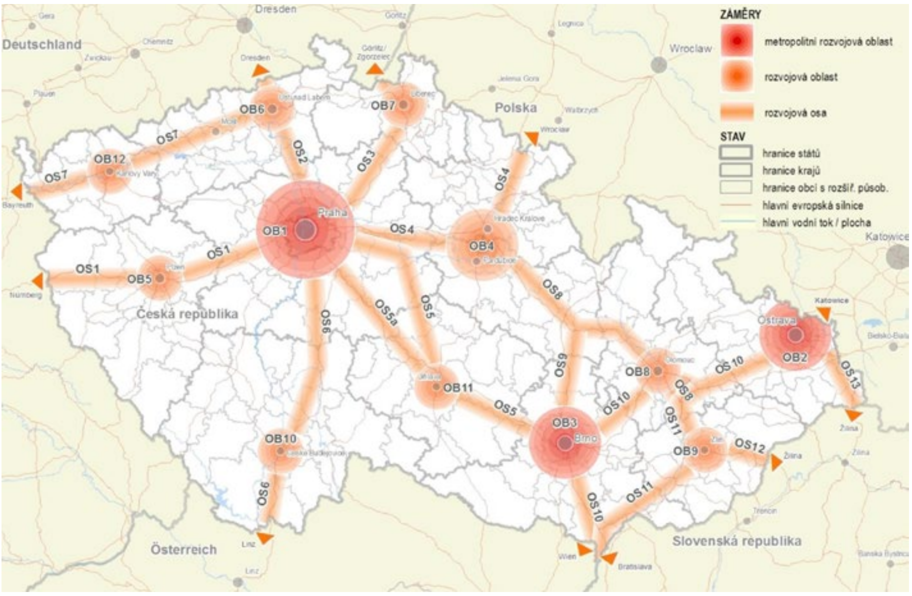


Fig. 8
Ministry of Regional Development of the Czech Republic – diagram from the Spatial Development Policy, 2019

Development areas and development axes - red and orange points (areas) and lines (axes)

12 ČÚZK: www.cuzk.cz

The regional level of landscape solutions is represented by the regional development principles. The document still has a global level but identifies where the landscape requires more detailed solutions through a spatial study with "supra-local" detail. It is the scale and scope of spatial studies that is currently the basic platform for attempts to comprehensively address landscape creation in a broader context. The elaboration of spatial studies of the administrative areas of individual municipalities with extended competence can and must be extended to include landscape character areas, cultural landscape areas and framework regulatory zones.

A scale of 1 : 10,000 is most appropriate for rural landscapes.

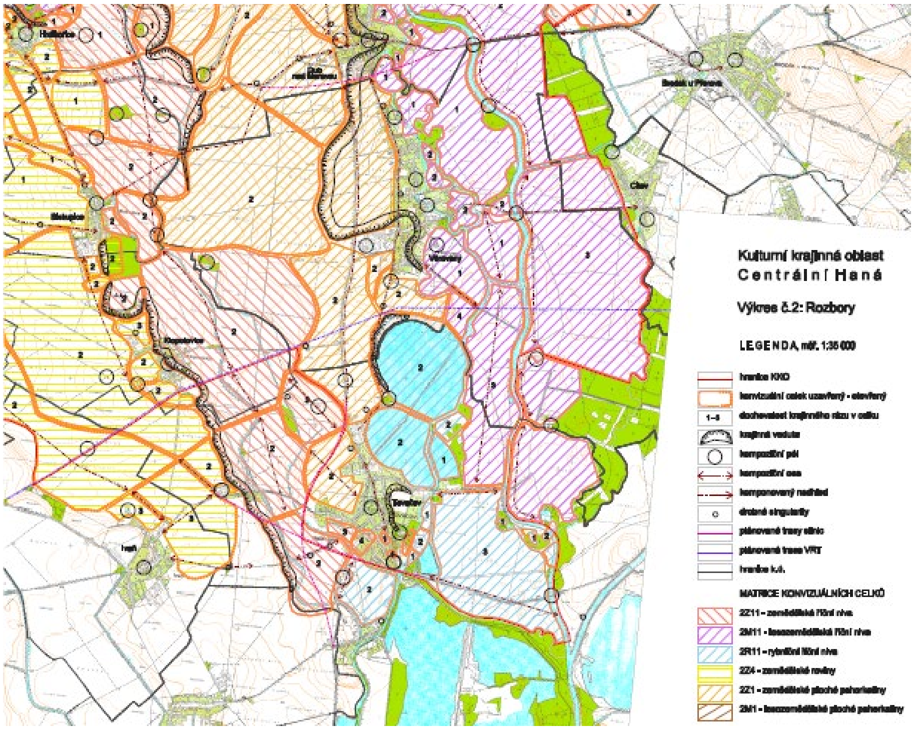


Fig. 9
Central Haná cultural landscape area – analysis of territorial values, generel of landscape character [LÖW & spol., 2014] (orange boundaries = super-visual compositional units)

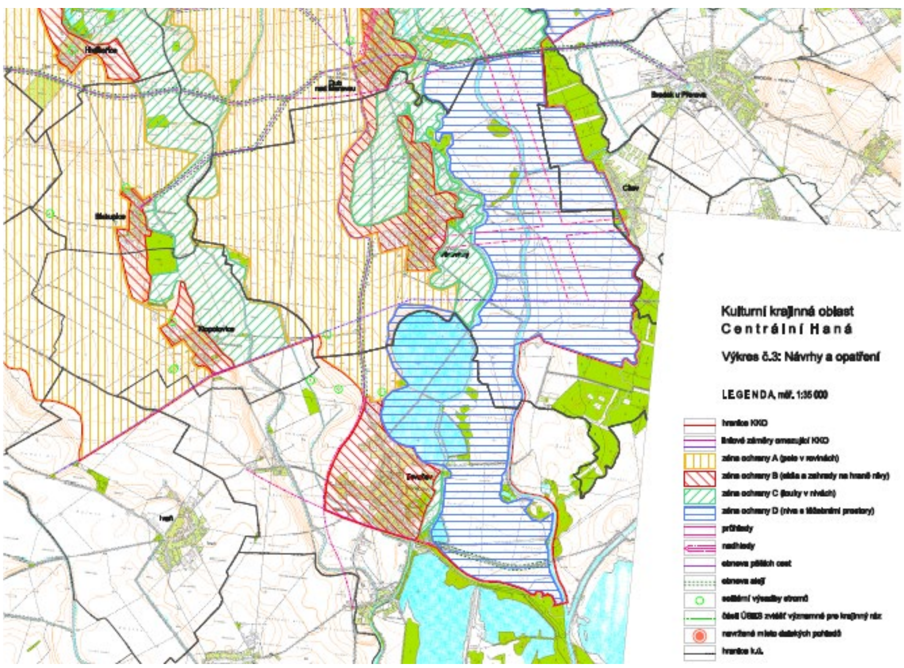


Fig. 10
Central Haná cultural landscape area – draft of framework regulatory zones A–D [LÖW & spol., 2014]

The local level of landscaping is represented by the municipality master plan providing the basic landscaping, where the creation from the higher category is always a framework limit, which is refined as needed. It represents the main level of landscaping with the identification of specific areas, lines, and points for specific functions with a clearly defined use regime. Here, too, there framework regulatory zones may occur as boundaries for land-use and forest management plan proposals and for the actual land-use management.

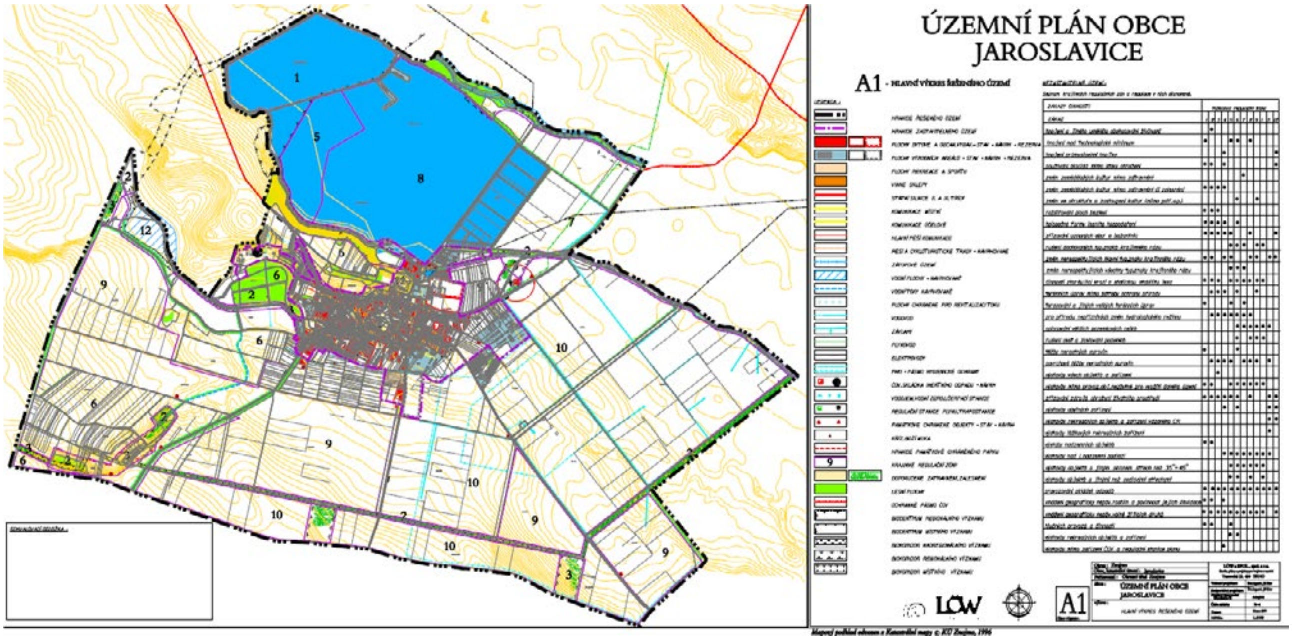


Fig. 11
Comprehensive proposal in the zoning plan with negatively defined framework zones (black numbers) and a table of framework limits and regulations in the zones [LÖW & spol., 1999]

Concluding remarks on the chapter

Every landscape is different, and all theories and mechanical procedures can be modified or even lost in it. The main recipe is, equipped with theoretical knowledge, to walk the landscape and get to know it. Landscape is an outdoor but defined space that cannot be described by painting views from selected viewpoints, but only by personal experience of moving around it. By moving through the landscape one can create a mental map, a picture of all its changes, characteristics, and peculiarities.

Spatial planning lacks the main instrument for change – mechanisms for its implementation. Therefore, spatial planning should be followed by essential implementation documents – agricultural land improvement projects (preferably comprehensive), forest management plans. **These are the real implementation phases of landscape change.**

2. PRIMARY LANDSCAPE SYSTEM – GEORELIEF

The primary landscape system consists of spatially functional features that are **governed by purely natural laws** (natural conditions, hydrological network as a reflection of the relief, natural ecosystems), i.e. without the influence of man as a thinking being.

Schematically, it is made up of **little areas = habitats** with certain natural conditions and certain organisation of communities in them with corresponding energy-material processes and their potentials (from Latin potentia – possibility, power, strength). These habitats are interconnected by **transport systems** of substances and information [Forman and Godron, 1993]. Habitats can be modal (identical), contact (related), and contrast (boundary).

The primary system is the domain of environmental disciplines of natural sciences, agriculture, and forestry, but the architect – urban planner, who is the coordinator of the specialists and their outputs, also applies here.

The primary system manifests itself in areas by certain natural properties and the ecosystems that use them (energy-material transformations). The moment we intervene in the primary system, we have to deal with the induced changes.

2.1 Landscape habitats and their potentials

They are based on the basic characteristics of *internal – endogenous* (mainly geological) and *external – exogenous* (mainly climatic). It is necessary to distinguish between the natural characteristics of a given habitat and its suitability for different uses – potentials. Potential must always be related to the specific exploiting interests (e.g. the potential for agriculture may be high, but for raw material extraction zero).

The natural landscape system is based on *geosystems* (especially rock types, mountain-building activity and geological faults) and *climate* (rock weathering and soil transport).

The fundamental habitat conditions of the *georelief* [Demek a Zeman, 1979] are derived from the relief and climate, shaping the ecosystems that evolve within them.

Individual natural habitats are thus shaped

- by georelief,
- by the rocky environment,
- by climate,
- by soil,
- by water supply,
- by natural communities

into ecosystems, their biodiversity, ecological stability, and suitability for different human activities (potentials).

2.2 Georelief

One of the main features determining the formation of the landscape is the georelief [Demek, 1987]. Together with other, derived properties, it determines all the events in the landscape. To capture these properties, the **biogeographical division of the Czech Republic** serves to broadly subdivide the landscape into *Hercynian region* (Hercynian Forest = the Bohemian Basin, Bavaria, Saxony and the surrounding mountain ranges), *Carpathian region* (the arc of the Carpathian Mountains with the foothills) and *Polonian region* (the Great Polish Lowlands) together within the *central* ***European broadleaf forest province*** and western Pannonia (the Vienna Basin and Moravian lowlands) within the ***Pannonian province***. Thus, 4 regionally distinct arrangements of landscape ecosystems operate in our country. Within this subdivision we can distinguish 19 distinct georelief framework types [Typologie české krajiny, VaV 640/01/03].

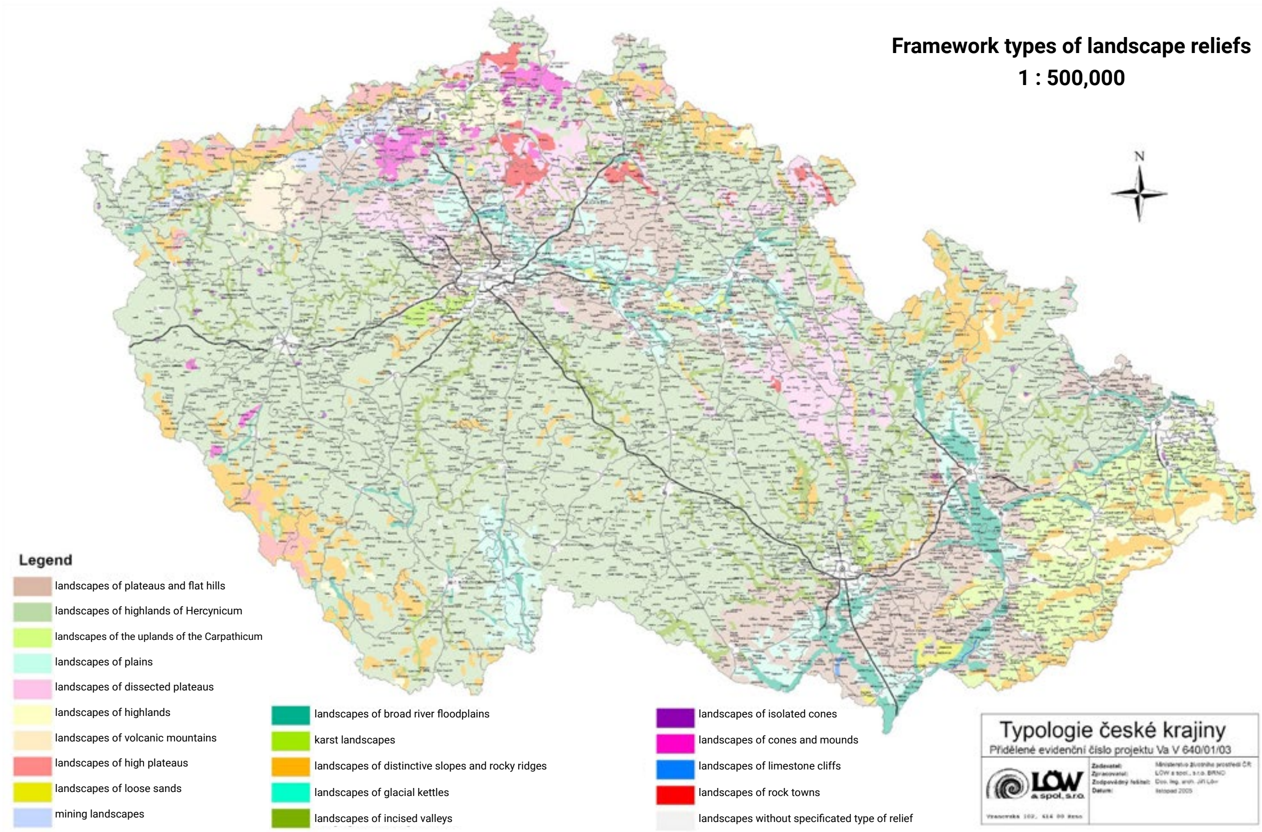


Fig. 12
Types of georelief in the Czech Republic [Typologie České krajiny, VaV 640/01/03] – the most common, green are Hercynian uplands, brown are plateaus and hills, the others are rarer to exceptional landscapes

Framework types of georeliefs

Common:

- landscapes of plateaus and flat hills (about 12% of the country´s area)
- landscapes of indented hills and uplands of Hercynicum (about 51 % of the country's area)
- landscapes of indented hills and uplands of the Carpathicum (about 4 % of the country's area)

Rare:
- landscapes of plains
- landscapes of dissected plateaus
- landscapes of highlands
- landscapes of volcanic mountains
- landscapes of high plateaus
- landscapes of loose sands
- mining landscapes
- landscapes of broad river floodplains
- karst landscapes
- landscapes of distinctive slopes and rocky ridges
- landscapes of incised valleys
- landscapes of cones and mounds

Unique:
- landscapes of limestone cliffs
- landscape of isolated cones
- rock pillar landscapes
- landscapes of glacial kettles

Within these frameworks, we can define **17 main individual types of georelief layout**, which predetermine their basic spatial landscape characteristics and thus also partially predetermine their internal layout.

We can divide the types into three groups – according to the openness of the view:

A – Open landscapes	B – Semi-open landscapes	C – Closed landscapes
A1 – Broad river floodplains	B1 – Hillside	C1 – Basin
A2 – Moist basins	B2 – Broad ridge	C2 – Shallow broad valleys
A3 – Drier landscapes of the plains	B3 – Frontal slopes	C3 – Furrows
A4 – Lower plateaus and tablelands	B4 – Frontal foothills	C4 – Medium incised valleys
A5 – Mountain plateaus and flat tops of slopes		C5 – Deeply incised valleys
		C6 – Asymmetrical valleys
		C7 – Tub-shaped valleys
		C8 - Canyons

2.3 Open landscapes – A

Even though the plains are open relief, the low vantage points mean that the elevation of the trees also applies, making the landscape uncluttered. The vastness of the landscapes is therefore only apparent in distant views and overlooks.

A1 – Broad river floodplains

Flat surfaces, which are mainly composed of unconsolidated Quaternary sediments (Pleistocene gravels, sands, and sometimes also weathered sands and Holocene flood clays).

The floodplain is shaped and modified by two basic water regimes:
- normal flow – mainly horizontal forces (meanders and undercutting of banks)
- flood flow – vertical forces are added to the horizontal forces, so that after a major flood the area is partially realigned.

The floodplains are divided by watercourse channels with bends and meanders, blind arms, wetlands, aggradation mounds. Above the level of the floodplain there are also so-called hummocks – isolated accumulations of sand. These greatly increase the biodiversity of the floodplains. Wet and periodically flooded habitats are supplemented by dry, non-flooded habitats on permeable sands. The floodplain is usually divided into lower and higher levels.

Watercourse floodplains, or their edges, are natural migration corridors that have been used by humans since time immemorial. Floodplain margins (low terraces and alluvial cones) are one of the longest inhabited areas. The floodplains have undergone a fundamental change in their character over historical times. Massive medieval deforestation of the hills and uplands resulted in a change in the hydrological regime. The river floodplains began to be regularly flooded and the sedimentation of the floodplain clay increased considerably. From the High Middle Ages onwards, the floodplains ceased to be a suitable place for life and human settlement abandoned the floodplains.

The only fixed line in a natural floodplain is its boundary – therefore the floodplain inside is spatially indeterminate, difficult to cross and to use. However, the regulation of rivers has led to a partial prevention of regular flooding and to the deepening of watercourses. A large part of the floodplain meadows was converted into fields (a process that intensified during the collectivisation of agriculture). The landscape type thus loses its main geomorphological attributes and belongs (at least for the duration of the regulations) to the successor type. Groups of flooded sand and gravel pits occur in places.

Arable land now dominates the floodplains. Flood restrictions have also led to the expansion of settlements into river floodplain areas. However, spacious, flat land is increasingly at risk from flooding and regulatory measures are losing their effectiveness.

The supporting landscape systems to be respected here include the hydrological layout, where the aim is to hold back flood waves and their further, collision-free transfer downstream. This is an important source of groundwater. Intensive forestry depends on the irrigation of productive floodplain forests. In places, gravel extraction has created mining lakes. The floodplains should be avoided for traffic, crossing the floodplain requires wide flyovers. It is completely unsuitable for settlement.

Fig. 13
Flooded floodplain – soft meadow

Fig. 14
Dammed, non-flooded floodplain

A2 – Moist basins

Unlike river floodplains, they are not periodically flooded but permanently waterlogged. At present, there are ponds, wetlands, peat bogs, forests, meadows, and watercourses. The core of the Třeboň basin is an example. The basins have been filled with lakes (the range of basins from the western foothills of the Alps to the Caspian region). Drainage to the south was interrupted only in the Pliocene (about 4 million years ago). The entire basin area began to drain northwards and the river network gradually took on its present form.

The cooler and wetter habitats in the basins were settled later (mostly in the Middle Ages). The use of such landscapes is dominated by a mosaic of fields, forests, grasslands and typically ponds and wetlands.

The establishment of ponds, localised according to mesorelief shallow shapes, inevitably led to the destruction of native communities. However, this has effectively resulted in an artificial restoration of the Chalk lakes, and the ponds have been integrated into the landscape over time and are now seen as enriching the landscape with new types of habitats, otherwise rare in nature. Due to the flat topography, entire pond systems can be created quite freely in the landscape. The axes of orientation are faint, originally omnidirectional, but nowadays they are determined by the directions of the dykes and the traffic connected to them.

The supporting landscape systems that need to be addressed here include the hydrological network with the construction and recharge of ponds, forestry is more of a stabilising role, irrigation is ineffective, and wet habitats favour meadows. These are important sources of groundwater.

Fig. 15
Basin with ponds on the bottom

Fig. 16
Moist basin landscape

A3 – Drier landscapes of the plains

They mostly follow the flood plains in valleys, basins, and lowlands. They are flat surfaces of river terraces or pre-Quaternary sediments, overlain by variously powerful accumulations of eolian sediments (loess and silty sands with dunes). They are subtly dissected by shallow valleys of the lower reaches of smaller tributary rivers.

The warmer and drier plains have been inhabited since the Neolithic. They are heavily dominated in land use by arable land, especially on the sprays. The collectivisation of agriculture has replaced the traditional belt-like fields of long ploughland with large swathes of fields, forming a ‚shadowless landscape'. The most fertile arable land dominates, sometimes combined with windbreaks (Znojmo region).

They are often separated from the recent floodplain by a low step – the edge of the floodplain, over which they are open to the floodplain. This is a separate phenomenon, intensively used for settlements, which have been moved away from the floodplain since the Middle Ages, and together with orchards and vineyards often form urbanisation corridors (typically in the Lower Moravian Valley, they form a continuous belt of settlements from Břeclav to Hodonín and on the other bank as far as Otrokovice). The main, dominant axis of the landscape structures is the edge of the floodplain with the urbanised corridor.

Fig. 17
Typical field plain

Fig. 18
View from the subrecent terrace over the edge of the floodplain

Among the supporting landscape systems that need to be addressed here are intensive arable farming (the most fertile soils and climate), threatened by wind erosion eliminated by windbreaks, irrigation facilities to limit drought, ideal conditions for settlements and construction in general, but rightly limited by the protection of agricultural land. The lack of forests increases the need to implement territorial systems of ecological stability.

A rarity in this type are areas of quicksand – they have long been open and have the attributes of true sandy deserts. Today, they are mostly forested (pine trees survive extreme drought and needle fall stabilizes the soil surface) and the sands are stabilized. Although the economic yield of these forests is low, it is significant precisely by stopping the movement of sands under wind erosion.

A4 – Lower plateaus and tablelands

The plateaus were formed by the alignment of the georelief of solid rock by erosion and denudation during the Mesozoic and Tertiary eras. Their surface is mostly gently sloping and often undulating with shallow but distinct valleys, the margins are usually complex in plan, bounded by floodplains or shorter steeper slopes. The depth of the valleys gradually increases according to the erosion base. The large valleys, as a landscape basement, form their own enclosed landscapes that do not appear on the plateau. Even the marginal slopes no longer belong to the plateaus. In contrast to the plateaus, the surface is more rugged and there are numerous small watercourses. The orientation of the structure of the lower plateaus is usually derived from the watercourses; in the higher parts, the tops of the flat slopes form the orientation axes. These are landscapes typical of the Hercynian raised plains, especially in the transitions from lowlands to uplands, in the Polabí, Pomoraví and Poodří regions.

They have been inhabited since prehistoric times, although they did not take their final form until the Middle Ages. The use alternates between a mosaic of intensive forest areas, however ecologically unstable (spruce forests), and predominantly intensive arable farming. The original subdivision of the meadows was largely erased during the collectivisation of agriculture. The settlement network is expanding normally and without collision, as is the transport network. Typical is the use of block weathering of rocks for the construction of farm buildings.

The supporting landscape systems that need to be addressed here include water erosion processes associated with the washing of topsoil from the hilltops and the facilities to protect against it, part of the ever-protruding stone skeleton. The hydrological system needs to focus on local retention of rainwater. The territorial system of ecological stability should be protected and supplemented.

Fig. 19
Field landscape of tables

Fig. 20
Wavy platform

A5 – Mountain plateaus and flat tops of slopes

The wavy plateaus (the aligned surfaces of mountain peaks) were raised to higher elevations by later mountain-building processes. Like the previous type, they were also formed by erosion and denudation of solid rock, but unlike the lower plateaus, the relief is even more undulating. These are typical landscapes of the Šumava, Krkonoše and Jeseníky mountains. Peat bogs are an important phenomenon. The mountain plateaus were only settled in the modern era (19th century), and only sporadically.

The flat tops of hills and mountains with convexly curved slopes have a similar character. Due to their unsuitability for intensive agriculture, these landscapes have been spared collectivisation. Thus, agricultural and forest-agricultural landscapes are gradually changing into forest landscapes with large forest blocks and small enclaves of settlements with remnants of the plain. The supporting landscape systems that need to be addressed here include the protection of wetland areas, especially peatlands, as water reservoirs; farming is extremely extensive, previously focused on animal husbandry. Disturbance of vegetation cover is erosion hazardous and therefore only a minimum of roads and buildings can be implemented.

Fig. 21
Upland farming

2.4 Semi-open landscapes – B

The landscapes are always enclosed on some sides by the formation of their relief by differently high veduta, otherwise they offer distant views. It is a type evoking the formation of the seashore. These are isolated elevations with the edges of the upper convex slopes open on three sides, resting on the horizon of the top of the elevation.

B1 – Hillside

Flat elevation with moderate slopes around the perimeter on at least three sides. The upper part has an area of 10-50 ha, is flat without a distinct summit, slopes gently in all directions. The highest point is hardly visible, and the top of the elevation belongs more to open landscapes with views to all sides. Genetically it is generally a raised and eroded aligned surface. It is a shape typical of the Bohemian Massif area. If the slopes are steeper, it may be a table mountain.

The length and use of the area correspond to the colonial medieval landscapes, depending on the altitude.

Due to the gentle slopes below the summit, the orientation of the edges is more influenced by the method of cultivation (ploughing to the bottomland since the Middle Ages!) and the access routes to the fields rather than the relief. Grazing predominates on the ridge top, fields only occasionally.

The supporting landscape systems that need to be addressed here include, above all, the limitation of surface water erosion, with maximum underground seepage, the transport service for fields and forests and the regulation of artificial landmarks – both technical (windmills, transmitters) and cultural (Euro-viewpoints). The definition and protection of the territorial system of ecological stability is important.

Fig. 22
Hillside

B2 – Broad ridge

The ridge is an elongated elevation with a rounded and slightly flat top. As with valleys, ridges can be subdivided according to the height and slope of their slopes. It may be developed in a variety of more resistant rocks. However, it is always the upper part of the slopes – visually connected to the summit. As a rule, these are uninhabited, wooded areas. Extensive grassland also occurs. In the past, the area of grassland was much larger. Overall, they are close to the plateau type, but with a flat top, preventing greater views. The orientation of the structures is loose and indistinct, roughly corresponding to the direction of the ridge line. The horizon of the ridge is also significant here for views from the wider area, with the flat top of the slope unable to obscure any above ground structures across the broad top and these are prominent in the horizon.

The supporting landscape systems to be considered here include forestry, including access routes, rarely grazing areas with feeders and watering points, and the tourist system of long-distance vantage points. Then again, there is the regulation of man-made landmarks, possible development in general and traffic access to them.

Fig. 23
Broad ridges

Fig.
24 Broad ridges

B3 – Frontal slopes

The higher and complicated composite slope of the edge of the high ridges consists of slopes of different gradients, edges, and ridges. Steep-sided valleys with steep valleys are usually cut into them. The tops of ridges, hillsides and the foot of slopes are often visually separated and form stages of separate compositional units. Even the hillside itself may have multiple stages if it is convex in shape. Slopes have an elevation of over 250 m. These elevations are reached on the precipitous edges of mountains and rarely on uplands. Typical frontal slopes are the slopes of the Jeseníky, Krkonoše and Krušné hory mountains, which open onto the neighbouring plains and plateaus. The spatial arrangement in the slope evokes a “coastal” atmosphere, closed against the slope, open to the distance along the slope.

The length of the settlement and the use of the area depend on the altitude and exposure of the slopes. Medieval to modern settlement is often concentrated in the foothills, but also extends into the lower third of the hillside. Overall, forests predominate over agricultural crops. There are often far-reaching views from the whole hillside and the hillside is even more prominently exposed in views from the outside where it forms a major boundary. The main orientation axes are of course the contour roads and the basin relief boundaries. It is the prominent basins that enhance the monumentality of the slopes.

The supporting landscape systems to be addressed here include the hydrological system with a preference for retention, infiltration to groundwater and protection from water erosion. It is important to define the TSES in the sloping areas and to verify the natural conditions in terms of arable, livestock and forestry farming, including their transport systems. Furthermore, the regulation of the full range of possible types of development and transport accesses is important. Independently, the tourism system of far-flung places and the residential needs of hillside settlements in the open countryside need to be addressed.

Fig. 25
Structured front slope

Fig. 26
Upper part of the slope

B4 – Frontal foothills

Foot of the front slope – the boundary between the hillside of slope and the foundation plain. It is the accumulative concave portion of the slopes below the hillside, consisting of talus, debris mantles, or footwall piles of varying texture and grain size that gradually slope downslope. They are generally terminated by a band of pediments, which are, however, often carried away by lateral erosion of streams. They are often lined longitudinally by wetter lowlands. At the head of slope valleys, they are supplemented by debris cones, in places becoming inland deltas. This is the most geomorphologically sensitive part of the slope. Often these are very unstable parts of the slopes at risk of undermining and further subsidence from above. These are ‚coastal' (côte = shore – meaning not only the edge of the land but also an open slope) types, where views are open to the distance on one side and closed by an elevated slope on the other.

The foothill is again defined by visual accessibility from the heel up. These convex shapes are usually low and therefore do not form veduta shapes. However, stabilised foothills, especially in their pediments, are often the safest belt of flood-protected and densely populated landscapes, especially in mountainous areas. Compared to the previous type, these are compositionally low vistas into the adjacent plains, the axis being clearly the edge of the footslope.

The supporting landscape systems that need to be addressed here include stabilisation of the foot of the slopes (protection against artificial deepening – see the Ústí n. L. motorway, strengthening of the foot by retaining walls, anchoring piles, etc.). Hydrological systems favouring retention basins and devices to prevent seepage into unstable subsoils.

Furthermore, regulation of development against slope failures, including transportation infrastructure, is important.

Fig. 27
Foothill slope cones

Fig. 28
Foothills in the floodplain

2.5 Closed landscapes – C

These are landscapes enclosed by relief elevations. The landscapes can vary in size from broad basins to narrow, deeply incised valleys, often in the position of a landscape basement, hidden in the wider flat landscapes that overlie it.

The landscapes are uncluttered and habitable.

C1 – Basin

A broad, flat-bottomed low-land depression, surrounded for more than 2/3 of its circumference by higher relief, usually about as wide as long, but basins may be elongated. They are usually more than 5 km wide. Their origin is either denudational – on old surfaces, but often formed by extensional basins of tectonic faults. Their bottom is therefore made up of old sediments.

The length of settlement and the way the area is used depends mainly on altitude, in the Neolithic-Neolithic range. The shallow basins are the basic settlement type of the Hercynian aligned surfaces and are the basis of the centre settlement system in our country, where the centre of settlement (formerly usually a market village with a manor house) lies in the middle of the basin and other settlements are star-connected to it. The edges are usually occupied by forest, and the bottom is often occupied by ponds and their systems. The hierarchy of settlements was mostly maintained even under socialism, the centre of settlement was also the seat of the "JZD" (former socialist cooperative farm network), etc. Even today, centres remain focal points of development. The orientation of the edges is mostly star-shaped.

The supporting landscape systems here include the erosion and retention organisation of the catchment area. Due to the often star-shaped organisation of the drainage system, it is also important to artificially distribute the runoff over time so that flood waves do not add up in magnitude. Careful consideration must be given to land reclamation, especially drainage, and sufficient road networks must be provided for the possible subdivision of land into sizes of around 20 ha. Around watercourses it is important to maintain a strip of grass land due to run-off from fields.

Fig. 29
Elongated basin

The small basins are usually 1–5 km wide and are easily visible. The length of the settlement and the way the area is used depends mainly on the altitude. The basins are the basic type of relief for the formation of round villages, which are characterised by a ray-shaped plain. They occur mainly in the southern half of our uplands. The orientation of the linear structures is star-shaped, with the centre at the bottom of the basin, often with a pond at the village square. The woodlands within the basin are only in the nature of draws on field bunds. This type of landscape is extremely unfavourable in terms of natural addition to the settlements and the settlements are land-locked.

The supporting landscape systems here include soil erosion protection and the retention-active organisation of the entire catchment area. The transport system must serve not only fields and forests but also tourist routes and attractions.

C2 – Shallow broad valleys

The depth of shallow valleys is up to 50 m. They were formed by deepening of the water flow. The angle of the slopes depends on the resistance of the rocks, the intensity of erosion and the duration of the dredging. Due to their shallower depth, slope valleys or slope ridges and slope mounds are not developed here. Indications of such shapes may occur only in the cores of the bends. Rock formations and boulder accumulations in these valleys tend to be small and are generally hidden in the forest. Often these are wider open valleys with gentle slopes and no rocks. These valleys are more common in less rugged and lower-lying areas, e.g. the valleys of the Olšava river above Uherské Hradiště, the Loučná river below Litomyšl, the Ohře river near Žatec or below Cheb.

These are generally suitable places for settlement. The length of the settlement depends mainly on the altitude. In the river, sedimentation prevails over erosion, often resulting in a wider floodplain. Any floodplains are generally used as meadows and for mill systems. The steep slopes have been reforested or used as pastures, while fields, orchards and villages have been established on the gentler slopes.

As a result of massive medieval deforestation, the water regime has changed. Regular flooding forced the relocation of settlements away from the floodplain. The floodplain was used as woodland and grassland. In the 20th century, the streams were regulated, the floodplain ploughed and built up, causing disasters during larger, otherwise normal floods. The orientation of the edges is essentially governed by the valley axis with the stream.

The supporting landscape systems here include the organization of side tributary watersheds, slope erosion protection, and a tree-lined conveyance system from the valley floor. Protection of the valley catenary biocorridor is becoming important. Next is the regulation of artificial landmarks, possible development in general and traffic access to them.

Fig. 30
Partially closed valley

C3 – Furrows

Due to the extension (stretching) of the rock environment, Permo-Carboniferous depressions have formed inside some mountain ranges, which are referred to as extensional according to the way they were formed. In our country, narrow trenches, called furrows (Blanice Furrow, Boskovice Furrow, Poorlice Furrow) were formed in this way alongside the basin belt. These are tectonic sinkholes, mostly filled with sediments of various ages and origins, brought down from the surrounding mountains and also ash and lava from volcanoes. At certain times there were swamps, at other times climate change has led to semi-desert conditions. An important feature of furrows is that watercourses usually cut across them, creating secondary, smaller, shallow denudation valleys within them. The area has been inhabited since ancient times, but does not reflect the layout of the furrow, but its discontinuous subdivisions descending to the streams at the bottom. The shape of the furrow is therefore best reflected in the distribution of fields at the bottom and forests at the edges.

The orientation of the landscape structure, however, is based more on the directions of the transverse watercourses than on the edges of the furrow, which are often indistinct.

The supporting landscape systems here include erosion control, the retention organisation of individual floodplains and the transport system across and along the lowland. Then again, there is the regulation of artificial landmarks, possible developments in general and traffic access to them.

Fig. 31
Boskovice Furrow

C4 – Medium incised valleys

Valleys of this type are 50–250 m deep. They were formed by the deepening of a watercourse. They represent a common type of our valleys. The slopes have a typical angle of 15–25° and only occasionally have lower rocks on them. There are generally aligned accumulations. The slope gradient depends on the resistance of the rocks, the intensity of erosion and the length of time the dredging has been in operation. Due to the tightness of these valleys, the slopes are not so extensive in area as to form typical slope valleys, but neither are they more conspicuous slope mounds. Notched side valleys do occur, of course, sometimes with large gradients and rapids. Rock spurs, cliffs and boulder accumulations may be present. Overall, the valley is still clear from the bottom to the tops of the slopes and often forms unique compositional units.

Footslope deposits are generally where, separate from floodplains, human settlement of the landscape spread. In addition to elevation, slope gradient played a major role in the settlement and cultivation of the valley. The steeper ones remained wooded, and settlements were therefore rarely built in the medieval period – in the valley extensions. The valleys were used as meadows. The unambiguous axis of orientation of the structures is the axis of the valley with the watercourse.

The supporting landscape systems here include parallel watercourse lines with transport routes on the valley floor, approaching forest paths and forest embankments on the slopes. They are among the preferred transports ascending the side slopes.

Fig. 32
An incised valley with floodplain

Fig. 33
An incised valley in a forest landscape

C5 – Deeply incised valleys

The deep valley has an elevation between the valley floor and the upper edge of more than 250 m. It was formed by intensive deepening of the watercourse, sometimes with the contribution of partial tectonic subsidence. The inclination of the slopes depends on the resistance of the rocks, the length of development and the intensity of erosion processes. As a rule, they have only a narrow valley floodplain and their profile is of type V. Given the size of these valleys, it is appropriate to use the term ‚hillside' for the whole area from the floodplain to the upper edge. This slope consists of sub-slopes, slopes of different gradients and orientations, slope ridges, slope valleys and sometimes slope piles, rocks, and boulder accumulations. The largest valleys have been used as trade routes for thousands of years. In addition to altitude, slope gradient played a major role in the settlement and cultivation of the valleys. The steep slopes and the narrow, wet, and cold valley floor did not provide sufficient space for the formation of the ploughland or suitable conditions for settlement. As a result, there are only a minimum of settlements in the deeply incised valleys. However, at the same time as the surrounding landscape was being settled, the energy of the watercourse was being harnessed. A number of water mills stood in the valleys. In the 20th century, a number of dams were built in the valleys. They are one of the preferred routes for railways ascending the side slopes. In deep valleys with partially convex slopes, the compositional spaces are arranged in horizontal layers, with the lowest unit defined by the bottom with hillsides, and the uppermost by the tops of slopes with distant views and varying numbers of layers in between. The unambiguous orientation of the landscape structure is determined by the axis of the valley with the stream.

The supporting landscape systems here include the water retention capacity of the watercourse, including tributaries, and the TSES following the individual continua of the valley catena.

Fig. 34
Incised river valley

Fig. 35
Deeply incised valley

C6 – Asymmetrical valleys

The asymmetries of the relatively straight valley sections are conditioned mainly by tectonic movements or different resistance of the rocks in the opposite slopes. The more asymmetrical a valley is, the more remarkable it tends to be, but usually in the case of smaller valleys and short stretches. Uses range from fields, meadows, pastures, orchards on gentler slopes to forests and pastures on steeper slopes. The orientation of the edges of the structures is based on the axis of the valley floor.

The supporting landscape systems here include the organisation of land use, the TSES, retention measures on streams and transport services.

Fig. 36
Asymmetrical valley with a creek

Fig. 37
The valley of cuestas

A broader type of asymmetrical valleys is defined by cuestas (which is an asymmetrical ridge whose asymmetry is determined by the geological structure). On one side there is a gently sloping plateau (on dipping layers of solid sedimentary rocks), on the other side the ridge drops down the escarpment at the faces of the layers. Here, rock outcrops, rubble and underlying landslides are common. They are typical in the Bohemian Cretaceous Basin.

The area was mostly settled in the Middle Ages. Gentle slopes are with settlements and usually agricultural use, steep slopes are mostly forested, often with rock outcrops. The orientation of the edges is contoured.

The supporting landscape systems here include the organisation of agricultural land on gentle slopes and forestry on steep slopes. Important are side tributary watersheds, erosion control on slopes and tree transport systems from the valley floor, the TSES, retention measures on streams and transport services to the landscape. It is also the regulation of man-made landmarks, possible developments in general and traffic access to them.

C7 – Tub-shaped valleys

It is characterised by relatively steep slopes and a wider flat bottom. It is a type of broader incised valley, where the deep erosion of the watercourse no longer takes place, but instead there is an accumulation of material and the development of a floodplain. However, the slopes are intermittently undercut by lateral erosion of the stream. Slope gradients thus reach, and locally exceed, 25°. This type is not confined to the middle reaches of rivers in the Czech Republic but is nevertheless found mainly in the uplands on the edges of the Hercynian plains.

The straight valley bottoms are meadows with mill systems, their width and flooding do not create conditions for ploughlands, the slopes are dominated by forests. Above the valleys are fields with settlements. The structure is oriented according to the flow, better according to the edge of the valley floodplain. The valleys take on an almost park-like character. The energy of the watercourse has also been harnessed. A number of water mills stood in the valleys. It is one of the preferred routes of the railways, ascending the side slopes from the lowlands to the Hercynian plains. In the deep valleys with partially convex slopes, the compositional spaces are arranged in horizontal layers, with the lowest unit defined by the bottom with hillsides, the uppermost by the tops of slopes with distant vistas, and a varying number of compositionally closed layers in between.

The supporting landscape systems here include the fortification of the eroding stream banks at the edge of the floodplain against slope undercutting, the organization of side tributary watersheds and mill systems, and the transportation system from the valley floor. The delineation and protection of the valley catenary biocorridor is essential. It is also the regulation of man-made landmarks, possible developments in general and traffic access to them.

Fig. 38
Typical valley in Hercynium

C8 – Canyon

A deep valley with steep and stepped slopes and precipices, rock walls and a relatively narrow bottom, which is usually filled by the stream bed. Below the hillslope there are frequent scree, debris mantles and footwall piles that gradually slope down the hillside, often terminating in a band of pediments, which are, however, constantly being carried away by lateral erosion of the streams. This is a geomorphologically sensitive area, often very unstable, threatened by rockfall from above.

It differs from the gorge by its greater depth and width. It is a type of valley that is uncommon in our country and is unsuitable for settlement and agricultural use. A landscape little affected by human activity, but under constant pressure to build technical infrastructure since the railways. In this respect one of the most complex landscapes in the country. Difficult logging, in places stream modifications for hydropower. The best example in the Czech Republic is the Elbe canyon below Děčín with a clear orientation of the landscape according to the valley axis.

The supporting landscape systems here include the protection of slopes from undermining, the stabilisation of alluvial deposits and mantles, and the establishment of transport passages in the valley.

Fig. 39
Wide river canyon

Concluding remarks on the chapter

In practice, therefore, we can encounter 17 types of landscape reliefs requiring different approaches to creation. The arrangement of territories according to georelief type is very visible in the landscape in many places, even in the case of urban structures [cf. also Löw, Dohnal a Novák, 2014].

The most common relief types are relatively dry landscapes of plains, lower plateaus, and tablelands. Rarer are broad river floodplains, wet basins, hills, broad ridges, headlands and hillsides, basins, shallow broad valleys and incised and necked valleys.

3. PRIMARY LANDSCAPE SYSTEM – POTENTIALS AND TRANSPORTS

3.1 The rock environment

The rocks are formed by common mountain-forming processes, in particular:

- Earth‘s crust displacements (simplified – where they push, uplift mountain ranges, where they stretch, create sinkholes, or igneous rocks penetrate, volcanoes), Earth‘s crust cracks and tectonic faults are formed in them. Although they are mostly deep, they often occur on the surface, where they create tectonic valleys (Jihlava region, Prague fault) and dramatize the relief due to their easier erodibility;
- Volcanic activity – rare in the Czech Republic today (occasional earthquakes in western Bohemia, the caldera of the Doupovské Mountains, volcanoes of the Bohemian Central Highlands, flat volcanoes of the Jeseníky Mountains, etc.).

These endogenous processes dramatize our landscape in terms of altitude, while exogenous processes conditioned by climate calm and level it. Exogenous processes cause **weathering of rocks in various ways** (frost, temperature gradients, water erosion, tree roots, etc.), sometimes even dissolving them (limestone – karsts). In general, the closer to the surface, the faster they weather, forming **a soil-forming substrate, which interacts with the biota to form soil**.

In general, erosion processes predominate over elevation processes.

Rocks have **different nutrient contents** (N, P, K, etc.) – depending on the mineral content.

Rocks have different pH – acidic (quartzites, granites, mica schists, phyllites, migmatites, rhyolites, sandstones, slates, gneisses, etc.), alkaline (gabbro, diabase, basalts, marls, limestones, marbles, calcareous sandstones, dolomites, etc.).

The rocks have different ways of formation – *igneous rocks* (deep below the surface and outcropping on the surface during volcanic activity), they gradually weather or are chemically bound at the surface and are carried by water and wind into depressions where they are deposited and their weight strengthens them – *sedimentary rocks* (limestone, sandstone, fine calcareous sandstone, travertine = they could be cut well). Where the earth‘s crust sinks, the rocks are transformed by increased pressure and temperature (they melt and re-crystallise to varying degrees) to form transformed rocks (gneiss, mica schist, schist).

Rock potentials for construction

In terms of the potential (suitability) of the rocks for exploitation, the suitability for building foundations and ground works is particularly important for us. The type of rock and its properties are important for use as construction material, as is the mineral composition of the rock for extraction and exploitation.

Building foundation – the main types of building foundation risk and slope stability in the landscape are related to different types of slope movements:

- *Creeping* – a very slow and prolonged movement in which soil or rock masses creep. A deformation occurs but does not exceed the strength limit of the mass.
- *Landslide* – when the gravitational stress exceeds the strength limit of the rock or soil, a sudden deformation of the slope occurs – a landslide. It is the rapid, short-term, sliding movement of a mass down a slope along a shear surface. This may be shallow – below the surface, or deep – at greater depth. Sloping areas create slip layers in rocks. These become dewatered when water passes through them, reducing friction and causing the slope to slide by shallow or deep manner. This is the greatest risk for larger structures. Besides the debris slopes in northern Bohemia (a more recent landslide in 2013 during the construction of the D8 motorway through the České Středohoří mountains), landslides occur on the flysch slopes of the Carpathian Mountains.
- *Rock falling* – sudden and short-term movement of rock mass on steep slopes, which usually moves to lower positions by free fall. Rockfall occurred in the Czech Republic, for example in Hřensko.

Fig. 40
Natural geological landslides in the landscape can also be recognised by trees growing angled

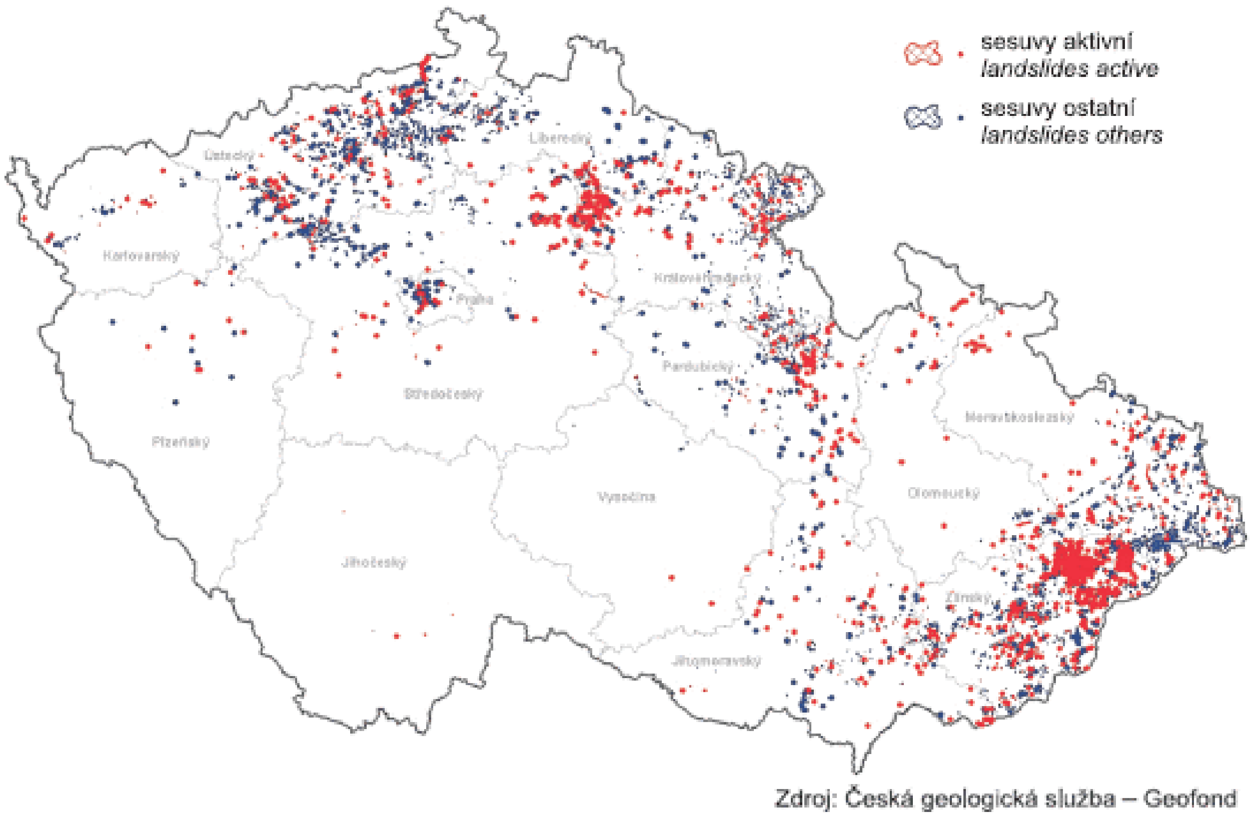


Fig. 41
Areas prone to slope movements [Czech Geological Survey, 2006]

Another hazard is posed by hydromorphic sediments, which change in volume according to the degree of water saturation – typical for claystones, madstones and loesses. The excavation of the foundations gets rained into, then the house is built, the soil dries out and the house falls down.

Landslides, abrupt falling and sediments form slopes and plains and expose rocks – it is very important to reveal how the relief in a given landscape was formed and how it can therefore be treated.

Mineral resources and their availability

Surface rocks and their extraction potentials

Examples of constructional and stone-sculpting uses of rocks:
- fine calcareous sandstones, hard sandstones, slab limestones – layered or blocky weathering = walls, terraces
- slate – slabs = roofing, paving
- soft sandstones – can be scraped and eroded = walls, sculptures
- granite – brittle but chippable = square shapes, columns, troughs, walls, paving, aggregate
- limestones, siltstones – boulders, source of lime = lime, cement, sculptures, mixed masonry
- gneiss, mica schists, phyllites – crookedly split = for terraces, aggregate, etc.

Architecturally significant rocks can be divided into four related series with minorities and intruded singularities:
1. sandstone series (sandstone, fine calcareous sandstone, wacke ...)
2. limestone series (limestone, dolomite, marble, travertine ...)
3. granite series (granite, granodiorite, diorite, syenite, trachyte ...)
4. basalt series (gabbro, basalt, peridotite ...)

5. singularities (migmatite, diabase, quartzite, metabasite …)
6. slate (one of the three basic ancient roofing types)
7. minorities (serpentine, tuff, amphibolite, porphyry …)

The extent and location of the occurrence of these raw materials and their availability can be indicated from the locations of individual quarries in the Czech Republic (see the following map).

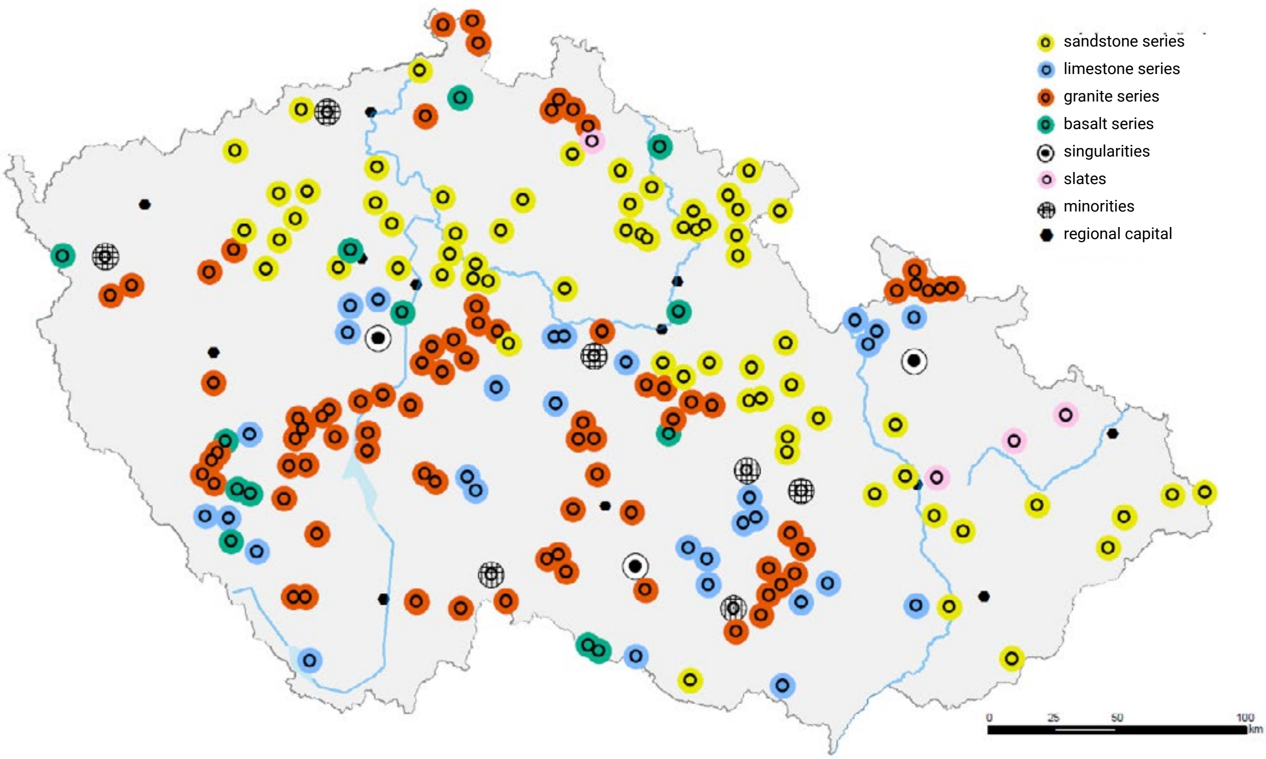


Fig. 42
Quarries with accessibility zones of 5 km [by J. Löw]

Stone, as a basic building material, has been found in large landscapes for centuries and the techniques of its use have been derived from it. The sandstone range homogeneously occupies the entire North Bohemian plateau (including Prague), the Broumov region, regions of Podyjí, Haná, the mountains on the border of Pardubice and Olomouc regions and the Beskydy Mountains. The smaller limestone range covers the Bohemian and Moravian Karst, part of Posázaví region, southern Moravia, and the Jeseníky Mountains. The most extensive is the granite series, typical of the Hercynian region, occupying most of southern and western Bohemia, Vysočina Highlands, and Jeseníky Mountains. The other series do not form larger integrated complexes and are interspersed into the previous ones.

The extraction of these **rocks in quarries** significantly reshapes the georelief and thus entire ecosystems, which in this case, as analogues of canyons, allow the formation of mature rock steppe communities.

Fig. 43
Ecological succession in a former quarry

The occurrence of other raw materials is linked to both water deposits (gravel, sand) and wind erosion (brick clay). Clay pits, sand pits and gravel pits are therefore regularly found in the river floodplains of all streams and on alluvial loesses. Locally, opencast coal mining continues (northern Bohemia). Mining typically creates mining lakes or lowlands.

Borrow pits

Quarrying radically alters the georelief and soil substrates and thus the potentials. It is also quite often a unique opportunity to create a completely new landscape (reclamation), but it is important that reclamation becomes part of the surrounding ecosystems again!

Fig. 44
Surface-mined lagoons and their integration into the landscape

Underground mineral resources

Mineral mines:

- tin was a key raw material in prehistoric times, as one of the foundations of the Bronze Age;
- in the Middle Ages it was mainly iron, limestone, sand, clay, but also lead and, in the case of our territory, silver;
- later there were coal and gravel;
- more recently, uranium or lithium.

The potential for mining is identified by geological surveys and marked by a registered land file:

- *The registered deposits of exclusive raw materials* – only they are known – are registered.
- *Protected deposit areas* – the boundaries are defined, whoever wins the tender to examine the reserves has the right of first refusal for mining! Declarations often lead to surface construction closures.
- *Mining areas* – precise spatial demarcation and allocation to the owner who is obliged to mine everything.

The consequences of underground mining are also felt on the surface – partly by piles of mined tailings, but much more by a subsidence of mines.

Fig. 45
Underground mining often changes the surface by subsidence (lakes instead of hills) – newly created water surface in an undermined area

3.2 Climatic characteristics

Jointly with geological properties, they determine the potentials of all other conditions.

Key climatic characteristics of rural landscapes:

Temperature – average and extreme values and their distribution during the day and year are crucial for the main indicators:

Length of the growing season – varies with elevation and exposure of slopes to the sun. It also controls the organisation and diversity of the biota (see STG).

Extreme temperatures – big frosts are like floods – they select the biota (that is why fig trees do not grow here normally – once every few years an extreme frost comes and the tree freezes).

Precipitation – the only source of water in our country, is unevenly distributed over time and the key is how much water it can soak into the ground and how much evaporates or runs off unused.

The overall climatic situation depends on the overall relationships outside our republic. We lie in a temperate zone, but at the interface of oceanic (from the west) and continental (from the east) character. The irregular alternation of these two influences determines both precipitation and temperatures. The distribution of these influences is determined by the behaviour of pressure above and below the Atlantic, within their oscillations.

Climate change caused by us is mainly increasing the extremes of weather, although temperature and precipitation are slowly changing in absolute terms.

Temperatures and precipitation fluctuate or worsen (see the following figure).

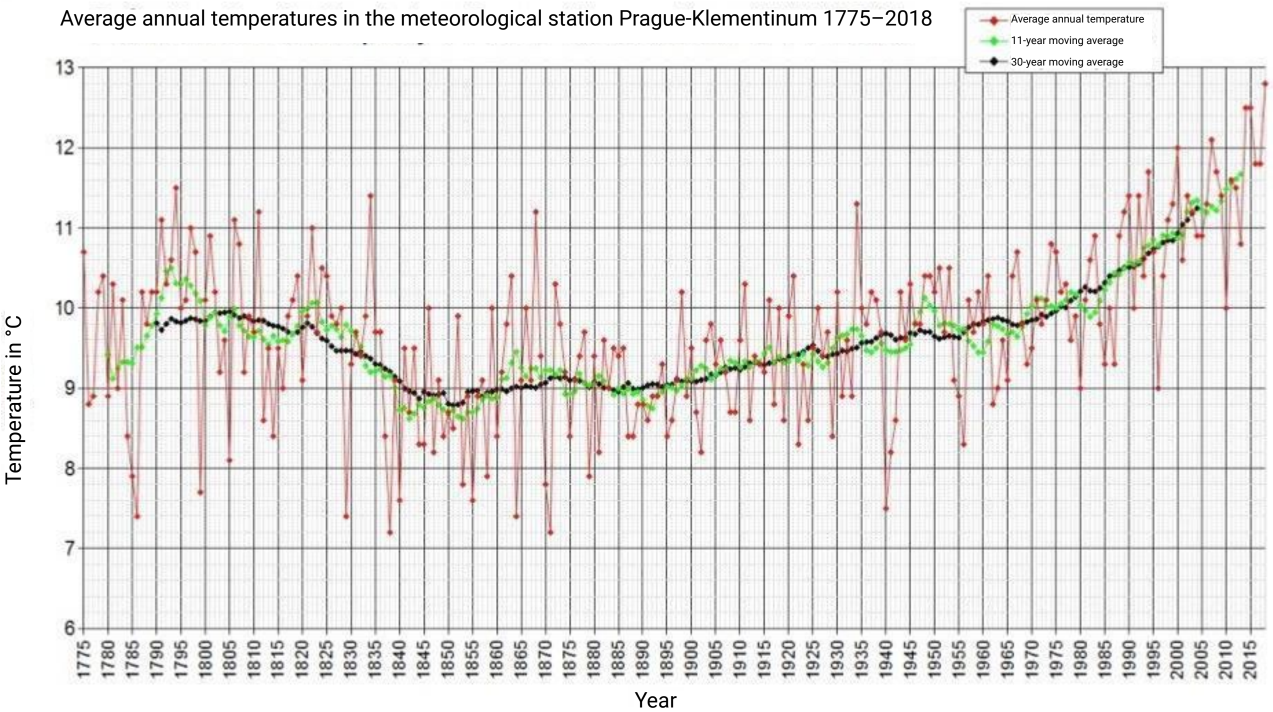


Fig. 46
Measured temperature changes – showing fluctuations and rapid warming since 1980 [ČHMÚ, 2018], English translation

3.3 Pedological characteristics

The soil is a non-living environment animated by a community of soil organisms = *edaphon* (bacteria, yeasts, fungi, algae, worms, crustaceans, etc.). They are mostly decomposers, processing detritus (body remains and excrements) and breaking it down into individual nutrients one by one – into a solution for plants. Without it, the soil is dead! Therefore it is so important to hide and properly store soil during construction.

The soils depend on the soil substrate, the climate and the length and method of cultivation. We distinguish:

- **Kinds of soil** (by grain size) – clay, clay loam = *heavy soils*, loam = *medium soils* (the best), sandy = *light soils*. Neither too much nor too little is best for plants – lots of humus (*still organic!*) which sticks together to form an ideal crumbly structure, where the soil has a huge surface area within itself in a small area (the surface holds water with dissolved nutrients). Soils also have a rock content = *soil skeletivity* (hinders cultivation – it is permanently removed from fields, but due to erosion the rocks still "grows," on forest soils of course it doesn't matter).
- **Types of soil** (according to how they were formed and developed – by heat and moisture, soil cover etc.) come in two basic groups in our country – *forest soils* (native), *agricultural soils* (cultivated by cultivation – the longer the more towards black soils).

The fertility of soils (their ecosystems) = potential primary biomass production is influenced (according to Liebick's law of minimum) mainly by the following limits:
- lack of photosynthetically active radiation (FAR – this is the light spectrum suitable for photosynthesis, the lack of which can be under dense forest cover or in a cave or in a water depth),
- water scarcity (potential evapotranspiration is higher than precipitation – arid climate) – no trees, tundra, or steppe,
- short length of photosynthetic (vegetative) season (sum of active temperatures) – tundras;
- lack of mineral resources (nutrients).

Suitability for various agricultural crops (arable, vineyards, orchards, ponds, meadows, and pastures, etc.) – has been the main potential for landscape use since prehistoric times.

Potential (fertility) is mainly governed by soil types and species (but these are in turn influenced by management) and climatic characteristics.

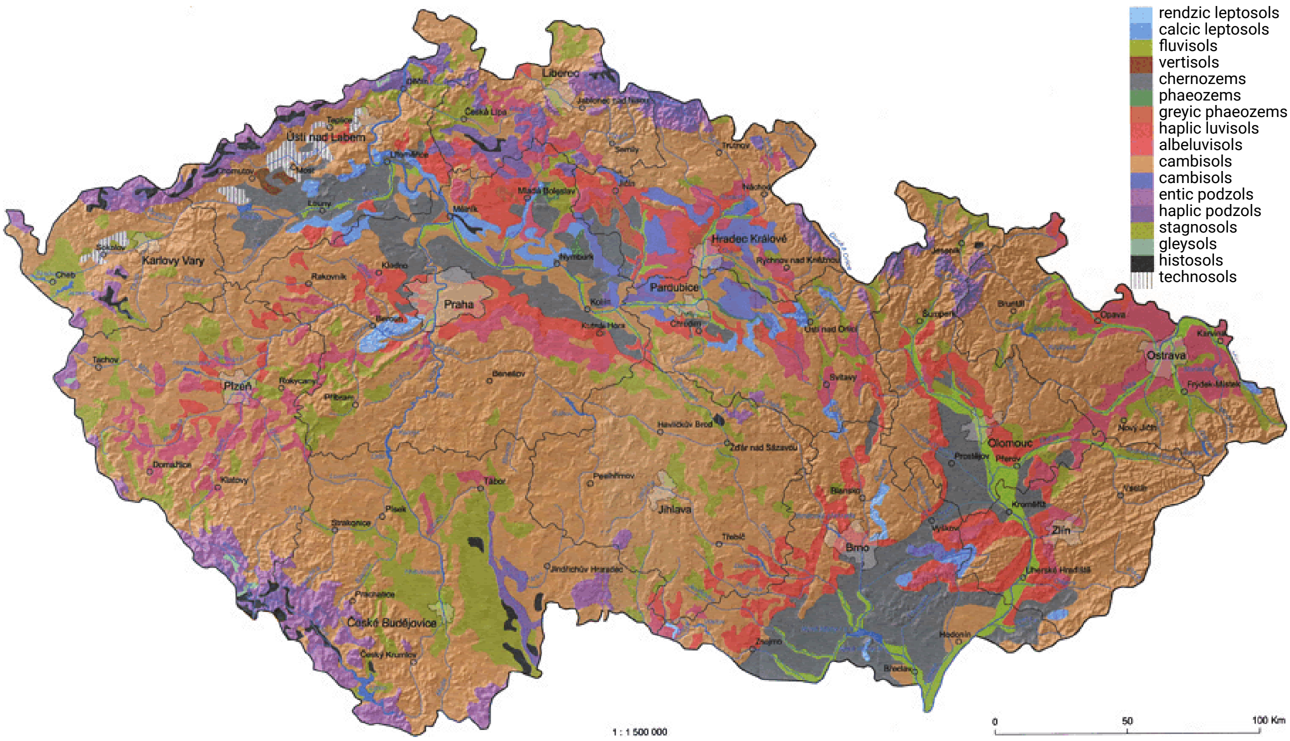


Fig. 47
Schematic definition of soil types in the Czech Republic [MŽP, 2020]

For predominantly agricultural land management, the potential is expressed using special BSEU units (bonitated, soil ecological units), which are nationally defined on all agricultural soils[13].

Soil properties are described in the **BSEU** in terms of potential for agriculture and are identified by a five-digit numerical code:

1 * * * * – climatic region (warm, dry = 0; cool, wet = 9) = *conditions for vegetation in general (phenological needs of plants)*;

* 1 1 * * – main soil unit (soil species and types, denoted most fertile 01 to poorest 78) = soil fertility = *nutrient supply (biomass production rate)*;

13 Act No. 334/1992 Coll., Protection of Agricultural Land Fund, as amended
Decree No 227/2018 Coll., on the characteristics of the soil-ecological units and the procedure for their maintenance and updating, as amended

* * * 1 *   – angle of slope and exposure of the area (flat = 0 to steep, north slope = 9) = *accessibility for machinery (ploughed boundaries, terraces)*;

* * * * 1 – soil skeletivity and depth (deep, loamy = 0; stony, shallow = 9) = *cultivability of the soil (clearance cairn)*.

In general, the higher the numbers, the worse it is for agriculture (but beware – e.g. for wine, skeletivity and depth are not a problem, nor is higher slope, but exposure and climatic region are important).

Each BSEU is classified into one of five classes of protection: class 1 means the best and most fertile soils, class 5 means the worst with the lowest yields. The difference in yields between class 1 and class 5 is a factor of ten! Lands of classes 1 and 2 must not be built on (only in the public interest), it is advisable to use mainly soils of classes 4 and 5 for this purpose!

On **forest land** we distinguish *forest types* and ***forest type sets*** – by these are habitat characteristics defined from a forest management perspective. They are identified by a two-digit code:

1 * – forest vegetation level (mainly altitude and exposure – as in group of geobiocene types: degrees 1–9) = basic regionalization of cultivated tree species;

* A – soil category (mainly soil type – trees do not care whether the soil is skeletal or sloping – it is not ploughed) – 24 types.

For forest types, the official protection of the rating does not apply, the main issue is the suitability of the tree composition in the given habitat – a bad composition degrades the soil (spruces in the lowlands), a good one cultivates it (return of deciduous trees).

3.4 Water resources and their characteristics

All the Czech water sources come from rainfall. We can only control what falls in our country.

The natural water cycle in the landscape:
- Usually more than 50 % (but sometimes 100 %) of rainwater evaporates again = small hydrological cycle – evaporation is mainly influenced by the type of vegetation (trees evaporate the most) and by the length of time the water surface stays on land.
- About 40 % or less can soak in = this is the water for our normal landscape. How much of it we use for agriculture depends on the soil – its ability to absorb and hold it. When the soil is saturated, water continues to seep into the soil substrate and rock environment.
- 10% to 20% of surface rainfall runs off into streams, rivers and eventually the sea. The more rainfall there is, the less is retained and the landscape is in worse condition.

Hence our basic water protection strategy.

First of all:
1. To capture and retain as much water as possible directly **in the area, in the soils** available to the plants.
2. To let as much water as possible that is not captured by the soil **seep into the substrate** and groundwater, where it often flows to the surface in the form of springs with a delay of thousands of years, and we drink it.

After that:
3. The water that we cannot capture and flows off the field must be as slow as possible and **carry away as little topsoil as possible** – this is the basis of erosion control protection. Water from fields should be only slightly turbid! Farmers should be punished for mud in streams (not to mention on the streets).
4. As much surface water running off the fields as possible must be retained in the **upper parts of the watershed** – at the points of concentrated runoff – by a system of catchment and soakaway ditches, small reservoirs, and polders.

And finally:

5. Only what we cannot capture in the upper watersheds (**large floods**) can be captured in large reservoirs in the lower sections of the streams and, most importantly, must be safely guided through our landscape to the sea (wide active floodplains).

It means that the quality of the soil is decisive (looseness, enough organic matter in the soil – the opposite of today's fields without ploughing and manure), the permeability of the subsoil (the opposite of today's layer suffocated by heavy machinery) – i.e. the features **dependent only on the farmers**! It is also clear that water for irrigation needs to be kept in small reservoirs at the top and not expensively pumped from valley reservoirs! Water managers should get down to the last 10–20 % of rainfall[14].

Types of water reserves in the landscape

Surface water – watercourses and reservoirs. Water also creates the specific environment of aquatic biotopes – the basis of aquatic ecosystems.

Standing water:

- water bodies – water level above ground = rare mountain and river lakes
- wet areas – water level at ground level = marshes, wetlands
- periodically flooded areas – floods = floodplains
- waterlogged areas – water table rises = springs
- wet areas – groundwater seepage = wells
- dry areas – the water table is deep = the amount of rainfall, the formation of the relief and the permeability of the rocks

Flowing water:

According to the slope of the bed and the flow velocity (and therefore temperature and oxygen content), our streams can be divided into five types of natural habitats – fish zones – fishless, trout, grayling, parma and bream, whose characteristics and layout also correspond with terrestrial biochoras.

Fig. 48
Fish-free zone (hypocrenal) – streams without fish, outflow from the spring

Fig. 49
Trout zone – mountain and foothill streams

14 Water management is regulated by Act No. 254/2001 Coll., on water and on amendments to certain acts (Water Act), as amended

Fig. 50
Grayling zone – foothill streams

Fig. 51
Parma zone – lowland streams

Fig. 52
Bream zone – lowland streams and pools

Groundwater is collected in rocks into aquifers, which are underground layers with a large storage capacity (gravels, sands, rifts, fissures, karsts) through which it slowly flows over impermeable layers. After varying lengths of time (from a year to centuries and millennia), water rises to the surface = springs.

There must be a constant communication between surface water and groundwater – especially the possibility of seepage. The journey of water from the surface to the underground aquifers occurs either in a full slope or line or by lateral seepage (seepage bank and bed) from meandering streams to river floodplains.

Floods and their territories – territories that are periodically flooded annually, but also only once every 100 years (100-year water – but beware, this is all just an arithmetic average, the reality is different).

Floods create a floodplain (it is made up of sediments carried by a swollen river and left behind in a flooded area). **Wherever there is a floodplain, there has been a flood and one day there will be a flood again.** A floodplain is recognised by its relief (the plain around the stream) and its underlying geology (recent floodplain sediments). Floodplains both hold back the flood over time and allow massive seepage into underground aquifers – the water constantly opens up new pathways for seepage.

In the floodplain everything is constantly changing = historically it has therefore been difficult to maintain the transition of paths across the momentary flow – the floodplain is spatially indeterminate within itself. From the 10th to the 19th century nobody even thought of building in the floodplain (except for purpose-built mills and tanneries). It was only from the second half of the 19th century, during the Verneian era of the engineers, that massive regulation of the floodplain began, giving a sense of (as we now know unjustified) safety from flooding, and buildings quickly occupied the floodplain.

In general, water should be allowed to soak in wherever possible and the rest should be retained, especially on impermeable surfaces (roofs – barrels, cisterns, ancient atria). This is still common in arid regions, and in our forts.

Protection of drinking water source areas and their protection from pollution

For protection, *protected areas of natural water accumulation* (19 in total – e.g. the Morava River Quarter, the Žďárské vrchy and Šumava mountains...) and sanitary protection zones of 1st, 2nd, 3rd degree (1st degree is fenced and nothing is allowed, 2nd degree restricts farming and construction, 3rd degree restricts particularly dangerous activities) are declared.

3.5 Natural communities – living nature

Without human influence, natural communities and their landscape ecosystems evolve primarily within the fixed boundaries of their habitats (ecotopes), and through long-term interactions with each other they evolve to make the best (most efficient) use of the habitat [Forman and Godron, 1993]. Thus, the diversity and arrangement in natural landscapes is primarily determined by habitat distribution – biogeographic differentiation.

3.5.1 Biogeographical differentiation

The natural conditions of landscape ecosystems can be hierarchically divided into biomes, biogeographic provinces, sub-provinces, bioregions, biochora [Culek 1996 and 2005] and geobiocene type groups. They are often typically heterogeneous within – the main system (but also typically a combination of systems), forming a matrix, and within this matrix there are outliers (singularities) = spots. These are a source of restlessness and biodiversity (as in a painter´s composition there are main figures and backgrounds).

For landscaping and urban planning, as well as for landscape ecology, it is appropriate at a basic level to typologically identify natural distinctions of an area, in the geobiocenological concept of the Zlatník school [Zlatník, 1953 and 1978], using combinations of the main habitat characteristics. They express the complex unity between the non-living environment and the biota living in it. A given *habitat* corresponds to a certain vegetation formation, both *potential* (in wilderness – climax) and *replacing* (paraclimax, cultures – a certain successional stage). Thus, according to the abiotic characteristics of the group of geobiocene types we can determine the nature of the community within it and, in turn, according to the indicator plant and animal species we can retrospectively determine its abiotic characteristics [Buček a Lacina, 1999 and 2007; Lacina, 2015].

Climatic, trophic (nutrient) and **hydric** characteristics of the ecotope are decisive for the ecosystem and its STG: in our country we can distinguish 9 vegetation stages, 8 trophic series and intermediate series, 6 hydric series.

Climatic characteristics – vegetation stages (9 vegetation stages according to A. Zlatník):

1. oak
2. beech-oak
3. oak-beech
4. beech and, in Bohemia, oak-fir
5. oak-beech
6. spruce-fir-beech
7. spruce
8. knotty pine

(9. alpine – forestless)

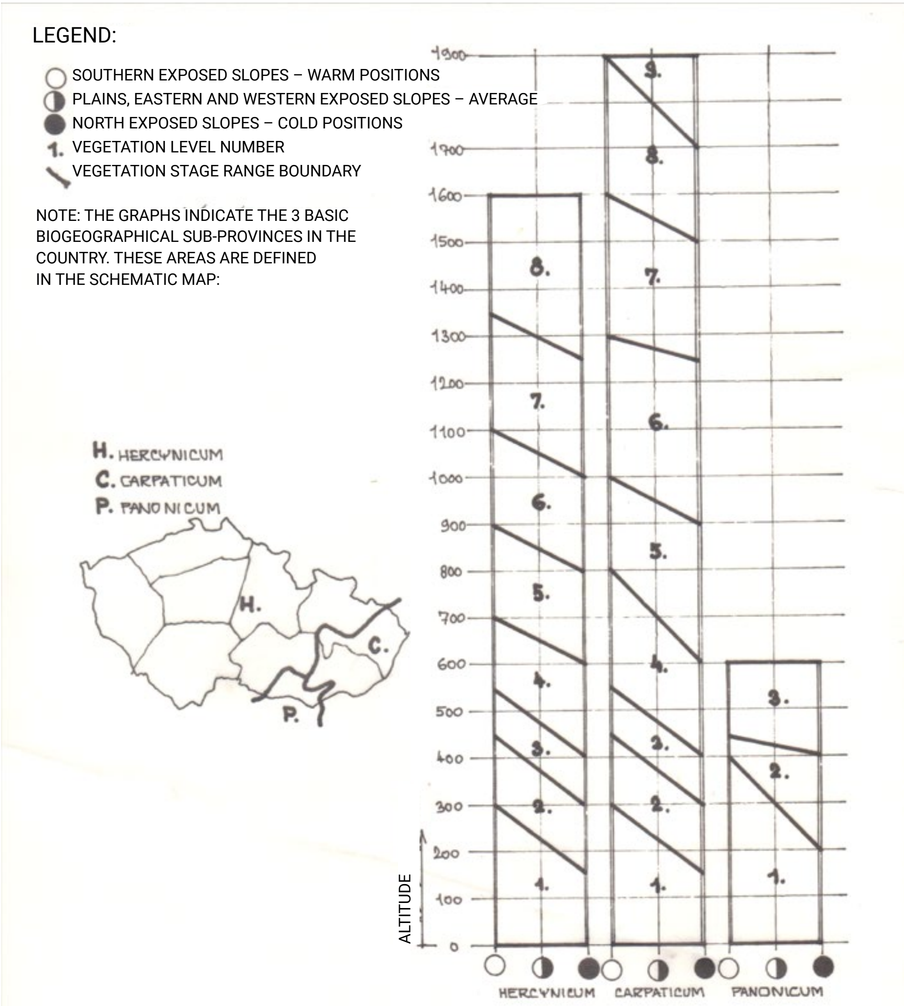


Fig. 53
Graph of the dependence of vegetation scale on altitude (vertical) and exposure (horizontal) [Löw, 1984]

A note on the vegetation levels of forests in our country: up to the 4th century (up to 650 m above sea level in Moravia, up to 450 m above sea level in Bohemia) only deciduous trees grow naturally, up to higher than mixed stands and spruces are common only from the 6th century, i.e. above 900 m above sea level! **The current forests are therefore far from being natural, which reduces their physical and ecological stability.**

Nutrient supply – trophic series (8 trophic series and intermediate series):
A – oligotrophic – acidic and poor soils (e.g. on sandstones) – e.g. cambisols
B – mesotrophic – moderately rich – most agricultural soils – brown soils, black soils
C – nitrophilic – nitrogen-rich, mostly sedimentary, and therefore wetter – alluvial fluvisols
D – alkaline – (especially on limestones), rich in nutrients – rendzic leptosols
AB, BC, BD, CD – nutrient combinations by series

Water supply – hydraulic lines (6 hydraulic lines):
1 – dry – top of Pálava hills, sand dunes, anhydrous
2 – limited – steppes, dry hillsides, woodland
3 – normal – normal fields or forests, reasonably moist
4 – waterlogged – soft soil – wet meadows, sedges, etc.
5 – wet – wetlands, soft meadow – water sniffing
(6 – peaty)

The totality of the group of geobiocene characteristics also determines the main potentials of a given habitat towards different exploitation plans. The potentials can therefore largely be derived from these.

Outside the group of geobiocene types, broader relationships apply at the regional level. Thus, for the group of geobiocene types, not only its internal structure, but also its position in the regions is important. The group of geobiocene types can be grouped according to georelief and climate into 366 biochora types in 91 bioregions [Culek 1996 and 2005]. At an even higher level into biogeographic sub-provinces (4 in our case) and provinces (2 in our case) – these are then at the highest level components of the biomes of the globe.

3.5.2 Protection of ecological-genetic information and biodiversity in general

The diversity of different biogeographic units in the landscape is also the diversity of their ecological potentials and it stores information – what is the most effective community organization in a given ecotope (with the lowest entropy and highest ecological stability). Individual species of organisms also adapt to a given ecotope through long-term evolution. This shared ecological-genetic information cannot be reconstructed without centuries of undisturbed evolution and is thus unique and irreplaceable. The basic task of landscape protection is thus to ensure, as far as possible, the undisturbed development of the natural ecosystem of each group of geobiocene types (but also of higher geographical units) in the biocentres (biotopes, or sets of biotopes, which, due to their ecological conditions and size, allow the permanent existence of a natural ecosystem) of the TSES, at least within the minimum necessary parameters. This is also the main purpose of the specially protected parts of the landscape according to the law (I and II zones of national parks and protected landscape areas, national monument reserve, monument reserve, national nature monument, nature monument) – where the main motto is "leave nature alone."

The diversity and arrangement of the groups of geobiocene types in a given landscape determines not only the spatial and functional need for nature conservation in the biocentres, but also the maintenance of spatially functional links between them. This is done by natural transport systems.

3.6 Natural transport systems

Transport systems of substances and information are subdivided according to the transport media through which the movement takes place. These systems carry volumes of matter and virtually immaterial information (e.g. seeds). There are just few transport systems of primary structure – they are practically only:

- air flow (balancing low air pressure with high air pressure),
- flowing water (rain – from rain on mountains to hillsides to the sea),
- actively moving biota (living, moving organisms),
- geological movements (gravitational movement of rocks and soils, etc.).

The geological transport movement is very slow, except for rock falls and landslides (see building foundation), and much of it is already exhausted. In contrast, wind movement in today's landscape, while occurring throughout the landscape, can only be responded to probabilistically. Water movement is quite essential, as is actively moving biota.

3.6.1 Air flow transport system

It is governed only by probabilistic factors (prevailing wind direction and strength in different seasons):

- Mass transfer by wind erosion, is significantly dependent on the context of vegetation cover on surfaces. Wind erosion in our country was therefore greatest in the Pleistocene (tundra and ice wastes). This is the time of the formation of loose sands and loess. Today, transport is more moderate, though significant, mainly by wind drying of the soil.
- Transport of information in pollen (windblown), seeds, gliding and flying insects, etc.

Probabilistic movement means complete dispersal (depending on where the wind was blowing at the time of take-off).

3.6.2 Flowing water transport system

a) Hydraulic transport system for large volumes (sediments and floatables)

Since both water erosion and the unsuitability of land for cultivation are dependent on flowing water, the water transport system – the hydrological system – is a crucial natural generator in landscaping. The complexity of this apparently simple system (water flowing downhill) is due to several specificities:

- the first is the **magnitude of average flows** – depending on the size of the catchment, rainfall, and evaporation in it;
- the second is the **huge changes in flows** depending on the dynamics of rainfall and snowmelt (Figure 54);
- the third is the **nature of the topography** through which the water flows (erosional incised and sloping valleys in the mountains on the one hand, and broad, accumulating flat river floodplains in the lowlands on the other).

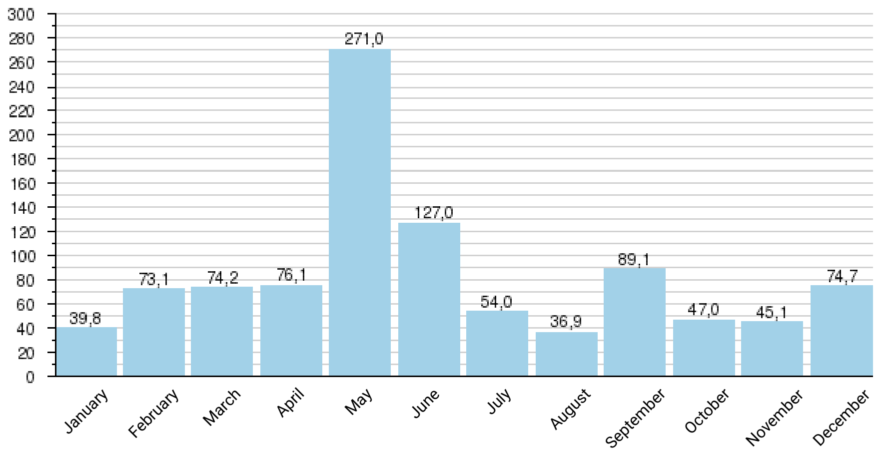


Fig. 54
Average monthly flows of the Oder River (m³/s) in Bohumín in 2010 [Povodí Odry, 2011], English translation

Radical changes in flows are crucial – floods

The differences between the minimum and maximum flow can be up to an order of magnitude (e.g. in the Morava River in Kroměříž the maximum flow (240 m³/s) is 24 times(!) higher than the minimum (10 m³/s).

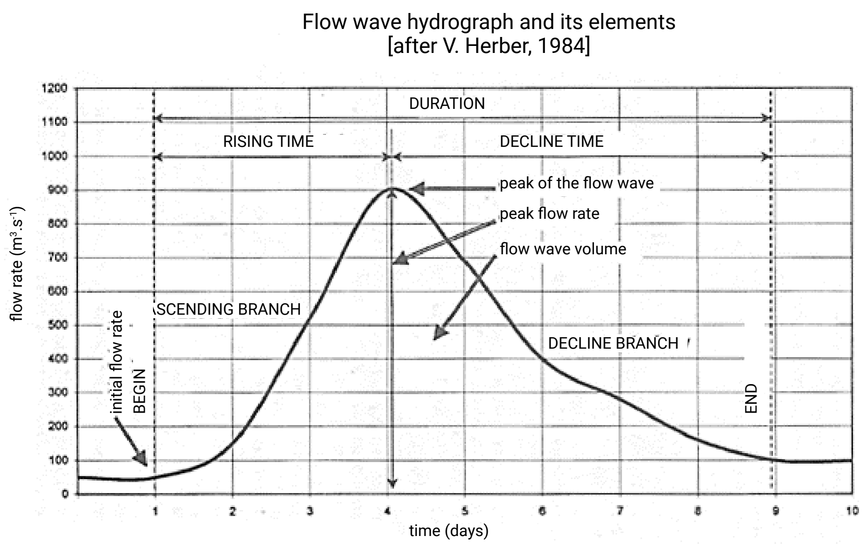


Fig. 55
General course of a flood [Chábera a Kössl, 1999], English translation

We simplify the variously sized floods to the limiting flow classes of Q x-year flows. It indicates how many years or months on average such a flood has recurred in the measured past. It is therefore a quantity constructed from short series of measurements (from about the 1800s onwards) and by no means implies that such a flood will recur regularly (we can have 100-year flood two years in a row).

In terms of practical protection of our water works, the flow is divided into flows that, if exceeded, will already unacceptably impair a function, and must therefore be protected against:

Q 10 000 – maximum imaginable – protection of dams by overflow

Q 100 – flood protection for historic settlements, today practically all new settlements

Q 50 – for industrial plants and continuous buildings

Q 20 – scattered residential and cottage developments

Q 5 – agricultural crops on arable land

Q 1 – common spring floods (melting snow), in floodplains they are a necessity, otherwise floodplain ecosystems degrade

The water flow is therefore dynamic, constantly trying to abrade the banks (horizontal erosion) or the bottom (vertical erosion).

It is crucial for the action of the flow whether the water **accelerates** (slope gradient and length, convex profiles) and carries material with it, or whether it **slows down** (slope gradient decreases, slope length shortens, erosion retarders – faults, boundaries, concave profiles) and deposits the entrained material on the bed and the depositing bank.

Deceleration and acceleration depend on:

- the slope of the surface (velocity and gravitational acceleration), but beware – the slope of the streambed often does not determine this, but the level of the erosion base (where the erosion ends);
- the roughness of the surface and its relation to the water column (grass x asphalt);
- the turbulence of the flow (counter-currents);

= all of which we can influence.

In smaller streams or in extreme climates, the minimum flows are zero and thus we have *permanent* and *intermittent* flows (wadis, ditches).

In very general terms, we can divide the ecological flows into:

- **Forest** (the catchment is forested), with high retention of the catchment area, so that the effects of torrential rains are limited, and flows are relatively balanced (the forest functions like a sponge). Such a river tends to incise more (erosion in depth). The forest in our area captures 50-220 mm of rainfall depending on the soil type.
- **Steppe** (the basin is forestless), with lower rainfall retention, flows are erratic, floods are significant, even torrential rains raise the level sharply. Such flow tends to spread more into the surrounding area (erosion into the width) and creates wide floodplains.

As our watersheds change from forest to steppe, so too does the flood regime of rivers.

Erosive and fluvial river sections

The river is trying to create a balanced longitudinal profile, i.e. it wants to achieve that no section in the stream has a greater gradient than any other section in the stream above it. The smoothness of the longitudinal profile can be easily illustrated by the so-called gradient curve, which is a parabolic curve that has the greatest slope and the most irregularities in its upper part, gradually becoming more like the horizontal, and finally merging with the horizontal at the downstream end, at the mouth of the river. The longitudinal profile of most rivers is very uneven, characterised by abrupt gradients and gradient disturbances, which the river tries to flatten over time, thus flattening the gradient curve. Through back-erosion and accumulation, the river gradually removes local erosion bases and other irregularities, reduces its gradient and, depending on the flow, the channel structure, its geological substrate and the tectonic activity of the area, the river reaches a profile of equilibrium where neither erosion nor accumulation is necessary. These processes progress from downstream to upstream. The main stream generally reaches the levelling off of the gradient curve before its tributaries, which are linked by erosion and accumulation to the main stream.

Basic types of erosion processes in stream channels:

1. deep bottom erosion in spring areas (smoothed bedrock)
2. deep and lateral erosion in canyons (formation of new floodplain and trailing boulders)
3. wild flow in gravel bars (floating boulders – source of downstream sediment)
4. channel branching in gravels that float downstream (entrained gravels – source of downstream sediment)
5. fixed island branching of a meandering channel (drifting sands and their drift)
6. classic meandering (floating clays)

Stream incision – the result of backward erosion (from the erosion base) and sedimentation (and clogged geologic furrows) – alternating floodplains and cuts.

The flow undercuts the slopes, which are then either rocky (canyons) or sloping – slope cones (slides of undercut slopes – inclined layers, which are again undercut and carried away), and "V" cross-section valleys are formed.

Sometimes it happens that the flow reaches the erosion base and starts to silt up the valley floor in the form of a narrow floodplain with a "U" profile.

Fig. 56
Clear river in a sunken valley with a secondary floodplain

Stream sedimentation – dissolved material, floatables (fine-grained material floating in the water) and debris (coarse-grained material dragged along the bottom) are carried in the river. During floods (higher water velocities), these materials also move around the stream and remain in place when the water recedes, forming horizontal layers of varying character – the floodplain. The stream fills with sediment all the lowlands it crosses.

Fig. 57
Natural stream section

Horizontal movement – lateral erosion – leads to meandering (for large streams the meander width is 7–10 stream widths, for small streams up to 7 stream widths, the radius of curvature is about 2-–3 stream width – then it is a plausible shape).

Particularly during a flood, all sorts of things happen (spills, breaches, new channels, subsidence – back-sorted alluvium, silting of pools, aggradation embankments, channel deepening).

This happens all the time, whether we want it or not – we only shift or modify it by the technical arrangements.

The incised valleys and wide floodplains in the Czech Republic are marked in the map of the Framework georelief types (chapter 2.2.).

b) Hydric transport system as a carrier of ecological-genetic information

The hydric transport system operates only in the stream channel and its floodplain. Mainly non-mobile species (plant seeds, animal eggs, plankton) are carried downstream, while active water-bound animals are also connected with water – they drift on their bodies (waterfowl, mammals).

Flowing water creates three interconnected systems of ecological transports that run continuously through the landscape (environmental continua):

River continuum – creates aquatic habitats for its own aquatic biota, carries low-moving aquatic organisms (river drift) and creates aquatic environments. It is linked to the terrestrial environment by runoff, erosion, flooding, and food webs.

Littoral continuum – forms an essential part of the biotopes of coastal communities, it is also part of the terrestrial TSES (zone of origin of terrestrial plants and lungfish). The flow of water carries with it the seeds of plants and the eggs of animals. The seeds anchor at the shore and germinate. Therefore, a belt of trees (willows, alders, poplars) continuously forms on the shore = riparian vegetation. Due to the homogeneity of the natural conditions around the stream, these form the basis of natural biocorridors that have accompanied watercourses since ancient times, even in otherwise deforested landscapes. The continuum is very narrow but varied. Concrete embankments without outlets from the water brings death to it, but little is enough – small natural embankments and they function as biocorridors even in Prague.

Fig. 58
Riparian vegetation from seeds carried by water

Fig. 59
Retreating spills in the floodplain

Flood continuum – created by the flow and mainly by the dynamics of the flood tides – the floodplain area. Part of ecological food webs, both aquatic and terrestrial. The flood regime both protects the reproduction of aquatic organisms (protection in pools from predators) and introduces aquatic organisms into wetland habitats (seeds, eggs, aquatic animal stages) and leads to their integration into ecosystems. The existence of flood refugia (permanent pools) is important, preserving biota from floods and a possible source of recolonisation in subsequent floods.

The continua of the water transport system are also a natural part of the TSES.

The natural shapes and behaviours of water should not only be a fundamental inspiration for artificial creation, but also a limit in development (floodplains and riparian areas).

3.6.3 Transport system by actively moving biota

Actively moving organisms are both terrestrial and *aquatic* and their preferred movement routes exist even in completely natural landscapes (TSES in natural landscapes).

The terrestrial routes of actively moving organisms are of course of varying extent and character:
- habitat-sensitive organisms (terrestrial and terrestrial) have fundamental and very strict habitat requirements (light/shade, wet/dry, food) and require continuity of the entire route; they are usually smaller, and their spatial requirements are also small;
- habitat-oriented organisms (terrestrial and flying) are generally larger in size and their territories are also more extensive (requirements for cover and orientation of major lineages).

Water routes of actively moving organisms upstream and downstream carry other organisms on and in the body (fish, waterfowl, amphibians and reptiles, some arthropods, and worms), resting in upstream areas. Reasons for active movement:
- migratory species – long hauls to spawning grounds (eels, salmon);
- spawning above home habitat (most fish in flowing waters spawn above their normal range – there they hatch and fatten to a larger size and return (drift) to their original habitat;
- migration to open food niches – dispersal of species in search of food supply.

The system of *habitats* (biocentres) and this *transport system* (biocorridors) together form the basis of the **Territorial System of Ecological Stability** (TSES).

The form of the TSES in nature is decided by:
1. The diversity of the natural landscape, i.e. the representation and distribution of bioregions, biochoras and geobiocene type groups and types of water biotopes = **biogeographical differentiation** and the **biocentres** representing it. Here, too, the figure-background principle (singularity-matrix) applies, so that we have large areas of the same geobiocene type groups with islands of exceptional geobiocene type groups in the landscape.
2. The degree of compatibility of neighbouring ecosystems, i.e. the mutual relatedness of geobiocene type groups. It is therefore about the neighbourly **relationships between potential communities** and their natural connectivity through **biocorridors**. This lays the foundation for the spatial organisation of the natural landscape. It can be noted that different ecosystem types are often grouped by relatedness into long continuous chains and, conversely, unrelated ones form natural barriers to migration.
3. **The spatial requirements** of ecosystems – how large an area is able to represent a given habitat, how far apart they can be and how wide the biocorridor must be, i.e. the spatial limiting sizes of biocentres and biocorridors according to the characteristics of individual geobiocene type groups. These natural limits are supplemented by two others, but they depend on secondary and tertiary laws:
4. **The current state of the landscape** – i.e. how the more stable (natural) parts of the landscape are distributed today. This will show where and how individual geobiocene type groups are preserved and what new, mature but anthropically conditioned habitats are present in the landscape today.
5. **Other societal interests** – what other significant purposes and interests are present in the landscape today influence the resulting form of the TSES. Most components of the TSES often serve other purposes in the landscape and are therefore multifunctional.

The aim of the TSES in general is to preserve at least a minimum of natural communities representing the ecological and genetic diversity of the landscape, and to increase the ecological stability of the territory through their arrangement.

The first comprehensive methodology was contained in the *Manual for the designer of local territorial system of ecological stability* [Löw, 1995]. After ten years, based on practical experience, it was summarized in more detail in the teaching material *Methodological procedures for designing local TSES* [Maděra a Zimová, 2005] and supplemented after more than ten years in the *Methodology of defining TSES* [Kolektiv, 2017]. However, the conceptual basis dates back to the 1980s [Löw, 1980], and a number of prominent natural scientists and other experts participated in the development of the first methodological procedures for the delineation of TSES [Löw a kol. 1984 and 1988], formally under the umbrella of the project institute Agroprojekt Brno [see literature – oral communication of KRB 1983–1987].

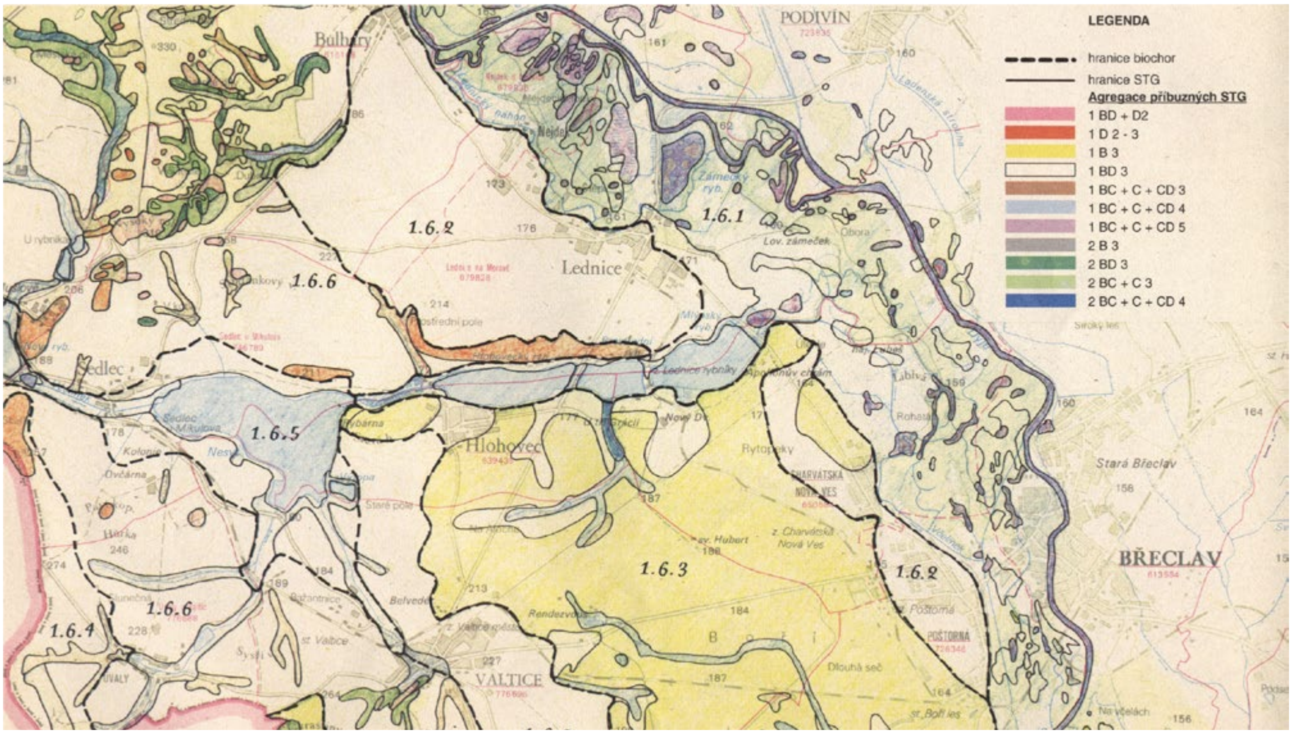


Fig. 60
Example of the geobiocene type groups differentiation and their barriers [Löw, 1995]

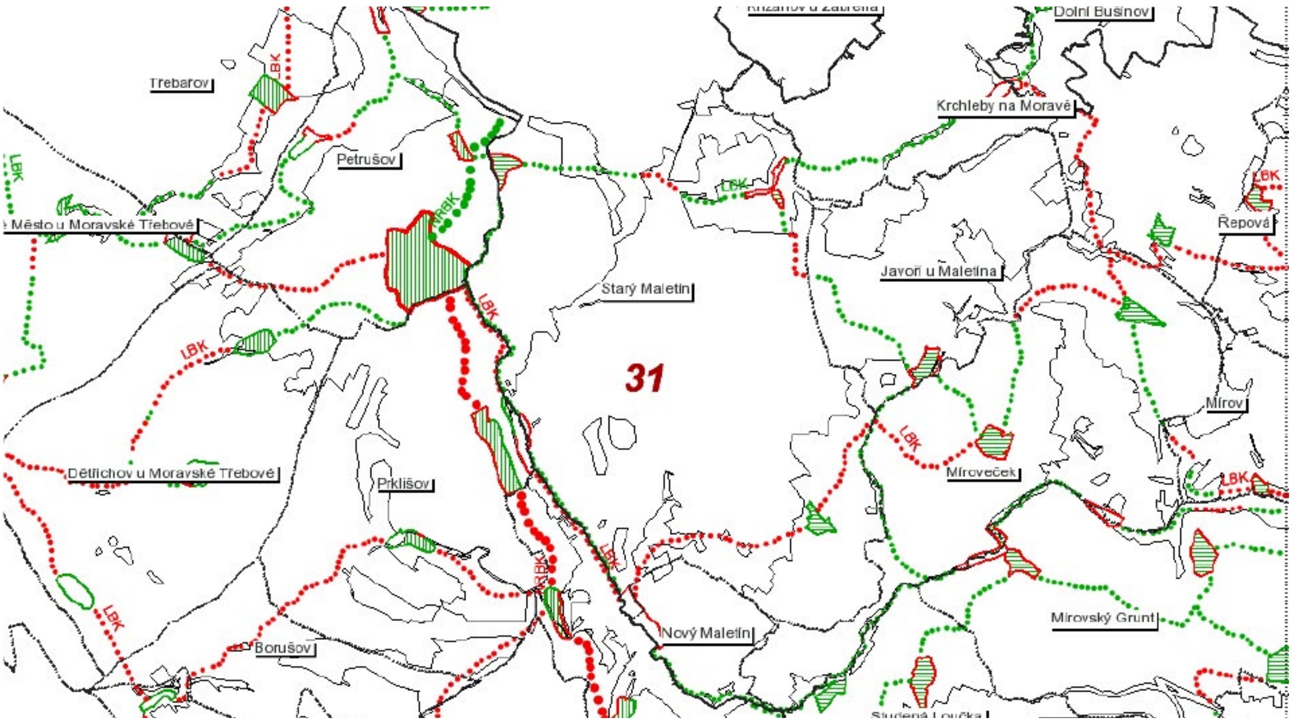


Fig. 61
Example of schematic representation of components of the TSES [Maděra a Zimová, 2005

Three basic levels of the TSES

As we have stated, the TSES serves different groups of organisms with different spatial and functional requirements. Sensitive organisms are tied to a specific geobiocene type groups or anthropically determined habitat and require a local level. For more mobile and therefore more tolerant species, a regional and supra-regional level is sufficient.

The densest network (but with the least requirements – biocentres of about 3 ha, biocorridors of 15 m width and 2000 m length) is **the local TSES** = representing individual geobiocene type groups in a given bioregion defined by biochora, and in water, individual types of aquatic habitats (3 types of flowing water and 3 types of standing water) in a given fish zone.

A thinner, but much more demanding (biocentres of about 30 ha, biocorridors of 40 m width and 8000 m length (but with necessary embedded local biocentres of 700 m each) is **the regional TSES** = represents individual defined biochoras in a given bioregion, in water then individual fish zones in a given II. order river basin (of rivers of Danube, Morava, Dyje, Odra, Opava, Elbe, Jizera, Vltava, Ohře and Orlice).

The supra-regional TSES is the most demanding (biocentres of thousands of hectares), but rare in the landscape. It represents individual bioregions in the frameworks of biogeographical sub-provinces (4 in the Czech Republic), in water individual river basins of the 2nd order in the basins of the 1st order (Danube, Elbe and Odra). It creates conditions for our largest ungulates, carnivores, predators, and migratory fish species.

Component parts of the TSES

The basic spatially functional elements of the TSES are biocentres, biocorridors, interaction elements, and protective devices.

A biocentre is "a biotope (or a set of biotopes) in the landscape which, by virtue of its ecological conditions and size, enables the permanent existence of a natural ecosystem."The main objective of biocentres is to preserve the ecological and genetic information of mature ecosystems, proven to be more ecologically stable with high natural species diversity.

- **Representative biocentres** are the spatial basis of the TSES, representing the main natural communities (forest and wetland). They are small and must be connected by biocorridors to a functional ecological network system.
- **Unique biocentres** are special, exceptional, but close to nature communities (singularities) created by specific and unique ecological conditions. Unique biocentres must be connected to the main network by natural routes.
- **Anthropically conditioned biocentres** – some communities are conditioned by human activity – steppe lade, flowery meadows, mixed or combined formations of different phytocenoses (groves, park landscapes) and hydrobiocenoses (artificial wetlands, pools, ponds). They are dependent on certain permanent human activities (mowing, grazing, clearing, maintaining water levels, etc.), yet they are highly stable with high biodiversity (but within the framework of long-term unchanging anthropoecological conditions). These too must be represented in the landscape as anthropically determined biocentres. Unlike natural ecosystems, however, these communities require permanent management.
- **Aquatic bio-centres** – stream sections with ecological conditions characteristic of a given fish zone and aquatic habitats, enabling the permanent existence of the relevant aquatic communities.

Fig. 62
Forest – representative biocentre

Fig. 63
Unique biocentre – peat bog

Fig. 64
Anthropically conditioned biocentre – steppe fallows

Fig. 65
Aquatic biocentre on the stream – heterogeneity of depths and flow is evident, sandy point bar suitable for trout reproduction, undercut banks suitable as shelter for crayfish and fish

Fig. 66
Wetland biocentre

Due to its ecological conditions and size, the biocorridor allows the migration of organisms of advanced communities (but does not necessarily ensure their permanent existence). Biocentres are connected by them according to their laws into systems.

- **Simple biocorridors** connect related biocentres and their internal structure corresponds to them. They can be intermittent within permissible limits (forest up to 15 m, steppe up to 2,000 m).

- **Composite biocorridors** are defined at regional and higher levels and respond to the fact that the maximum length of regional biocorridors is much shorter (up to 700 m) than that of local biocorridors (up to 2,000 m). Therefore, local biocentres are inserted between regional biocentres at 700 m intervals and their total length can be up to 8,000 m.
- **Aquatic biocorridors** mean a continuum of the entire flow, without migration barriers, connecting biocentres. A biocorridor serves both actively and passively moving organisms.

Fig. 67
Simple biocorridor as a windbreak

Fig. 68
Biocorridors through the field landscape

- **Biocorridor bundles** are parallel biocorridors in incised valleys where particularly preferred routes connect individual habitat continua in typical valley catenas, where aquatic, littoral, floodplain, and xerothermophilous and thermophobic continua typically coexist on slopes.

Fig. 69
The valley catena biocorridor bundle

Fig. 70
Biocorridor bundle in the incised river valley

Interaction elements as part of the local TSES serve to stabilize the landscape. They mediate the influence of more stable communities on the surrounding fewer stable parts of the landscape. By its size and the state of ecological conditions, an interaction element complements in a partial, but essential way the ecological niches of those species of organisms that are able to join the food webs of neighbouring, less stable communities (e.g. pollinators – bumblebees, parasitoids – wasps, predators on voles and mice, sunfish on aphids ...).

Fig. 71
Interaction element – alley

Fig. 72
Interaction element – baulks

Protection measures are intended to protect biocentres and biocorridors from unbearable anthropogenic pressures from outside. Co-existence with other interests is only sometimes possible and protective measures are therefore always individual, depending on the pressures the TSES has to face in a given location. It can take the form of:
- protective regime – busy neighbourhoods (playgrounds, cycle paths, parades, shooting of hunters, etc.);
- protection zone – disturbing activities in the neighbourhood (fertilisation and chemical protection, lighting at night, etc.);
- protection structures – retention ditches, fencing (highways, overpopulated game, dogs).

Reflection of Chapter 3 in the modular system of generels

The primary relationships in the landscape result in systems of these generels (or their natural parts):

1. Generel of potentials and limits of the territory
Includes mineral resources, biogeographical subdivisions, nature conservation areas, refugia of invasive species, slopes according to cultivability, slopes according to longitudinal slopes of roads, tectonic faults, alluvial areas, mineral deposits, baseline conditions, bonitated soil-ecological units, forest types, fertile and infertile soils and their agricultural cultivability, ecological footprint control, etc.

2. Geological transport procedure generel – geologically risky areas in terms of creep, landslides and subsidence, risk of undermining of slopes by water, etc.

3. Part of the generel of common natural, vetoing limits of transport by flowing water and air and their regulation (next part – see chapter 4)
Water – water sources, reservoirs, catchment areas, erosion hazard, concentrated runoff, flooding (passive and active zone), surface runoff, hydrological network, existing water regulations, stock and rearing ponds, erosion control.
Wind – prevailing wind directions and strengths at the time of the black eel, windbreaks.

4. Part of the transport generel for actively moving biota (see Chapter 4 for the rest).
TSES – biogeographical differentiation, preferred routes, proposals, large mammal migration routes for the trans-regional TSES.
Aquatic TSES – fish zones, biocentres, biocorridors, interaction elements of different hierarchical levels, ecological network.

4. SECONDARY LANDSCAPE SYSTEM – REGULATION OF THE PRIMARY SYSTEM BY THE SECONDARY ONE

The secondary system is a manifestation of the exploitative activities of man in the given natural conditions of the primary landscape system and is governed by **economic laws**.

"Economics is the science that deals with the description and analysis of the production, distribution, and consumption of economic assets (especially goods, services, and money), and examines how scarce resources are allocated among alternative uses" [Wikipedie, 2020].

The key economic patterns in primary production (agriculture and forestry) derive from supply conditioned by natural limits on the one hand and demand for products on the other. These are therefore discussed below.

Supply

For centuries, the supply has been local and uniform due to the unchanging natural production and distribution conditions. The structure of the supply of crops, as well as their quantity, has changed only with the introduction of intensified farming systems and new crops (mainly potatoes and maize). Until the modern period, the primary production function was effectively subsistence, and market relations were applied only to special products (salt, fish). Natural characteristics determined the representation and distribution of the types of production areas (crops) and thus their production. In addition to food, the cultivation of textile plants was also important. Grain was the main staple, with less legumes, and the rest was only supplementary, except for cabbage, which was an essential source of vitamins all year round. Livestock production (meat, tallow, milk, butter, leather, wool) depended on the amount of forage (ruminants) and the need for organic fertilisers. Of the others, it is worth highlighting the breeding of pigs (meat, lard), rare and highly sought-after fish (over a third of the days of the year were fasting days), the production of beer (by boiling a disinfected drink), and occasionally "farmer" wine (it was sour, intended for the staff, the farmer drank distilled one).

The supply, both in terms of the structure of production and quantity, was always the same within nature, and due to the absence of normal regional trade, it was practically subsistence until the end of the Middle Ages – what was produced on the estate was used on it.

The local market was partly found in the towns (mainly vegetables, meat, fat – pork fat was not allowed by the Jews and therefore there was a great demand for fattened geese). Supply only expanded in the 18th century, with the emergence of regional markets for grain and livestock and the introduction of maize, potatoes, and fodder.

Subsequent periods, characterised by the addition of non-renewable resources, new machinery, fertilisers, and pesticides, represented a major increase in supply. Thanks to chemistry development, primary production is increasingly divorced from the natural characteristics of the soil and is becoming an artificial cultivation system that degrades the landscape.

With communism, the slogan of collectivisation, concentration, co-operation, and specialisation of large-scale production invaded agriculture. Agricultural production has been divorced from the farmland (which has become a mere means of production) and the chemical revolution of fertilisers and pesticides has reduced the cultivation of the soil and the loss of organic matter and soil structure. Here we must look for the cause of the loss of retention capacity and self-regulation in the fields. Increasing the water content of the soil, its purity, and the protection of the land against erosion can only be ensured by harshly punishing large-scale agricultural producers, who are the real, long-term cause of this state of affairs. Concentrated livestock farming has switched (except for ruminants) to scrap feed mixes produced elsewhere. The Minister of Agriculture's advertising slogans about our better meat are so ridiculous – all pigs in factory farms in Europe eat the same compound feed, often from the same producer!

Similarly, with forestry, which has gradually evolved from its centuries-old economic function of providing fuel, building materials and pastoralism (peasant forests), with a relatively natural mix of trees and their natural regeneration, to today's spruce monocultures, subject to a range of calamities.

Demand

Demand has long been dampened by transport problems, not allowing a wider division of labour and products. It was therefore forced to draw on resources from the territory, both in quantity (size of settlement) and in structure (sowing practices and representation of other crops), and demand practically coincided with supply. Transport routes other than the waterways were impracticable for large volumes of agricultural (but also construction) products and demand was limited to local markets (geese, vegetables, etc.).

The continental blockade during the Napoleonic Wars was a turning point, with a great shortage of cane sugar, replaced by sugar beet cultivation and the emergence of huge armies requiring supplies of flour, meat, and fodder. Dominican estates were the main object of this demand.

In the 19th century, with the introduction of large-scale transport systems (steamships on the seas and trains on land), an international food market was created, both at regional (meat and grain exchanges) and global (soya, wheat, fruit, tobacco, etc.) level. Assortment pressure on primary producers (feed grain, pigs, chickens, eggs, fish, sugar, potatoes for alcohol, textile plants, etc.) and, on the other hand, the advertising imposition of surpluses (nowadays "patriotic" foods). The processing industry and retail chains target their products at the lowest possible purchase prices.

As a result of these relations, the country is divided at national level according to its natural conditions into the most fertile landscapes used almost exclusively for agriculture, less fertile landscapes used in a mosaic way, and infertile landscapes – almost exclusively forest landscapes. A distinct minority of landscapes are residential (urbanised) and even fewer are mining landscapes.

The secondary landscape system requires primarily an analysis of the functions of the rural and urban landscape. Urban landscapes are the subject of interest of all other – urban planning disciplines, and therefore we do not deal with them in depth.

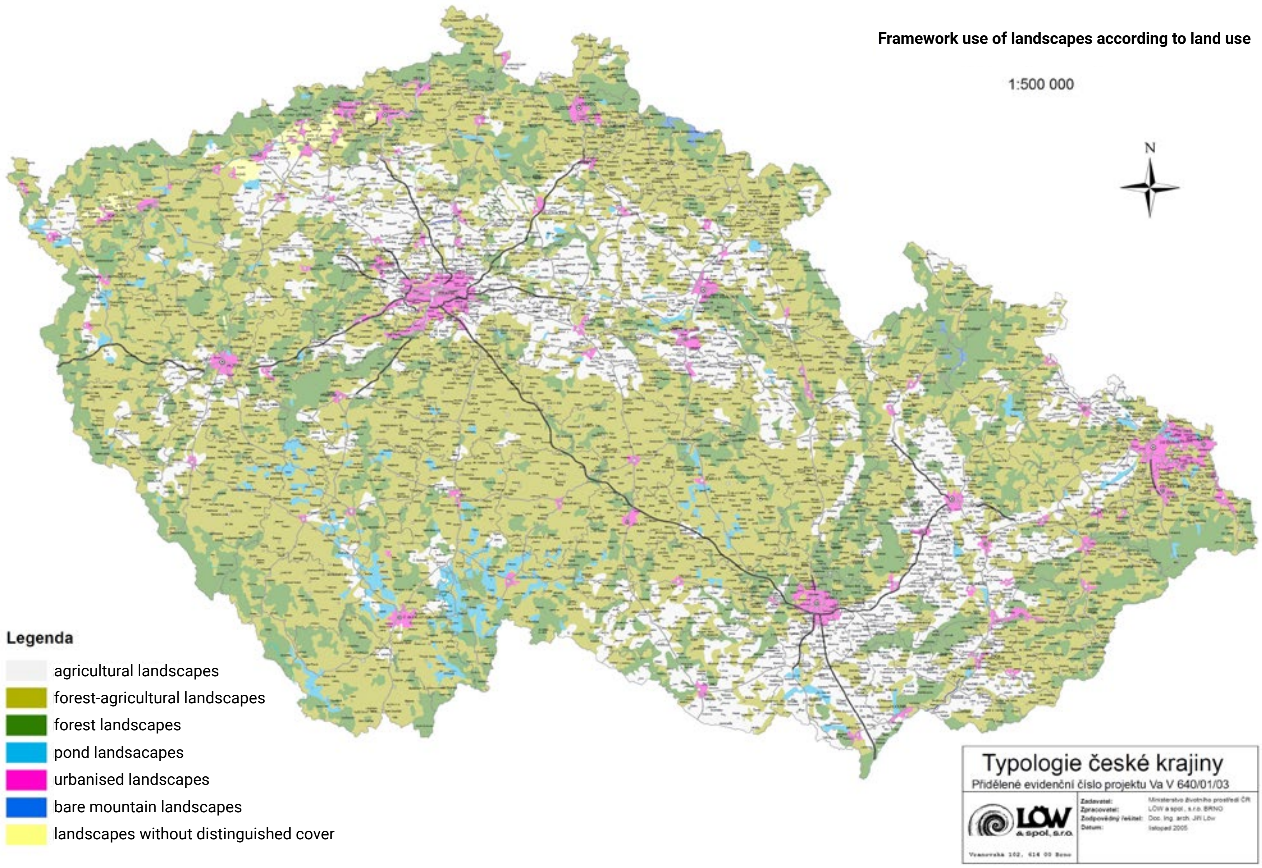


Fig. 73
The use of the landscape in the given natural conditions results in landscape types according to the type of use: field landscapes, mostly old settlement (white), forest landscapes, mostly medieval colonisation – the vast majority of the country (khaki), forest landscapes are in the minority (green), as well as pond landscapes (blue), urbanised landscapes (purple) and mining landscapes [Typologie české krajiny, VaV 640/01/03].

4.1 Types of human-influenced ecosystems

Man enters nature and creates anthropically altered, even anthropogenic, communities by either **permanently (long-term) deforming** the community directly (e.g. fields, meadows, farm forests, etc.) or **permanently (long-term) changing the ecotope** – the habitat itself (e.g. quarries, dumps). The landscape then exists in alternative – long-term, anthropo-ecological conditions.

Long-term anthropo-ecological conditions – both deform the natural characteristics of the ecotope and create new ones:

Long-term change in permanent ecological conditions:
0. **Relief change** – lasting somewhere for over 2,800 years, by mining, construction, but mainly by changes in runoff = erosion conditions.
1. **Altered climatic characteristics** – lasting about 150 years (since 19th century) – cities, relief barriers, hot water pipelines, dwellings and thermophilic ants, greenhouses, warming of the planet.
2. **Altered trades** – last 200 years (but sometimes even 700 years) – fertilization, liming – starting in 13th century (gardens), alternate system (18th century), but especially since early 20th century increasing fertilization with industrial fertilizers.
3. **Altered soil water supply** – in our country it has lasted 200 (500 years) – drainage, irrigation, urban rainwater, climate-related droughts.

Long-term anthropo-ecological conditions acting independently (in wilderness they are automatically linked to previous features and so do not play an independent role):

4. **Illumination rate** – change lasts 7,300 years (neolith), in nature automatically corresponds to tree and shrub representation or shade in rock cities and gorges. Humans, by clearing (deforestation of the landscape for agriculture), planting and building, change the illumination arbitrarily; in addition, artificial illumination changes the light spectrum.
5. **Persistence of vegetation** – lasts 2,800 years, in nature, with extreme exceptions, there is automatically always a permanent vegetation cover, but man changes it cyclically by ploughing and clearing.
6. **Degree of vegetation involvement** – lasts 2,800 years, always (except for rocks, embankments, windblown sands, and other natural singularities) automatically fully involved vegetation, man by weeding, ploughing in between, etc. changes it arbitrarily.
7. **The rate of change of food supply** – lasts for 7,300 years for fields, 700 years for cities, in nature the food supply is always varied and balanced, man introduces a one-sided diet by monocropping (e.g.fields of lucerne, grain, rape, etc.) or, on the contrary, by producing waste (leftover food in the city, especially near garbage bins, junkyards) he increases the food supply (rats, seagulls, martens, bears, raccoons, etc.).
8. **Rate of reduction of competing consumers** – 800 years of hunting food competitors (400 years of hunting) – distortion of natural ecosystem composition – hunting (overpopulation of game animals, killing of top predators), chemical weapons (extermination, pesticides, etc.) and in turn breeding of pets (dogs, cats), escaped breeders (nutrias, muskrats, ferrets ...).

The duration of the changes ranges therefore from 7,000 years to 200 years. In these long-lasting secondary conditions, ***replacement communities*** have evolved over the centuries. Most of our landscape today is made up of these replacement communities. What is fundamentally important, however, is that the permanent ecological conditions of the original ecosystems must be permanently and continuously altered by means of additional energy, and once the activity has ceased, a return to a more or less original arrangement (secondary succession) occurs.

Major replacement ecosystems:

- **Agroecosystems** (primary production communities) – communities altered by humans in order to make a profit (all agricultural, in our country strongly predominant areas, economic forests, lignicultures, ponds, etc.). Grain, as a light-loving plant, requires a cleared (formerly forest) environment.
- **Synanthropic ecosystems** (coexisting with humans) – inadvertently supported communities created unintentionally (near settlements, mines, quarries but also junkyards, ruins, brownfields, etc.) – chaotic changes of biotopes and food supply.
- **Blocked succession of ecosystems** (inhibitory succession model) – inappropriately destabilised by humans in the past (newly developing ecosystem after previous cancellation is blocked – e.g. bush formations on steppe lades, Mediterranean macchia, etc.). Long artificial treelessness in extreme conditions triggers soil and substrate erosion and the forest does not recover.
- **Anthropogenic ecosystems** (of human origin) – while the previous types of communities only deform existing landscape ecosystems, this type is completely artificially constructed (greenhouses = extremely controlled agro-cultures, "vertical greenery", controlled decomposition processes of micro-organisms – e.g. sewage treatment plants, food industry – e.g. yeast production). They are maintained by costly inputs, especially chemistry.
- **Psychogenic ecosystems** – are a special but widespread type of anthropogenic ecosystems governed by our psychological regularities (and therefore belong to the tertiary landscape system). Typical are parks, ornamental gardens, aquaparks but also terrariums, aquariums, land art, etc.

Response to the potential of the primary landscape system

Secondary systems, using primary features according to their economic regularities, must also respect the natural regularities of the primary system when intervening in it, otherwise whole systems would collapse (nature has no problem without humans, humans cannot exist without nature). Most of the so-called natural disasters are caused precisely by the disregard of natural regularities in economic exploitation. The extent to which we exploit the characteristics of the primary landscape is indicated by the so-called ecological footprint.

4.2 Ecological footprint of management

It is a constructed indicator of the degree of devastation of the primary system in a given area and thus the degree of its ecological stability and the urgency of its revitalization.

Ecological stability *"is the ability of an ecosystem to compensate for changes caused by external factors and to maintain its natural properties and functions"*[15].

It is mostly directly proportional to natural biodiversity – the more food chains (linked into networks), the better it can withstand unexpected pressures. Thus, ecological stability depends on the maturity of the ecosystem, and this is signalled by biodiversity [Míchal, 1992]. It manifests itself in two ways (similar to the strength of steel):
- **resistance** (strength) = durability – it does not budge,
- **resilience** (elasticity) – it responds but has memory (secondary succession – after deflection it tends back to the original state but sometimes in a different direction).

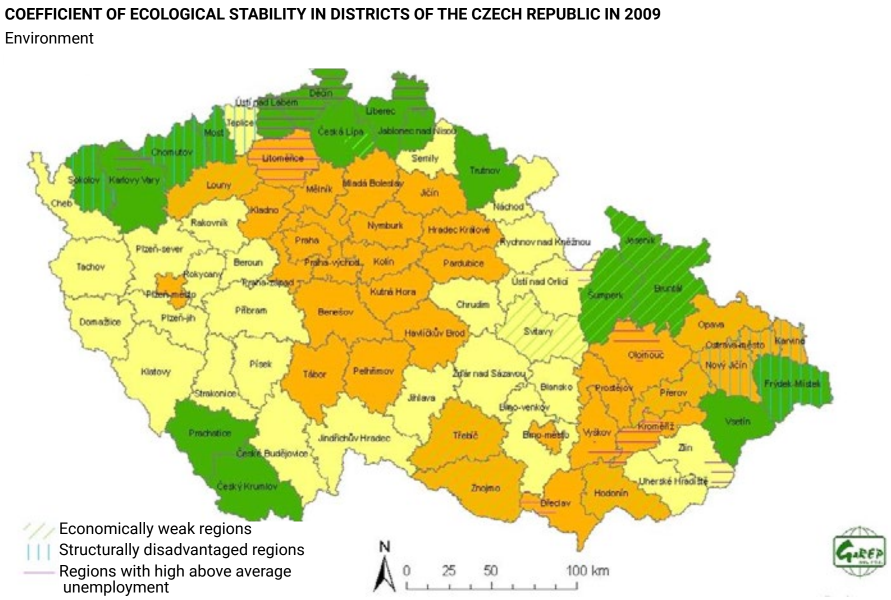
Each current type of landscape use therefore has a certain degree of ecological stability. The resulting ecological stability of an area can be described by the **coefficient of ecological stability** (CES, which is the ratio of areas that are ecologically stable to those that are ecologically unstable).

CES = (A5+A4+A3) : (A2+A1), where:
A = areas with a certain degree of ecological stability:
A5 = areas of high stability: forests with natural composition, natural pastures, wetlands, rocks, natural water areas;
A4 = areas with higher stability: permanent grasslands (PGs) with natural composition, steppe lade, semi-cultivated forests, natural water areas;
A3 = areas of moderate stability: semi-cultivated PGs, high-tribal orchards and small gardens, post-agricultural fallow, cultivated forests, landscaped water areas;
A2 = areas of low stability: cultivated PGs, large, grassed orchards, gardens, ruderal fallow, ligniculture, artificial water bodies;
A1 = areas with very low stability: arable land, vineyards, large-scale orchards on black fallow, built-up areas.
CES is calculated by cadastres for the whole country. In the case of proposals for new land use, the new CES can also be calculated to compare its possible development.

15 Act No. 17/1992 Coll., on the Environment, as amended

Fig. 74
Schematic overview of KES by districts [ČSÚ, 2009], English translation

Coefficient of ecological stability
<1,0
1,1–3,0
>3,1



Local comparison of ecological footprints

While the presented ecological stability coefficient is in fact simply the ratio of the sum of the more ecologically stable areas to the sum of the more unstable areas, for specific responses and to understand the state within landscapes we need a more detailed calculation, which also reflects the weight of the different levels of ecological stability of the areas on a five-level scale. For this, a weighted ratio of the totals – *the auxiliary coefficient of ecological stability* – ACES can be used. This is calculated using the formula:

ACES = (2 x area of 5th degree + 1.5 x area of 4th degree + 1.0 x area of 3rd degree) : (0.2 x area of 4th degree + 0.8 x area of 1st degree).

The changes that may be caused by our local proposals are already manifesting themselves here.

4.3 Location of rural settlements and their ploughlands

Villages with ploughlands (ploughland = ploughed part of the landscape used for growing key agricultural crops on arable land) have formed the basis of our cultural agricultural landscape for virtually all human history, which, together with forests, we call rural as opposed to urban. The location of individual rural settlements depends on the natural features to which they respond:
- From a sufficient area of land suitable for ploughing – the founders of the settlements were primarily looking for sufficiently flat and deep land for ploughing. The settlement is in the middle, preferably in the lowest parts of the ploughland (transport of volumes from the hill) because of the walking distance to the field. Cities also had their own ploughlands, and when the daily food markets started, their ploughland became a suburban area with estates and summer houses of the townspeople = villa rustica (Florence, Prague).

Fig. 75
Valley-based foothill ploughland

- **From water sources** – streams. The settlements were therefore primarily on the edges of the floodplains (never inside), then followed the un-flooded banks of the large rivers, then their tributaries and finally their streams and springs. The raster of the occurrences of permanent streams in our country is about 0.8 (0.2–3.0) km, the raster of settlements is about 2.4 km (max. size of ploughing areas). So, every settlement in our country has abundant waters – group water supply is needed because of pollution, not quantity! Settlement has always been by a spring or creek (watering of cattle).

Fig. 76
Chain of settlements along the edge of the floodplain

- F**rom natural obstacles on** long-distance routes. Especially when crossing larger streams and floodplains, merchant caravans in the early Middle Ages had to stop at fords and reload (unpack) some of their cargo so that they could trade with the rural surroundings – thus the first market places, later growing towns, were established. However, in the case of valleys with steep slopes there is a problem not only with the depth of the water, but also with access to it on steep slopes – fords are thus where the river widens (and is shallower – thresholds) and valleys with a slight gradient follow from the side – they are thus preferred as much as possible (Prague).

Fig. 77
Natural ford over the river

- **From the need for natural protection from the enemy** – strategic locations of castles (small complexes), forts (large complexes) and towns. It is particularly evident in the Mediterranean. Also, in our country, first on inaccessible positions – spurs over valleys (Vyšehrad, Hradčany, Levý Hradec, even fortified medieval towns – very effective until the time of artillery) and in the vicinity of swamps or waters (first wide river floodplains during the Great Moravia, then ponds, then anti-artillery forts with flooded ditches).

Fig. 78
Castle on a spur

4.4 Natural conditions and internal organisation of the ploughland

In the internal organisation of the ploughland and its surroundings, the natural features, or the possibilities of their modification, and the location of immovable landscape lines (slopes and cliffs, streams, floodplains, rock outcrops, etc.) are fundamentally applied. Equally important, however, is the type of economic system applied in the ploughland, particularly its ownership and technological requirements (community, emphyteutic law, ownership and tenancy, crop rotation).

Land sloping

Sloping of the surrounding area – where the land is ploughable – plays a crucial role in the livelihood of the settlement.

Accessibility of slopes for different farming mechanisms:

0–8° – all common cultivation mechanisms can be used – clearly arable land;

8–10° – lighter conventional tillage tools can be used here – arable land;

–––

10–15° – it is necessary to use special slope techniques – land arable in the Middle Ages;

–––

15° and more – terrain inaccessible for agricultural machinery, ploughed only occasionally by late new age colonists in unsustainable mountains – the village poor.

The other, complementary agricultural crops allow, of course, a different sloping (vineyards with deep roots need large sloping, on the contrary as orchards and pastures, e.g. gardens, meadows or hopyards on the contrary need smaller sloping). Forests are logically the way of use on all areas that remain.

Contour ploughing on slopes creates artificial movements of the soil by ploughing (you can only turn the soil on the slope), so that continuous surface shifts on the slope occur spontaneously, compensated by ploughed boundaries when cultivation is interrupted (they are approximately horizontal or sloping).

Sufficient ploughable areas in the **ploughland**, i.e. **within about 1.2 km from the settlement,** determined the location of the village – the ploughland had to be sufficient, otherwise the settlement did not survive and did not come into being (the maximum size of the ploughland, however, was on the contrary about 450 ha).

Agricultural land for cultivation

They originated from forest soils, but centuries of farming have changed them – **cultivation changes the soil:**

- reduces skeletonisation (picking up ploughed stones for field boundaries and stone demarcations);
- mechanical disturbance, soil turning, and drainage changes the soil type to steppe one;
- regular fertilisation changes trophity (fertility);
- fertilizing and ploughing increases the supply of organic matter to the soil – this feeds the edaphon, which releases nutrients for new plants.

The current size of agricultural land, especially arable land, is on average 10.8 ha for the whole Czech Republic (however, this is distorted by the large proportion of very small, "residual" land). The optimum in terms of cultivation is about 20 ha, above 60 ha (which is the majority of the current agricultural areas) extreme risks of land degradation (suffocation of the subsoil layer by unnecessary taxis, low biodiversity) is already occurring. On the contrary, up to 5 ha the land is small, less suitable for large-scale farming (every turn of the machines was and is demanding).

Permanent deforestation and land surface stripping, together with high sloping, lead to a sharp **increase of soil erosion** and nutrient runoff.

Most of our water problems today are caused by large-scale, unreasonably large agricultural plots.

Forest land for timber harvesting

The utility – economic value of wood species plays a role (wood price index ratio: oak = 8.0; ash = 6.0; larch, maple, cherry = 5.5; spruce, fir, pine, beech = 5.0; alder, linden, poplar, birch = 4.0).

But tree species have their ecological limits, which foresters are constantly trying to exceed – for cost, but mainly for ease of growing and subsequent processing, they prefer conifers (they are straight and relatively fast growing) – spruce, pine, larch = a forester‘s dream. But naturally there should be no spruces below 450 m and firs, larches, and yews only in admixture. There has also been the planting of non-native trees (Canadian poplars, oaks, cedars with varying landscape impacts). Artificially exceeding natural limits leads to “natural” disasters (bark beetle, wind breaks, etc.).

Mineral extraction and post-mining reclamation

This is a devastating activity in the landscape. According to the law, the site must be completely excavated, which determines the shape of the excavated area. However, a reclamation plan must also be established with a target focus. Reclamation must lead to the return of the original use. Newly created shapes outside of mining are unrealistically expensive. On the other hand, quarries and flooded sand sites in particular can create replacement habitats in the landscape for valuable relict ecosystems or as recreational opportunities. These are typical secondary ecosystems, often of high natural science value (preference for natural regeneration, supported to varying degrees).

4.5 Melioration – adjustment of the water regime on the land

Melioration is the targeted change of the hydric ecological series to normal, to lush (intermediate between normal and waterlogged) – drainage and irrigation.

Drainage of waterlogged areas (e.g. slope outwash, waterlogged areas in floodplain) – surface drainage interferes with machine cultivation, hence subsurface – drainage (main axis and minor axes supplemented by a raster of springs).

Small, sub-local systems are effective, but the communists introduced large-scale ones – no matter if it was drought or not and thus drained artificially large landscapes. Even maintaining the groundwater level is dangerous, especially at high evaporation rates when soils become salty (e.g. the “pusztas” of the regulated Tisza in Hungary, the salty fields of Iraq).

Fig. 79
Drainage

Fig. 80
Drainage ditch in the floodplain

Irrigation of drying areas (supplementing of missing rainwater in the soil).

The basic problem of irrigation is the reduced capacity of the soil:
- to absorb water into the topsoil (lack of organic matter in the soil and poor soil structure);
- to release excess water into the bedrock (suffocation of the subsoil by heavy machinery).

Irrigation technology has several methods:
- *Irrigation by overflow* (surface overflow and seepage) – irrigation channels with pumps and drains (constant cleaning is necessary due to colmatation) – mainly in the south (Žitný ostrov (island) in Slovakia, Mesopotamia, Egypt), for pumping already in antiquity complex pumping devices (first piston machines and water wheels), typical for rice paddies.

Figure 81
Irrigation channel

- *Spray irrigation* (overhead lines) – pressurised water in huge "walking" machines down to small sprayers (lawns, flower beds).

Fig. 82
Large-scale irrigation

- *Localised irrigation* (drip, spot, micro-sprays, etc.) – is applied to each plant separately according to its needs, since with previous methods a large amount of irrigation water evaporates without benefit (especially in arid regions, e.g. Israel).

Fig. 83
Economical drip irrigation

- *Subsoil irrigation* (underground irrigation lines) – buried supply pipes, water leads directly into the soil (either pressurised irrigation or, in contrary, drainage).

The appearance of all types of melioration structures shows a lack of design workmanship.

4.6 Adjustment of surface water runoff and erosion

From the first drop of rain, which moves with its energy the first grain of clay on the top of the hill, flat erosion gradually takes place, which, depending on the slope and roughness of the surface, increases with growing rate of runoff and further increases with growing amount of water runoff. Due to the spatial curvature of the slope, sheet runoff begins to merge into "valleys" and a sheet erosion turns into a groove erosion. Gradually a groove is formed, then a periodic flow channel (gutter) and thus becomes a permanent flow where erosion and sedimentation are already fully developed – a river is formed.

Therefore, runoff from land is always associated with erosion activity. However, in our natural conditions this is moderate (as much soil is carried away, roughly as much is created by weathering). Artificial deforestation and agricultural crops increase it significantly, and therefore artificial protection must be addressed – erosion protection is thus a necessary response to the disturbance of natural processes (in particular deforestation and land stripping) caused by us.

Fig. 84
At a higher slope, runoff accelerates (by gravity) and removes soil (rill erosion), at a moderated slope it slows down and deposits the collected soil (sedimentation), the same happens when the surface roughness changes (photodocumentation from agricultural soil erosion monitoring [VÚMOP, 2014])

Soil erosion protection

Soil erosion depends on a number of factors that can be summarised as rainfall and surface runoff characteristics, soil conditions, terrain morphology (slope gradient, length, and shape of slopes), vegetation conditions and land use (including agrotechnology used). The historical basis for calculating erosion is the USLE, the *Universal Soil Loss Equation* for calculating long-term soil loss by water erosion [Wischmeier and Smithe, 1978].

The formula is: A = R x K x L x S x C x P
- where A = soil loss in t/ha/year (erosion rate), R = erosion efficiency of rainfall, K = erodibility of soil structure and texture, L = uninterrupted slope length factor, S = slope gradient factor, C = protective effect of vegetation cover, P = effectiveness of anti-erosion measures.

The individual factors are difficult to calculate, but there is a programme for this. The most important information for us is where erosion (soil entrainment) exceeds soil production from the substrate = permanent unsustainability. For us, about 4 t/ha/year is allowed for deeper soils (see BSEU, code 5), shallow soils should not be ploughed at all!

Secondary water erosion control systems are divided into:
- **Organisational measures**: design of suitable crop placement (strip cropping, optimal shape and size of the plot, vegetation strips between plots, grass catchment strips).
- **Agrotechnical and vegetation measures**: soil conservation tillage, anti-erosion ploughing, anti-erosion sowing of maize, anti-erosion protection of potatoes.
- **Technical measures**: terrain stabilization, retention ditches, swales, terraces, protective baffle, anti-erosion reservoirs, anti-erosion roads.

Organisational measures are naturally the most suitable for protecting the landscape from erosion, agrotechnical measures are less suitable and technical measures are the least suitable.

It is about:
- **Reduction of slope gradient** (S factor):

Fig. 85
Artificial terraces

Fig. 86
Field boundaries

- **Break in slope length** (L factor):

Fig. 87
Retention ditches

Fig. 88
Swales

- **Change in surface friction** (K factor): when the surface roughness changes, the water velocity and erosion rate change. When the water slows down (e.g. on grassy land edges or strip fields), it deposits entrained particles on the site and over time sedimented field boundaries are formed spontaneously, which still form the basis of the linear agricultural landscape. Sedimented field boundaries only occur in fields; land that was formerly meadows and pastures does not have field boundaries.

Fig. 89
Sedimented field boundaries in the background

Fig. 90
Strip fields – original, satisfactory condition before land consolidation

Fig. 91
Strip crop rotation

- **Protection of streams from run-off** (C factor): approx. 50 m protection zone between field and water (floodplain) for run-off.

Even during heavy rainfall, only slightly turbid water should flow from the fields. Water that leaves a deposit of mud (the finest soil particles) in the settlement indicates poor management of the fields!

Options for regulating runoff circumstances in streams

Even with planned concentrated runoff, erosion and sedimentation processes take place. Where water speeds up, it carries away soil; where it slows down, it deposits it (the specific gravity of the stone is less in the water).

The goal of stream regulation is generally to create a flow profile that will carry the maximum flood flows (Q100 or Q20, etc.) through the landscape unscathed and, conversely, when the stream dries up, it will provide the necessary flow depth for aquatic ecosystems to survive (the so-called minimum flow). All water management is regulated by water legislation, in particular the Water Act[16].

The individual measures are mostly only technical and their effect on the landscape is usually disruptive. This is where we see the great debt of architecture.

Types of measures on flow

Flow magnitudes particularly important for their artificial regulation:
- *longitudinal slope of the water surface* – is determined by the slope of the valley floor and the

16 Act No. 254/2001 Coll., on Water and on Amendments to Certain Acts (Water Act), as amended

width of the stream (when the river widens in width, the slope above the spillway increases and the water flows faster);
- *longitudinal bed slope* (can be not only smooth but also dramatic due to bed composition);
- *impounding* - hydrostatic (for standing water);
  - hydrodynamic (for flowing water) = makes a big difference;
- *erosion base* – the highest fixed bed downstream, which thus determines the overall slope and upstream flow velocity

The basic measures used today include:
- **Flow deepening**: a popular layperson's measure, but in reality, not very effective and expensive – actual functionality depends on erosion base and hydrodynamic surface elevation (more variables than the flow profile at the site). When the deepening does not depend on the erosion base, the water slows down, and the cover quickly silts up again.
- **Straightening of the flow:** shortening the length of the flow will increase the bed slope and thus increase the velocity of runoff, but storage space is lost, and the rapidly diverted water can cause problems further downstream.
- **Channel widening or narrowing:** channel widening is limited by the minimum water column, which must be maintained in the stream at minimum flows; the problem of the relationship between the flood width of the stream and the minimum depth of the stream can be solved by small weirs or by raising the minimum level by means of ditches.

Fig. 92
Small weirs on the stream

- **Stream fencing:** creates a composite flow-through profile of the river – the small, narrow profile of the actual stream (the cuneettes) is extended by a large, wide profile between the dams, above the inner banks (berms) in the event of flood overflow out of banks. Thus, there are two main flow profiles in the cross-section of the stream – the flow for normal water conditions (trapezoidal cross-section through the cuneette) and flood conditions (composite trapezoidal cross-section through the entire excavated area). This is the most popular water management solution in practice. However, the problem is caused by the riparian vegetation (see transport system by water) at the banks of the cuneette, which narrows the flood profile and forces the water managers to continuously cut them down. Extending the berm by a strip of riparian vegetation may be a solution.

Fig. 93
Cuneette and berms of the stream channel, its fencing

Damming of part of the floodplain: we protect only the economically important edges of the floodplain, outside the active flood zone. In a wide floodplain (with high dynamics of flows), a wide strip of floodplain should be left for safe passage of even the largest floods – a sufficiently wide active zone (in the case of the Morava river in Napajedla it was calculated at 200 m!). The rest can be dredged, but:

- often long stretches of side tributaries must be fenced together, otherwise they require pumping stations when floods return;
- the volume of water from the dredged area is sent further downstream without slowing down.

Streams and riparian vegetation

Natural stream banks with inflows of tree seeds form the basis of natural lines in the landscape. It hides the hydric and littoral natural continuum and a major source of biodiversity in the rural landscape.

Fig. 94
Watercourse line with riparian vegetation

Artificial retention facilities

They are a substitute for the natural and fully forested landscape of river basins with high water retention ("forest" type of rivers). By simplifying the ecosystem, they technically retain water on the surface. In principle, this is a correction of the behaviour of the "steppe" river towards the "forest" river.

The best retention measures are small, independent of each other, densely spaced and automatically functioning, such as:

- slowing the flow of water through the channel,
- slowing the water in the meander floodplains.

- **Diking of rapid streams in valleys:** normal flow flows through the lower channels and does not silt the bottom. At higher, shock flows, the entire area fills in until the water overflows the spillway. Excess flow, including sediment, is captured, but the bottom is again cleaned by normal flow.

Fig. 95
Watercourse barrier

- **Dry polder:** similar to the previous one, but much larger – in flat valleys.

Fig. 96
Dry polder

- **Lateral polder in the floodplain:** it is irrigated only after the specified level of the river rise is exceeded, by overflowing over the dams – it creates the largest retention volumes.

Fig. 97
Lateral polder in the floodplain

Reservoirs can also increase retention by combining functions.

For floods, the storage, unfilled space of the reservoir is important (but this is in contrast to the main function of reservoirs – to keep as much water as possible out of the flood).

Dams – have different functions (retention, energy, navigation, recreation, irrigation...). They are complex systems whose operation is governed by a management plan with necessary staff. The primary objective of the retention functions of dams is to improve flows for predetermined purposes. Obligatorily retained water can be released in drier periods to maintain a minimum flow downstream. During times of increased inflow, it is important to capture as much floodwater as possible for later use.

The eternal dilemma of the dammers is thus every spring:
- either they let the spring waters through the reservoir and leave it empty, and then they are afraid that the next flood won´t come because otherwise they won‘t fill the reservoir and they won‘t have enough water for other functions the rest of the year;
- or they fill the reservoir with spring water, but during the next flood the storage capacity of the reservoir is lost, and a flood occurs below the dam.

In general, we distinguish between different functional capacities of dams and their corresponding reservoir storage levels:
- Permanent retention – this is necessary for the correct location of the intake facilities, which must be protected from siltation and must not be allowed to entrain sediment into these facilities. The level of this space must never drop and cannot be drained.
- Storage area – this is above the permanent retention area and is designed to store water for water management purposes and is manipulable.
- Controllable protective space – extends from the level of the storage area to the crown of the spillway, capturing flood waves.
- Uncontrollable space – defined by the thickness of the spillway beam and therefore the maximum retention elevation.

Ponds – an important part of the landscape retention, but their priority function is never retention itself, but fish production. Unlike dams, they are relatively shallow and form a reminiscence of the ecosystems of former shallow lakes, mostly Pleistocene, filled with alluvial sediments in the Holocene.

The location of the ponds depends primarily on sufficient water inflow and secondarily on suitable terrain profiles.

The water supply is:
- so-called sky and spring water (rainwater or spring water in the pond only),
- flow-through (a stream or river flows through the pond like a in the dam),
- overflow (a peripheral drain floods the pond from the side so that sediments are limited).

Depending on the function in fish farming, the following ponds are distinguished: maternal pond (rearing of generation fish), spawning pond (used for fish spawning), fingerling pond, pond for rearing of young fish, chamber pond (wintering of fish before stocking into the main ponds), main pond (finishing the production run of fish and the output is marketable fish), fish stocking (temporary storage of fish before sale). All of the best-known ponds are main ponds.

The main components of the ponds:
- The water drive brings water to the pond. It can be up to several tens of kilometres long (e.g. the Zlatá stoka (Golden Sewer) water drive). The peripheral drive diverts some of the incoming water, which then does not enter the pond at all.
- The inundation land is the land flooded during normal water level rise.
- The inundation area includes other land where other economic uses are precluded. Land in the basin may be heavily waterlogged, flooded at higher water levels, etc. (formerly often reedbeds with willows).
- The water outlet consists of a sluice with a sluice shaft to completely drain the pond.
- A safety overflow spillway prevents water from spilling over the crown and subsequently breaching the dam.
- The stilling basin dampens the energy of the overflow, preventing undercutting.

Opportunities to increase the water supply in the riverbed as part of natural retention

Restored meanders are the most natural:
- In addition to increasing the retention capacity of the stream, the water in the stream will improve the connection between the stream and the surrounding floodplain (a stream that is not "moving" will be collamed = sealed by argils, and will not let water out of the channel). It is important that the river can "dredge" – remove and deposit the collamed layers elsewhere to restore flow.

Channel overflows:
- Side-discharge reservoirs (as well as ponds and weirs with weirs on the river – the outlet allows channel sediments to pass through at high flows)

Floodplain spillways:
- Controlled flooding at high stage in the river (significantly increases retention and sheet flow across the entire surface of the floodplain).

The main legal standard on river basin management is the Decree on river basin management plans and flood risk management plans[17]. It distinguishes three types of documentation: a) sub-basin, b) water bodies, c) protected areas.

Our streams have been regulated many times over 200 years, but the devastating floods are still there!

4.7 Protection against landslides

Landslides, including soil creep, are natural, but a significant part of landslides are caused by us – by poorly built or too steep embankments and trenches.

17 Decree No. 24/2011 Coll., on river basin plans and flood risk management plans, as amended

Fig. 98
Anthropogenic landslide caused by poor construction

Possible landslide protection:

- drainage – diverting groundwater away from slippery layers, limiting seepage over a possible landslide (drainage ditches);
- piles extending below the sliding layers;
- loading of the base of the slope;
- but it is best to avoid it and use it in such a way that landslides do not obstruct = pastures, forest.

4.8 Protection against wind

The wind by the ground carries away the soil (dust and sand) and dries it out. The size of the grains blown away is classified according to the wind speed – windblown sands (high speed), loess windrows and drifts (lower speed).

Windbreaks perpendicular to the wind direction slow the wind over the ground – depending on the direction, intensity, and seasonality of the winds. They occur up to 200 m in front of and 400 m behind the windbreak.

Fig. 99
Windbreak perpendicular to prevailing wind directions

The transition between windbreaks and soil-protective vegetation are raster tree plantations, typical in the White Carpathian dry meadows with falling winds.

Fig. 100
Raster planting of trees on the plot

Soil protection crops – field crops that cover the soil as long and as well as possible (e.g. perennial forage crops).

4.9 Implementation of the water Territorial System of Ecological Stability (TSES)

Opportunities for restoring the natural habitats of the river continuum

The original natural river flows are practically non-existent in our country, they have been completely changed and their ecosystems destroyed. A restored water TSES is therefore practically the only way to reconnect fragments of water ecosystems into functional units.

In addition to water clarity, the restoration of the continuity of flows interrupted by dams and weirs is crucial. Crossing critical sections upstream of rivers – rapids is difficult even in nature, but organisms are adapted to these obstacles and can overcome artificial barriers if they are not too high or poorly constructed. Of course, high weirs and especially dams cause a huge problem.

Fig. 101
Cascade – the high weir divided into three steps

Obr. 102
Fish passes at dams and weirs

Stream channel habitat mesostructures and their replacements

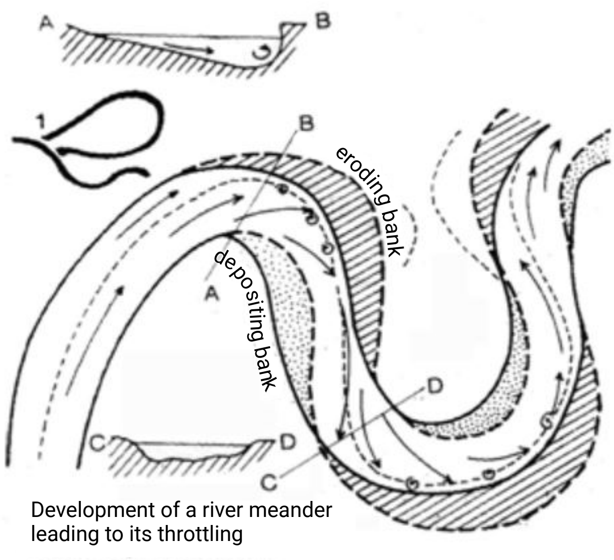


Fig. 103
Diagram of meandering stream sections [Netopil, 1984], English translation

Habitat structures that diversify the environment are important in the stream. They are either a natural part of the watercourse (rapids, shallows, pools, etc.) or may occur on a limited basis to accompany water management structures.

Fig. 104
Rapids in a natural channel with boulders

Fig. 105
Concrete threshold with overflow – artificial replacement (construction type)

Fig. 106 Stone threshold with rapids – artificial replacement
(rather natural character)

Fig. 107
Shallow – natural ford over the river

Fig. 108
Accumulation bench/banks

Fig. 109
Impact and accumulation bank – benches without vegetation

Microstructures of stream channel habitats and possibilities for their replacement

Streambed layout

In the transverse profile of the naturally flowing stream, the greatest depth is at the impact bank, becoming shallower towards the accumulation bank until it ends with a bench of sediment protruding from the water. The natural flow profile is therefore triangular. These bed types shift downstream during the year, depending on flow dynamics.

At the impact bank, undercutting – shading of the pool and shelters in the bank – is also common. These can be artificially replaced by shading the pool with a pier or bridge, or floating features.

Stream bed habitats depending on their nature

Boulders in the channel – Boulders in the channel have a variety of organism habitats on them depending on flow and inundation. In addition, they form eddies and counter-currents that serve as resting places for wandering organisms.

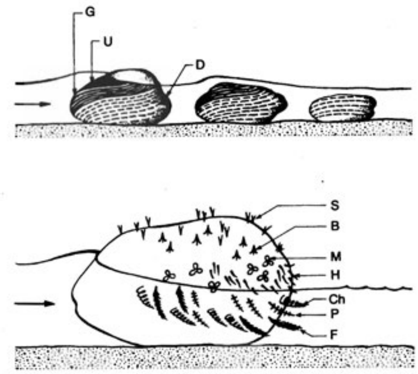


Fig. 110
Distribution of algae and mosses on differently submerged stones in the stream [Lellák and Kubíček, 1991], English translation

Sediment grain size and shape – even in small streams, we can clearly observe the distribution of sediments according to the velocity of water flow in them:
- **boulders** – abraded stones (limestone is abraded after 5 km in the stream, granite after 20 km) are first deposited on the bottom when the stream slows down,
- **gravel** – successively coarse, medium, and fine, typically composed of boulders, as the flow slows further;
- **sand + fine or coarse gravel** – mixing of different sediment layers during flood;
- **sand** – always washed, stripped of finer impurities and organic matter;
- **clay** – fine sediment in areas without flow;
- **argils** – the finest sediment, rare in normal flow;
- **submerged branches** – broken off branches from riparian vegetation, can form important shelters but also barriers during floods;
- **leaves** – fall from riparian vegetation, carried by the flow, their tannins diversify the environment, in dead-end channels they form the basis of their grounding;
- **coarse detritus** – partially decomposed leaf litter on the bottom of pools;
- **fine detritus** – decomposed leaf litter accumulating in particularly slow and small streams

Natural habitats of streams and pools should be a model for artificial water features of natural type.

Opportunities for restoring natural habitats of the littoral continuum

Coastal habitat mesostructures

Natural habitats can largely be replaced artificially, and in practice have been for a long time:
- artificially maintained gravel benches – as a replacement for accumulation banks;
- bays – artificial diversification of banks, e.g. at outshoots;
- curves – artificial diversification of stream reaches with hardened impact banks;
- coastal pools – fundamentally important habitat for amphibians and arthropods, they can be periodic, during revegetation they are even shooting and are formed by funnels after explosions;

Fig. 111
Artificially created pool

- swamps – can be initiated by artificial shallows with vegetation.

Fig. 112
Swamp areas of the pond inundation

Microstructures of coastal habitats

Even coastal microstructures can be maintained or restored, and it is often surprisingly easy:
- rock banks – walls, rough concrete;
- coastal vegetation (amphibious plants) – shallow channel;
- riparian vegetation (grasses, shrubs, trees) – planting alleys, shrubs, lawns, etc.;
- embankments (see Prague) – low terraces of the floodplain;
- alluvial banks – they arise spontaneously, are isolated from the surroundings, exist at the water surface (also in Prague);
- nesting islands – floating;

- overhang shelters – shelter under the pier.

Fig. 113
Actual Prague embankments

Fig. 114
Narrow, inaccessible berms

Fig. 115
Floating nesting islands

Fig. 116
Fish shelter – pier in the town

Fig. 117
Fish shelter under the pier of the water reservoir

4.10 Implementation of the terrestrial Territorial System of Ecological Stability (TSES)

To the natural criteria of the primary system, forming the TSES, two factors of the secondary system are added:

- **The current state of the landscape**, i.e. the skeleton of ecological stability as a result of the long-term development of the use of the landscape – "unintentional stability".
- **Other intentions of the society** – economic demands on the landscape – both known and unknown today. The unknown leads us to the construction of the biotope skeleton, therefore the TSES

in minimum parameters (i.e. parameters that we know for sure that exceeding them leads to the collapse of the TSES system!). For those sections where the spatial uncertainty of the location of the TSES is higher, it is of course the duty, especially of the land-use plan, to specify the TSES according to the other interests in the area so that the TSES does not unnecessarily restrict them. The long-term nature of the implementation of the individual parts must also be considered (the oak woodland biocentre may require up to 600 years!).

The aim is to preserve and restore the terrestrial continuum. The basic principle is to leave nature alone. But the environmental impacts on small parts of the TSES are massive (conservation measures).

Opportunities for the restoration of the terrestrial TSES

- **Biocentres in general** – It is necessary to protect them from chemical runoff from the surroundings by catchment and drainage ditches, or grassed seepage strips, in the case of special crops by protection zones of spray application, fencing against wild animals, including dogs and prohibition of their walking. Any replanting must be of indigenous or at least geographically native species.
- **Woodland Biocentres** – Over 3 hectares of forest means that there will be a true woodland environment right up to the middle, so we help provide shading and microclimate through dense planting of the tree cover. Even a local woodland biocentre needs to be internally stratified into patches of different ages, with a permanently shaded (forest) environment being the non-negotiable target condition. It therefore works best in forest units.
- **Wetland biocentres** – by raising the water table through irrigation, artificial flooding (cassettes, excavation).

Fig. 118
Planting a biocentre in a waterlogged area

- **Anthropically conditioned biocentres** – they are outside general conditions, and their restoration and maintenance are governed by specific long-term, anthropoecological conditions.
- **Biocorridors in general** – the primary goal of conservation and restoration is to maintain a continuum of connected biocentre habitat types. Plantings should respect the composition of ameliorative (temporary) and skeletal (target) tree species, in multiple age categories!
    - Interruptions by roads with lower traffic frequencies do not matter here – larger animals mostly pass at night, only small biota during the day, which is mostly solvable by gated underpasses.
    - Delineation should be based on river and terrestrial continuum outlines.
    - Maintenance is needed for all.

- **Forest bio-corridors** – out-of-level crossings are necessary with fenced overriding roads – highwayys (ecoducts, but better “underpasses”, care should be taken with shading and especially irrigation when bridging by flyover).

Fig. 119
Biocorridor on the bridge over the motorway = “ecobridge”

- Non-forest biocorridor – Most of the non-forest communities do not need a biocorridor due to the logic of their origin and duration, as they spread through other transport systems, but their sufficient density along the route is important. In general, for some anthropically conditioned communities, maintenance and restoration is specific (again according to long term anthropo-ecological conditions).
- Interaction elements – The actual spatial ecological stabilisation of the landscape is carried out by interaction elements, biologically continuously subsidised from biocentres and biocorridors, by ecological links to the food webs of surrounding, less stable communities. They create the most varied niches for regulators of field organisms – edaphon, insects (pollinators, e.g. wasps, bees, butterflies), ants, predatory insects, reptiles, birds (insectivores, raptors) and mammals. Some of their habitat needs can be replaced or intensified artificially:
    - beehives – 25/25 cm = wasps, bees, bumblebees;
    - nests – horizontal cavities 5 mm/10 cm = solitary bees;
    - insect houclearanceses = substitute for nests;

Fig. 120
Insect shelter

- corridors in gullies (5 mm/10 cm) = insects;
- holes (5 mm/10 cm) in fresh clay mortar, in stone wall = insects;
- nest cavity in tree – nest box = woodpeckers, ladybirds, titmice, some owls;
- cup-shaped nest – in branches by songbirds = open boxes;
- burrows in gullies = waders, kingfishers, Procellariidae;
- hanging = Oriolidae, Ploceidae, Nectarinidae, Remizidae;
- nesting pad = min. 8 m above ground, min. 1.2 m diameter – stork, raptors;
- depression in the ground = ducks, Galliformes;
- crutches = raptor observation sites;

Fig. 121
Crutch with a raptor

- melting pieces of wood = insect eggs, food for the larvae;
- melting pile of plants = edaphon, hatching and hibernation of reptiles and hedgehogs;
- clearance cairn, fallen trees = hiding places for insects, reptiles;

Fig. 122
Clearance cairn

- permanent grass = shelter, nests;
- artificial burrows in the ground = carnivores, insectivores.

Reflection of Chapter 4 in the system of generels

3. Generel of natural limits of transport by flowing water and air and their regulation (related to the first part – see chapter 3)

Water – water sources, reservoirs, catchment areas, erosion hazards, concentrated runoff, floods (passive and active zone) and sedimentation, flood control measures, irrigation and drainage, surface runoff, hydrological network, existing water management regulations, fish storage and breeding ponds, water erosion protection – organisational and technical measures, landslide rehabilitation.

Objectives:

- maximum infuse of rain into the soil (slow runoff by increasing roughness and infiltration);
- maximum water retention in the landscape (reservoirs of all kinds, channel extensions, forests, wetlands, not land reclamation);
- the smoothest possible runoff outside spring floods (maximum retention).

Wind – prevailing wind directions and forces during the black fallow period, windbreaks, measures – vegetation, organisational.

4. Generel of transport by actively moving biota (related to the first part – see chapter 3)

Terrestrial TSES – biogeographical differentiation, preferred routes, proposals;

Migration routes – large mammals = supra-regional TSES;

Aquatic TSES – fish zones + fishways, biocentres, biocorridors, interaction elements of different hierarchical levels, ecological network.

Objectives:

- the most economical possible network of the TSES, negative demarcation, stage differentiation;
- specification of alternative habitats in the interaction elements.

6. Generel of settlement functions (first part, with further continuation)

Urban functional areas – settlement pattern, rural settlements, urban settlements, pattern, and development of settlements.

5. AUTONOMOUS SECONDARY SYSTEMS

5.1 Functional areas of forest landscapes

All our natural, potential communities are forest communities. A forest (even an economic forest) is always ecologically better than an artificial treeless area. In terms of its habitability, the situation is different – the forest is beautiful but uninhabitable – few people wish to live in a closed off forest without sun (Klánovice, Kersko, Finland).

5.1.1 Natural forest landscapes

Natural forest landscapes are practically non-existent in our country, there are only fragments in some protected nature areas (large national nature reserves, zones I and II of national parks), however, such areas are rare and untouchable. In our nature, therefore, these are mainly landscapes close to nature and even these are rare and are preserved mainly in extreme natural conditions. They exist as small fragments within reserves, nature parks, protected landscape areas, etc. (they have the character of steppe, forest, wetland, etc.).

Fig. 123
Natural forest

Fig. 124
Natural forest-free area

5.1.2 Land intended to fulfil forest functions

Our forests are designated by law as *land intended to fulfil the functions of a forest*[18]. This includes not only forest, but also fields for game, timber stores, hauling and approach roads, etc. The forests in our territory are generally located where it has not been possible to effectively farm up. These are areas that are characterised by:

- naturally cold climate,
- naturally steep slopes,
- naturally skeletal and shallow or sandy soils,
- natural waterlogging,
- long distances from settlements.

5.1.3 Forest functions

The main function of the forest in terms of human utility is the harvesting of timber for the timber industry, and formerly also the need to provide heating wood and grazing. Other functions of the forest include:

- the needs of everyday recreation (suburban forests), where again the "liveability" of the forest is important, which should be characterised by a transparent interior preferably without a shrub layer (deciduous forests should include clearings – groves á la Arcadia, coniferous forests should include shady glades with clearings and moss);
- intensive hunting grounds – formerly near manor residences (game-preserves, pheasantry) nowadays often leased and with an excessive amount of game (intensive grazing and nibbling of branches disturbs the forest);
- protection from run-off, odours, and views (insulating function).

The forest also has newly recognised functions:

- it is part of the TSES and landscape ecosystems or natural areas;
- agricultural land is being converted to it as part of the managed decline of agriculture, with the aim of rapid wood production – ligniculture on arable land.

5.1.4 Types of forests

The law establishes the following types of forests:

- **economic** (main) **forests**, used for timber production (other functions are auxiliary);
- **protective forests** – in the sense of protection of the forest vegetation itself (high slopes, forest edges, areas high in the mountains, etc.);
- **special-purpose forests** with various specific functions (the aforementioned pheasantry and game-preserves, nature conservation, protection of water resources, recreation, etc.).

The functions and types of forests are related to the so-called ‚fallow period'. This is the time between the establishment of a forest stand and its clearance. It can be as long as 40 or 160 years, depending on the harvesting methods and the type of tree species. Any forest vegetation must be replaced by new planting within the legal time limit, i.e. artificial reforestation takes place.

The forest has a mandatory protection zone against disturbance (including buildings), namely 50 m from the edge of the forest.

18 Act No. 289/1995 Coll., on forests and on amendments to certain acts (Forest Act), as amended

Fig. 125
Close-to-nature forests with natural tree species composition are the most stable¨

Fig. 126
Cultural forests – monocultures are not very stable

Fig. 127
Lignicultures – poplar monocultures – low stability

5.1.5 Methods of harvesting forests

Harvesting methods = "economic methods" – the harvesting also determines how the new forest will look.

Clearing management method

- *Large-scale clear felling form* – large areas of bare land are created during restoration. This form is no longer allowed in the Czech Republic.
- *Small-scale clear felling form* – small bare lands stand up to 1 ha (exceptionally 2 ha) are created during regeneration, their width must not exceed 1–2 forest vegetation heights. It is well suited for the rapid regeneration of poor quality vegetation or for the regeneration of lightloving and resistant trees (pine, spruce, oak, etc.). It can be considered as a distant analogue of calamity clearing areas in natural forests of the same species (fires, taiga blowdowns).

Fig 128
Clear felling

- *Group felling form* – contains several types of fellings, typically aiming at natural rejuvenation of the parent stand on differently sized, shaped, and oriented lighted or cleared areas (wedges, kettles, strips). It allows the formation of mixed and diverse stands or the simultaneous regeneration of shade-loving (fir, beech) together with light-loving species (pine, oak, spruce).
- *Large or small area undergrowth form* – the vegetation is screened in order to achieve spontaneous natural regeneration under the retained trees. In this form, there is no bare area and usually no need for planting seedlings, which is natural in beech forests.

Selective management method – the result of its application is a selective forest, which can most closely resemble *natural forests* in its structure and species composition, while still remaining an economic forest providing quality timber.

Fig. 129
Result of selective farming

The forest is the basic compositional element of our landscape – it forms **the basic, dark matrix**. Our rural landscape is predominantly *glyptic* – a forest with a deepened forest-free (treeless) zone.

5.2 Functional areas of agricultural landscapes

Rural landscapes are made up of a mosaic of agricultural crops, ponds, villages and agro-industries, transport structures and forest clearings.

The functional agricultural areas in the landscape reflect the way the land has been used, since the time of Joseph II, called **cultures**. The decisive culture from prehistoric times to the present day is arable land (cereals, root crops, but also large areas of vegetables) – other cultures only supplement – fruit, wine..., permanent grassland (meadows + pastures). They are situated according to natural conditions.

5.2.1 Arable land

The crops on the plot change over time – rotation according to crop procedures. The behaviour of the plot changes with them – four main crop groups: cereals (winter), root crops, cereals (spring), crops (main for the soil) = four-field system (but can be extended to a number of groups = up to eight-field system). However, due to current chemicalization, it can be disturbed or even abolished – monocropping = rape, wheat. The world today is dominated by the five mega-crops: wheat, rice, soya, potatoes, and maize – these feed most of humanity.

The erosion resistance of crops is important for the landscape – wide-row crops (maize, beet, potatoes, vegetables) are the worst, so they should only be on plains and short slopes!

Cultivation technologies and the field surfaces they create are used accordingly:

- The technological parameters of ploughing, subsoiling, sowing, weeding, and harvesting require different machines, and these have different demands on the land. The hallmarks of machine tillage are the continuous lines and textures of the fields hatched by furrows. Depending on the mechanisation, the length between the edges of the fields with roads varies from 500 m to 1,500 m.
- Tillage (ploughing) is parallel, at intervals (to allow the machine to turn), the headland is then ploughed perpendicularly.
- The ideal shape of the plot is rectangular.
- Harvesting irregularly shaped plots follows the edges and goes to the centre. Field game – young animals (hare, deer) sit and are roughed up, shy animals (partridges, quails) are pushed into the centre and killed there. That is why game scarers are obligatory (also applies to meadows and pastures when mowing).

Fig. 130
Cereals

Fig. 131
Root crops

Fig. 132
Forage crops – clover

Fig. 133
The economic hit of the last few seasons – rapeseed

The field without vegetation is not uniform, it is patchy, which is due to different moisture conditions (valleys/ridge, water seeps and pipelined streams/dry skeleton, extra organic matter/washed, hungry soils), different soil types, but also traces of old settlements.

Deforested areas of fields, meadows, pastures, or vineyards contrast visually with areas of forests and orchards. This is particularly significant during the grain ripening period and in winter. The treeless landscape gives it a contrast – the bare field is the "floor of the landscape" and there is nothing inferior. There are also solitaires in the field – permanent field manures and straw stacks (dry places) – temporary bales of straw or hay.

5.2.2 Permanent grassland

The current management of meadows and pastures is similar in many ways, so that today they are mostly listed as one category – permanent grassland (meadows, pastures).

Meadows are permanent grassland that is mown regularly (1–2 times a year) – it is not a permanent grassland – free movement is limited (no damage to the vegetation or soil)!

In prehistoric times there were no meadows (it was not worth cutting down the forest for them) – winter fodder for cattle was silage from tree branches. Later, meadows were where it was too wet (floodplains) or shallow (rocky, unploughable subsoil) or cold (mountains). Today, rather like a heritage of the past – hay is replaced by alfalfa, clover, and silage.

- Extensive meadows (flowery) – relatively most natural, flat ecosystems outside forests, with high exogenous stability, often part of ecological networks.

Fig. 134
Flowery foothill meadow

Fig. 135
Carpathian meadows with solitary trees

- Intensive meadows – to increase the yield, they are also artificially fertilised and restored after about 6 years: ploughed and reseeded with a high-yield mixture. They have high yields and low ecological stability.
- Floodplain, wet meadows – naturally highly productive in the past, even though the hay has sometimes been washed away by floods. It has therefore been stored in haystacks on poles.

Fig. 136
Fertilised meadow

Fig. 137
Floodplain meadow

Pastures – formerly residual areas (neither ploughable nor mowable), were common, communal = municipal.

Today, grazing areas – aggregated areas with a predominance of non-ploughable areas with intensive cattle breeding, all-day residence, fenced (electric fences, better wooden fences), watering and shelter are usually necessary. However, in our conditions we deal mostly with infertile grasses, hence the feeding with a mineral core. Atlantic wet grassland is the origin of the English park.

Fig. 138
Contemporary grazing area

5.2.3 Special agricultural crops

Orchards – formerly produced fruit and hay from grassed high stem orchards. Ecologically and landscape valuable. But note today´s specialisation – large-scale orchard patches – low-stems, fruit walls (wire mesh) on permanently ploughed (black fallow) chemical desert – is ecologically the worst; erosion.

Fig. 139
Traditional high stem orchards

Fig. 140
Intensive low-stemmed orchards – often reseeded and on black fallow

Vineyards – lifetime is 20–30 years, chemical desert. However, biological protection (e.g. predatory mites), resistant varieties, etc. are slowly gaining ground. Needs support – wire mesh (high and medium, wiring – tensioning of wire mesh requires long parallel straight lines), wire mesh does not require low head wiring (very low, each has a rod). Deep-rooted vines don‘t mind skeletal and drying soils (roots reach very deep for water), but they especially need soils that are calorific. In suitable areas, especially abroad, entire wine-growing landscapes are thus created.

Fig. 141
Vineyard on wire mesh

Fig. 142
Vineyard landscape

Mixed agricultural cultures (*Terra promiscua*, smallholdings, allotments…) – low productive mosaic of different cultures on one plot (e.g. Hustopeče, Židlochovický creek, etc.). The landscape has an interior to pitorean (allotments) scale.

Fig. 143
Small holdings with a mixture of crops

Garden – "behind the buildings" – land for mixed, everyday consumption (vegetables, fruit, small animals), it used to be always economic, but today mostly ornamental.

5.2.4 Productive water areas

With a few exceptions, these are artificial reservoirs for different functions, but they are often grouped together (ponds, dams, etc.).

The oldest artificial, but related to natural biotopes, water areas are **ponds**. The main problem of today's pond management is the intensification of farming through fertilisation (carp and duck farming), feeding and overstocking (turbid pond waters). For hygiene reasons, the breeding ponds are not suitable for recreation. Overfished areas also attract predators (cormorants), which are then persecuted.

The decisive artificial types of water bodies are **valley reservoirs** – dams. Unlike ponds, the related natural biotopes of dam lakes do not exist in our country (deep mountain lakes) and are therefore completely non-native – non-natural. In addition to their natural retention function, they fulfil a range of economic functions, depending on their intended use.

The energy function is obligatory – hydroelectric power plants (practically all of them) also participate in balancing consumption peaks, or even with a pumping function, supplementing conventional power plants. They are characterized by large reservoir level fluctuations and a strong influence on downstream water temperature (cold water from the bottom).

They are important for providing water for cooling nuclear power plants (huge volumes – the river evaporates!).

Rare are reservoirs for irrigation (although the cost of large irrigation systems tied to dams is not economically feasible without subsidies).

A large part of the reservoirs is drinking and utility water reservoirs for cities and agglomerations. Their other uses are, however, hygienically limited.

An important, albeit complementary, function of reservoirs is water recreation and water sports. This is particularly popular in our country and is limited in practice only by hygiene for drinking water and intensive fishing.

In addition to these two types of reservoirs, there are, of course, a number of completely **special-purpose reservoirs**. Some of them are technologically linked to the industry (sewage treatment plants, tailings ponds, technological reservoirs), some of them complement other functional sets, especially recreational, decorative, etc.).

Fig. 144
Large pond in a flat basin

5.3 Ploughlands and settlements

5.3.1 Ploughlands

The basic landscape unit of the rural landscape in our country is considered to be **the ploughland** (the term derives from the words "cultivated by plough") with a settlement in the middle. It is a perimeter of ploughed land forming the subsistence base of a rural settlement. Meadows, pastures, orchards, and gardens have always had a complementary function and were not included in the ploughland! The size of the ploughland is governed by the walking distance from the farm to the field, which is a maximum of 1.2 km, so the original size of the ploughland does not exceed 450 ha. In such an area, the basic agricultural activities as well as the daily life of the inhabitants take place over time. Economic systems (crop rotation, the continuity of livestock production with fodder and manure, etc.) are created. The floodplains are divided into land blocks (bounded by fixed barriers that are difficult to break down, especially in relief) and individual plots (bounded by ownership or different cultivation methods). The blocks were called *sections or tracks*. (Note in this context the Czech word "hon", which is an organisational, not an area unit – these are plots of land with a common classification in the economic system).

Blocks bounded firmly and in a long-lasting manner by linear *erosion retarders* (which create sedimented boundaries, ditches, and from the roads, then ravines), form a typical micro-relief of the field landscape, defined by boundaries (flat above, shaped according to the nature of the terrain below) and faceted fields.

The narrow plots within the block are routed from edge to edge of the block, usually along a declivity (so that each farmer has a part impoverished and part endowed). The plots along the contour line are mostly secondary and come with ploughed boundaries (artificial terraces of the recent era of replacement reclamation are sort of a hybrid). The plain is also characterised by the ray-like organisation of paths connecting individual fields as efficiently as possible with the stables (important for transporting of manure and fodder) and farmhouses (for storage and use of crops, granaries were built, firewood and timber for buildings were stored, etc.) in the village. The roads connecting the fields and the stables were always crucial in the ploughland and were only secondarily followed by roads connecting the forest and the stables. Although they were built in an era without machines, they are encoded in the relief for ages. The structure of the plain is nowhere completely erased.

Agricultural farming systems

The types of ploughland areas and their internal arrangement are mainly based on the economic systems that conditioned and determined their formation and arrangement [Láznička, 1956]. Ploughlands, like economic systems, have changed over time. Historically, there has been the following types of economic systems and their ploughlands:

- heat farming system (dating from the Neolithic, in some places up to the early Middle Ages) = without a fixed ploughland
- annexation farming system (Bronze Age to the High Middle Ages and again in the modern period in extremely infertile areas) = stretch ploughland
- triple-field farming system (medieval to 19th century) = track, non-track, and backfield ploughland
- and today‘s alternating economic systems (from the 19th century to the present day)

Preserved historical types of ploughs

As a result of an annexed system of farming, the **sectional ploughland** (early medieval and then modern) creates a heterogeneous environment with a mosaic of areas of varying suitability for agriculture.

Fig. 145
Sectional ploughland

The triple-field system before the emphyteutic law creates a linear ploughland (in newly colonized landscapes) and a quasi-linear ploughland (by reorganizing of older ploughlands). In these, triplets of equally sized land blocks – tracks – are always necessary, and in each of them the peasant had his own land (High Middle Ages until the end of the 14th century).

Fig. 146
Track ploughland

Fig. 147
Irregular track ploughland

The triple-field system with the emphyteutic right (the beginning of individual possession of fields by peasants) creates a backfield ploughland (late Middle Ages – from the first half of the 14th century to the modern period). The peasant's land is divided in a strip behind the farm. The transitional segment is formed by a longitudinal ploughland.

Fig. 148
Backfield ploughland

Fig 149
Backfield ploughland in forests

The variant backfield ploughland is **radial ploughland**. In flat or basin relief, the central ploughlands are radial with radial edge orientation. In elongated valley relief, the valley ploughlands are elongated radial with a partially ladder edge orientation. The radial ploughland does not allow any territorial organic growth of the settlement – it has always been assumed that it would not grow further. The ideal contour of the ploughland is a circle, but otherwise the shape depends on the relief.

Fig. 150
Radial ploughland

The settlements lie in the very centre of the historic ploughland areas as a *functional zone of the agricultural system* with relevant buildings, especially stables and warehouses (barns, granaries, cellars, etc.).

Integrated large-scale production ploughlands

Under socialism, all historic ploughlands were forcibly integrated, with the aim of:
- abolishing visible property boundaries by ploughing up boundary lines;
- adapting the size of the plots to Soviet agricultural technology (a plot under 100 ha! had to be justified) – there were problems with the turning of such huge machines with a great influence on the land and the way of cultivation, including the working position;
- abolishing also the boundaries of smaller land blocks, huge erosion and run-off occurs;
- reorganising the landscape into large-scale ploughlands, linking the fields to a centre outside the village, building new main roads etc – the ploughland has thus lost its link to the settlement.

Fig. 151
Comprehensive large-scale production ploughlands

In the merged ploughland, except for the crofts near the village, the ownership plots have been abolished and they are put into blocks. On the plains, they are largely defined by new roads and watercourses and the old ploughlands are almost wiped out, but in the more rugged terrain they have to respect the old retention boundaries. The basic layout of the historic ploughlands is thus more or less preserved to this day.

Complementary farming

Complementary farming is typical of non-agricultural settlements (often in poorer natural conditions or near town walls), mainly cattle breeding and horticulture. Milk, vegetables, etc. were perishable and difficult to import, therefore these products were produced as close to the market as possible. It was rather small-scale; the products were only for their own supplementary consumption. It was typical as a service base for castles, large towns, on long-distance trade routes, at mines, later also glassworks, sawmills, and hammers, and even later it was typical for mining (Ostrava). It is still preserved today as settlements of part-time subsistence farmers with agriculture of daily consumption or as crofts or gardening settlements.

Fig. 152
Structure of part-time subsistence farmer ploughlands in the mining landscape

5.3.2 Settlements in the landscape

The determining natural factors for the formation of a particular type of settlement are the climatic conditions and the relief. At higher altitudes, the less fertile ploughlands are able to support fewer inhabitants and therefore smaller settlements or even isolated settlements have been established; in the fertile lowlands, the ploughlands can support a larger population and therefore there have always been larger settlements.

Each settlement represents a specific functional zone of the landscape – a centre of livestock production and storage of supplies, with housing for the staff. A small medieval feudal lord with a small feudal rent resided in a fortress, which was also a dominical farm. A large feudal lord with a large rent resided in a castle without ploughlands and cultivated his land with the help of manor-houses. Historically, the largest part of the ploughland was usually in the feudal lord‘s possession (it was the so-called dominical or lord‘s land).

Each settlement may have evolved according to the organisation of the ploughland, so each ploughland corresponds to a type of settlement. Historical settlement types are mostly still preserved as their nuclei. There are several types of such settlements [Láznička, 1956, Škabrada, 1999]. They can be principally divided into three main groups according to their predominant urban form.

We distinguish a group of concentrated or semi-concentrated settlements, a group of dispersed settlements and a group of dispersed settlements.

The concentrated/semi-concentrated types are characterised by a village or street layout of estates, often adjacent to a central public space [Urbášková, 2019]. The dispersed forms are characterised by a grouping of homesteads arranged in succession (or in a different form), often without a clearly defined central space. Scattered settlement is characterised by separate, often isolated homesteads.

This corresponds to the historic settlement types, still preserved as the nuclei of contemporary settlements.

Concentrated types

This homogeneous settlement gradually developed in successive functional areas in the second half of the 19th and 20th centuries:

- concentrated settlement in the core and along the roads from the core (from all farmsteads there must be access to three opposite sides – the ploughland tracks);
- cottage development – formerly of the village poor, later of village non-agriculturalists, built on the “remnant” areas of the village (from unnecessarily large village squares to the village edges, with no links to the arable fields);
- completion with single-family houses – in crofts, terraced development in parallel streets – the main limit is the length of utilities per house (this limit is now often lifted by public funding of backbone networks and the intention of investors is for the largest number of houses in the area – carpet development).
- agro-industrial sites behind the village – displaced operations due to odour buffer zones – any concentration of livestock has a certain buffer distance from residential developments (but beware – today livestock farming is being phased out, residential development comes close to the centre, and it will start farming again!)

Main concentrated types of villages

Square villages

These are villages with an urban structure centred around a square, the crofts are supplemented by a road, and the ploughlands are sectioned, quazi-tracked, or tracked. It should be pointed out that there is a fundamental difference between the village square and the town square – the village square was primarily used for the gathering of livestock, the town square was used for trade. Typically, square villages are found in old settlement and medieval colonisation landscapes.

Fig. 153
The core of the square village

Road and street villages

These villages differ from the square villages by the lack of a village square and the buildings are organized along a central street, usually very long. The farmsteads are arranged in rows, so that the gables are connected to each other and form a continuous front of houses on both sides of the street. The crofts are supplemented by a backfield road, and the ploughlands are sectional, quazi-tracked or tracked. These villages are typically found in old settlement and medieval colonial landscapes. Street villages are typical of Moravian valleys and adjacent areas.

Fig. 154
Middle part of the street village

Two-row (street) villages

They differ from the square-type villages in that their length usually greatly exceeds their width, with the street widening into a square at some point. The crofts are supplemented by a sunken road, and the ploughlands are section, non-track, or track. The street square village is a combination of the previous two types and dates from the same period.

Fig. 155
Two-row street village

Loose types

Typical for longitudinal and backfield ploughlands, where individual farms respected the strip parcelling of allotments along the road. The homogeneous development of dispersed villages developed in the second half of the 19th century and in the 20th century in other typical steps, when the following took place:

- expansion along the main road,
- filling in the gaps,
- founding and building a new parallel street,
- agro-industrial areas were created behind the village, outside the chain of farmsteads.

Main loose types of villages

Row villages (forest row and short row villages)

Their urban structure consists of freestanding farmhouses arranged in a continuous line along the road. The ploughlands have a backfield but also tracked character, the crofts are therefore complemented by a road.

Fig. 156
Part of the row village

Forest villages with regular hides (Forest-hide village)

These are settlements adjacent to forests, which are usually in some part the natural boundary of their development. The crofts are not accompanied by a backfield road, the ploughlands have a backfield character. The villages became part of the late medieval and later landscape.

Fig. 157
Forest-hide village

Circular villages

They are characterized by a radial ploughland around the settlement. These villages, which represent a spatial modification of the forest-hide villages, are found in the southern part of the Bohemian highlands (on aerial photographs they can be seen as “ground spiders”).

Fig. 158
Circular village with a radial ploughland

This homogeneous development developed in further typical steps in the second half of the 19th and 20th centuries:

- without the possibility of a direct connection;
- a new, double-sided built-up street and a cottage street are created along the road, outside the farmhouses;
- agro-industrial areas outside the village.

Chain villages (Goral and Wallachian)

Their urban structure consists of free-standing farmhouses arranged irregularly or at intervals. Chain villages became part of the modern cultural landscape.

Fig. 159
Part of the chain village with larger spacing

Agglomerated (cluster) villages

Their urban structure is characterised by a disorderly but (historically) tightly shaped grouping of free-standing farmhouses. The ploughlands have an irregular track and sectional character. They are typical of villages of the earliest (early medieval) foundation and secondarily in the early modern period in sectional ploughlands.

Fig. 160
Part of the agglomerated village

Modifications of mass villages are villages around roads, where the urban structure is oriented/ concentrated along the roads (this is also how metal farming settlements were created). The ploughland is sectional with divided sections.

Fig. 161
Agglomerated road village

Dispersed types of settlements

These are settlements in completely marginal agricultural locations, where the fertility of the ploughland is so low that it practically does not allow a greater concentration of farms, and these are dispersed according to their reach into small, arable areas.

Courtyard

A small cluster of farmsteads with either family connections or housing for staff. The ploughland is sectional (Wallachian and Goral villages).

Fig. 162
Courtyards

Hamlets

These are separate, isolated homesteads located in such infertile positions that the ploughland (stretch) was able to support only a few families – Kopanice, Paseky.

Fig. 163
Scattered settlement of hamlets

Specific villages

In addition to the three main types of settlements in the landscape, there are rarely some villages with specific functions, functionally different from agricultural ones. They cannot be classified in any of the previous groups.

Market village

It represents a kind of transition between the village and the town, where a market village differs from a typical rural village mainly by its market function, i.e. the right to hold markets. Settlements were most often established on trade routes or near castles. They often served as the seat of an estate with a castle.

Transit village

These are most often village streets with linear (older) or longitudinal (newer) ploughlands, they were established as service and customs stations of the trade transit through the mountains, with selective management.

"Raabizing" villages

These villages were founded in the last quarter of the 18th century on newly, more efficiently subdivided land, usually divided among the former serfs. To this day, their regular division into regular sections is evident in the layout of the villages, as are the typical names Terezín or Josefov. The name of the type is derived from the name of the imperial court councillor Raab.

5.3.3 Development of villages

There are several types of basic units of development in the village. The types of farmsteads are specified in the following text.

Farmsteads

The basis of the village development are the farmsteads. These are homesteads with a typical composition:

- the residential part of the farmhouse is oriented to the street, sometimes with a fenced front garden (it occupies only about ¼ of the area of all buildings) with a passage to the yard;
- to the side of the courtyard there is an additive development of stables (horses and cows) and pigsties (pigs, goats, etc.) with chicken coops (poultry), as well as an open shed (tools and utensils, wagons);
- across the yard there is a barn (straw, hay, threshing floor), sometimes also a separate granary, a krecht (pit for storing root crops) and a cellar;
- behind this set of buildings there is a long garden with vegetables and fruit, at the end of which there is a fence or wall with a gate opening onto the backfield path; later a second barn was placed here (the location is a consequence of the so-called fire patent, which laid the foundations for fire protection during the time of Maria Theresa).

The original basis of the farm was 2 "láns" of fields (basic 1 lán = 17.3 ha), but the area often varied according to the fertility (large in the mountains, small in the lowlands).

Fig. 164
Development of farmsteads

Divided farmsteads

These are new farmsteads of so-called half- and quarter-owners concentrated along the main road at the exits from the settlement, usually at the corners of the village square and in the continuation of the street. In loose forms of settlements, either the farmsteads are continued in a row or new farmsteads are established, the first ones behind the crofts. In dispersed forms of settlement, new isolated estates are created.

Fig. 165
Development of divided farmsteads

Cottagers‘ homesteads

The cottager had a small amount of land, which was not sufficient for a complete livelihood, requiring a supplementary source of income. In both concentrated and dispersed row villages, cottagers‘ homesteads are located on what were originally communal plots (typically in the corners of the main development). In the dispersed types of villages, the cottages are created by the extension of a courtyard, so that the cottagers end up with only small fields and gardens.

Fig. 166
Cottager´s farmstead development
– in the middle of the development

Buildings of cottagers

The buildings were built in a situation when the cultivation of the fields no longer required more labour and did not provide a livelihood for part of the village population. The **cottagers** who made up this population settled on abandoned mining sites, on the village squares or on residual areas in the settlement (sand pits, later railway areas). From the 19th century onwards, these settlements were also built in the urbanised areas of towns, taking over the surrounding villages.

Fig. 167
Houses in the residual area

Houses of part-time subsistence farmers

Buildings without fields and with small gardens were built, for example, near railway stations, and were based on barrack-style floor plans. New working-class quarters in towns were also created in this way.

Fig. 168
Houses of part-time subsistence farmers

Deputation flats and gardens at the large estate

This specific type of building provided housing for the village staff on the farmsteads.

In the 20th century, new features appeared in the villages. Their urban fabric is being complemented by new developments which are changing the character of the villages and the landscape more than ever before. The new functions described in the following text generally give rise to the need for new or higher-capacity technical and transport infrastructure.

Pure housing

The new development consisting of single-family houses complements the urban structure of the villages, most often with carpet housing. Sites designed exclusively for housing are emerging. Non-agricultural employment opportunities for formerly urban residents remain in the towns. The emergence of new housing in villages is part of the suburbanisation process that characterises the late 20th and early 21st century in this country.

Fig. 169
Carpeted area development

Agro-industrial centres (former Unified Agricultural Cooperatives – "JZDs")

Areas with a large concentration of livestock are often located relatively far outside the village (large sanitary protection zone).

Fig. 170
Agricultural halls in the landscape

Civic amenities

Previously, the villages had a church (located with the cemetery on the plains of the village square or on the hills), a school, a pub, and a municipal hall in the centre. More recent features include a library, fire station, community centre with hall, gymnasium, playground, convenience store, doctor's surgery, swimming pool etc. The need for new amenities is often triggered by the arrival of new residents in villages.

Industries

These are new, often dominant buildings and areas of an industrial, energy or similar nature (e.g. wind farms, overhead water tanks or transmitters, etc.). New lookout towers are also appearing. The buildings significantly, often questionably, change the character of the local landscape.

Fig. 171
Electroindustry

Fig. 172
Electroindustry

The buildings of new functions, but unfortunately also of traditional functions, change the historical compositional character and the internal environment of the villages. The formerly legible structure, which provided orientation and clearly indicated the hierarchy and function of the buildings, is disappearing and must definitely be protected and restored.

Fig. 173
Clearly legible settlement

The related specifics of urban construction are the domain of urban planning disciplines. In the context of this book, which focuses on the landscape, they are mentioned only in the context of their influence on its historical development.

In terms of **architectural design**, two distinct approaches can be traced, typical of both the landscape and the urbanised area. The following can arise:

- Building as an individual and isolated creative act, where it is a free creation and where the artist has priority, the values of his work should be greater than those of the surrounding buildings. Often this results in "backdrops" where anything can be considered as anything. It is a kind of play on the truth that is elsewhere or nowhere.
- Building as a **form of function**, where the form corresponds to the centuries-tested reactions of the environment to given changes, the principle of contextualism is applied here. In a given place is what is supposed to be there, appearance fundamentally corresponds to function. What fulfils a common function must also have a common morphology; new creations only arise in works that are functionally exceptional in a given space. Every observer must be able to tell in which building one lives or manufactures, what is a dwelling house, a garage, a production facility and what is a theatre, for example.

5.4 Artificial transport systems

Important autonomous secondary systems in the landscape include artificial transport systems. They provide transport of people, goods, energy, etc. by technical means. The transport elements and systems in the landscape and urbanised area are subject to standard or legal requirements and are part of spatial planning documents – generels. The basic concepts and systematisation of the issues are included in the following text.

5.4.1. Road transport

Transport by car is carried out on roads, which are divided into the following categories by the Road Act[19]:

(a) motorways,
(b) roads,
(c) local roads,
(d) special purpose roads.
According to the Act, a surface road is a traffic route intended for use by road and other vehicles and pedestrians.

Motorways are divided into Class I motorways and Class II motorways according to their purpose and transport significance. The category of Class II motorways includes former expressways (according to later amendments to the Road Act).

19 Act No.13/1997 Coll., on Roads, as amended

Roads are divided into the following classes according to their purpose and transport importance:

(a) Class I roads, which are intended mainly for long-distance and interstate transport,
(b) Class II roads, which are intended for inter-district traffic,
(c) a Class III road, which is intended for interconnection of municipalities or their connection to other roads.

The Road Act divides local roads (roads in the municipality) into the following classes:

(a) local roads of Class I,
(b) Class II local roads, which is a congested collector road with restrictions on direct connection to neighbouring properties,
(c) a local road of Class III, which is a service road,
(d) a local road of Class IV which is a road inaccessible to vehicular traffic or on which mixed traffic is permitted.

A service road serves to connect individual properties for the use of the owners of those properties or to connect those properties to other roads or for the management of agricultural and forestry land.

The design of roads is dealt with by technical standards (ČSNs), in particular the design of roads and *motorways*[20] *and the design of local roads*[21].

Dirt roads are categorised according to the design speed and the cross-sectional layout. They are characterised by a fraction containing in the numerator the letter symbol denoting the dirt road (P) and the clear width of the dirt road in metres, and in the denominator the design speed in km/h. We distinguish:
- main dirt roads (P 6,0/30, P 4,5/30 and P 4,0/30),
- minor dirt roads (P 4,0/20, P 3,5/20),
- supplementary roads – not necessarily defined by the design category – provide seasonal road connections.

The design of dirt roads is governed by the relevant standard[22].

Forest roads are divided into four categories according to the relevant standard[23]:
- class 1 forest road (1L) allows year-round operation,
- class 2 forest road (2L) allows only seasonal use,
- the forest track (3L) is an access road for tractors,
- the technological line (4L) is an approach line on slopes.

Beyond these, it also distinguishes forest paths and footpaths – either for the exclusive use of forest owners and managers or for recreational use (‚other forest paths').

In terms of the rural landscape, the roads can be divided into two main groups:
- ***transit roads*** (motorways, 1st, 2nd and sometimes even 3rd class roads),
- ***service roads*** (class III roads, where local roads of class II and lower are directly connected to them, and special-purpose roads – field and forest roads).

Transit communication

Transit roads (motorways, class I and II roads) pass through the landscape as more or less operationally isolated corridors and represent an operationally isolated and visually separated element in the landscape. Transit roads can neither be urban avenues (they cannot accommodate safe and comfortable pedestrian routes – sidewalks, the character of urban avenues also does not suit the design speed), nor access roads to the landscape (they cannot be directly accessed by earth moving machinery). In this context, it is worth mentioning the so-called biological, or human physiological, driver speed of 30 km/h. – a higher speed must be compensated by a comfortable road configuration.

20 ČSN 73 6101 Design of roads and motorways
21 ČSN 73 6110 Design of local roads
22 ČSN 73 6109 Design of dirt roads
23 ČSN 73 6108 Forest road network

Transit roads are a major factor in the landscape:
1. Higher category routes (motorways, class I roads) fragment the landscape – both naturally and economically.
2. The actual routing of roads on embankments or even flyovers or bridges has a major impact on the landscape (especially if they are flanked by noise barriers), while routing on flat ground, but preferably in a cut, has a lesser impact.
3. Crossings with motorways are out of alignment and can also affect the landscape by their elevation.
4. Higher category roads act as a suburbanising stimulus to road services, but also to belts of large warehouses (although their own connection to motorways is often quite different!) turning their backs on the landscape.
5. Advertising billboards are in places more dominant in the landscape than castles and churches.

Service roads

Formerly mainly radial farm tracks linking fields to stables, nowadays to fields with the agricultural centre. They were and are followed by access roads to the forest on one side and municipal roads in the villages on the other. This ancient scheme was gradually followed by a hierarchical division into national roads (link roads) and local roads of various categories.
- The main functional relationships of the service roads are the **accessibility of land** for cultivation and its connection to the mechanisation centre and farm manure. However, the working position of agricultural machinery is wide, the verticals around the road are obstructive and the dirt roads are therefore mostly bare, without trees.
- Each plot must be connected in at least one place (ideally on one whole side). The depth of the plots from the connection to the roads is limited by the volume capacity of the truck (ideally the truck fills up at least on one round trip), i.e. about 500–1,500 m.
- This network, supplemented by possible access roads to the forest and the pond, forms the basis of the spontaneous erosion and sedimentation of the secondary linear structure of the agricultural landscape in general.

The basic layout of the main roads in medieval ploughland areas is radial, but the relief often modifies it. Local village roads converge on circular links (backfield roads). Secondary dirt roads are a response to the expanding dirt tracks and supplementary roads connect all plots as simply as possible. The settlements lacking a byway are later in date and point to late medieval and modern ploughlands, where each farmer's land is in a belt behind his farm so that he does not need to circle the whole village.

Fig. 174
Main dirt road – nowadays still, albeit redundantly, paved with asphalt or concrete

Fig. 175
Side dirt road – unpaved

Fig. 176
Backfield path with barns

Service roads become tangential as agriculture moves away from the village, connecting the agricultural centre to the ring of land around the village.

5.4.2. Other transport systems

Alternative routes through the countryside

These are destination only, not area-serving paths – they are supposed to be a separate pipe (avenue) or passage through the landscape (field, meadow, woodland etc). The speed of each mode varies greatly.

Bicycles:

- long distance road race – 45 km/h, uphill even 20 km/h, time trial 50 km/h;
- ride out – 20 km/h, 10 km/h when exploring the countryside.

On foot:

- 5 km/h – walking distance to the resort.

Hippotransport:

- horse and trailer – trot 15 km/h (similar to a bicycle, but different surface), walk 6–8 km/h (also in the field and forest);
- on horseback – trot 15 km/h, canter 30 km/h.

Rail transport

Advantages are low friction and high performance, disadvantages are low longitudinal gradient and large curves. Design speeds in our country max. 160 km/h, but 90 km/h is common (Prague – Bratislava). Protection zone from the track axis 60 m (national and regional) maximum gradient 4%. With rare exceptions (forest railway) not used in rural landscapes.

Water transport

Marginal in the landscape – water transport only on canals, these run in the flat, with locks it is worse. Reservoirs and canals between them – reservoir drawdown and improved flows downstream contribute to navigability. Developed mainly in the 19th century, later displaced by railway construction. In rural landscapes it is without economic application.

Air transport

It is still used in places for chemical plant protection. Requires a field airfield (grassed, open area) for operation.

Engineering networks

Transit pipelines, oil pipelines and other product pipelines – no function in the rural landscape.

The application of the principles described in Chapter 5 results in the following generels:

5. Agriculture and forestry generel

Functional areas of primary production – and their potentials, organisation of production, areas of fields, special and mixed crops, organisation, and preservation of ploughland areas, areas of agricultural crops sorted by suitability and yields, areas with anti-erosion sowing practices, areas of small holdings and mixed crops, agricultural buildings with a link to the soil, agricultural production without a link to the soil, irrigation and drainage, anti-erosion soil protection.

Objectives:

- maximum protection of high-quality soils;
- organisational, agrotechnical and technical anti-erosion measures.

Forests – economic, protective, of special purpose, areas of forest in the clearing period in the plan's design period, prohibition of a certain economic method of forest cultivation (bare-wood, group felling, undergrowth or selective).

6. Settlement functions generel

Urban functional areas – rural settlements (low-rise), urban settlements (high-rise), housing estates, types of settlements, functional areas in settlements, civic amenities, production, services, etc.

Historical types of settlements and their preservation – functional division of areas, types of historical buildings and their preservation, possibilities of addition, types of contemporary buildings and their protection.

7. Transport service generel

Traffic load on routes

Road traffic – superior = transit, service = county and local, access = major, minor, approach, etc. according to primary production (dirt and forest roads).

Non-motorized transportation – alternative: bicycle, hippo, pedestrian.

Rail and water transport = transit (but stations at the site)

Utilities (electricity, gas, water, sewage).

11. The alternative farming generel (first part, followed up on in Chapter 7)

Organic farming – all for autonomy – areas separated from the surroundings in terms of energy and materials, as diverse agro-ecosystems as possible, separate access dirt routes.

6. TERTIARY LANDSCAPE SYSTEM – LANDSCAPING AND ITS TOOLS

The tertiary landscape system is a spatially functional expression of human perceptions (individual and group) of the perceived reality of the landscape. **It is governed by purely psychological laws** (everything that derives from the human perception of the environment as a stage for individual life). It includes art, religiosity, habitability, tourism, landscape character, etc. This system in the cultural landscape creates an often hidden but always real tertiary landscape structure, speaking to us through **typical signs, i.e. symbols – "words of landscape"** (but our vocabulary varies).

It is the regularities of the tertiary system that are decisive for the perception of the landscape and the main subject of our artistic creation in the landscape.

If we think about the type of man's relationship to the landscape at the level of the tertiary landscape system, we find that man's surrounding world is for him a theatrical stage where he plays the play of his life. Just as each person has a dream idea of his future life, he has a similar idea of the environment where his idea is played out. The demands of the stage of his life are thus remarkably close in their arrangement to the performing arts (however, the theatre is also a "game of life").

In order to understand the ways in which the stage – landscape is arranged, it is of course necessary to know the play that is to be performed or played in them. This means at least a cursory acquaintance with the mental processes of the actors – creators. But since no actor owns the whole stage for himself alone, we must understand and enable the life games of all those who shape and use the landscape. The stage has both an **objective** (the ladder on the stage) and a **subjective** (the cathedral it represents) face; a typical character.

6.1 Individual human life in the landscape

6.1.1. What the objective stage looks like – the real territory of human life

It is a specific space that I inhabit and can influence or change it to my very individual physical and mental needs. The basis of the stage is my apartment and my property. But an equally important part of the stage is the wider, everyday environment that surrounds me, and it is far from being mine alone (dedicated spaces, community spaces, etc.).

I measure the objective stage in terms of my physiological characteristics and the primordial survival instincts that derive from them (my senses of perception of my surroundings – my escape and attack speed and distance, herding, etc.), essentially our *phylogenetic characteristics* [Jung]. Abstract thinking also gives us the ability to measure our objective surroundings by symbolic signs (signs of threat or hope – colours, shapes, size, ruggedness, manner of movement, types of appearance – like beast or prey, etc.). They form the basis of *gestaltism*, and its shape composition laws.

Fig. 177
Objective territory – harmonious landscape

6.1.2. What the subjective stage looks like – the dream territory of human life

Every man has (as well as ideas about his entire future) ideas about his ideal environment. The question of what I expect from the future is therefore crucial. It starts from the philosophical systems according to which society organises itself into ideologies and ends with very individual ideas about the material conditions of my happiness. It is not essential whether this picture of the stage of life is innate (in the subconscious) or the result of education, but what is essential is that it exists. It is the basis of our internal evaluative criteria of ambient quality.

Fig. 178
Subjective territory

This internal image of the stage is of course corrected and adjusted as time (and knowledge) goes on. But the basic idea does not change, and we carry it with us throughout our lives. The importance of subjective territories grows as the proportion of human life increases from one hundred percent use for production to an increasing proportion of leisure time that is not needed for sustenance.

The effort to fulfil our ideals in life also forces us to fulfil the image of our subjective stage in the objective world in our psychological territory.

However, some features of the stage combine into texture types and, as contrasts to the surrounding matrices (singularities), according to the law of figure and background, form the main models of dreams:
- *oasis model* – oasis in the desert = water, greenery;
- *clearing model* – a pallet in the woods = sun, clarity;
- *diminutive model* – solitaires in rice paddies = models of wilderness.

Consistency between the objective and subjective stage of life

Two basic types of mechanisms are used to achieve consistency between the subjective and objective stages. Either we search for a new objective stage that maximally corresponds to my subjective one (e.g., the mass migration of the British to the Mediterranean), or we reshape our existing stage so that it maximally approximates the subjective one (our rockeries at the villas). To put it simply, the first approach only becomes more important with the increasing mobility of people and the globalisation. The material result of the second, traditional approach is the attempt to adapt and "beautify" the territory as far as possible, which is also the basis of folk art. The effort to adapt a place to a subjective vision leads to concepts of psycho-biocenoses – on the large scale to ornamental gardens and parks, on the small scale to water parks, but also to terrariums and aquariums.

Both approaches lead in effect to the fact that one somehow sets out one's **objective stage according to one's subjective ideas**, calls it home, and begins to defend and identify with it.

Here, too, however, one can discern an overall orientation towards subjective types of dreams – in our case, in particular, "Southern" and "Northern".

Fig. 179
Longing for the south – a southern garden

Fig. 180
Longing for the north – a northern garden

Basic conditions for the existence of psychological territory

The stage of life = psychological territory must meet three basic conditions:
1. The **longevity** of my life in it – permanent settlement (otherwise I don't know it and can't get in touch with it).
2. The possibility of its **completion** – my influence on the development of the territory (I must be able to actively complete it and adapt it to my subjective stage).

3. The possibility of **protecting it from outsiders** (I must have a significant right to the present state and to protect my vision of the territory's future from others).

The cultural landscape is a complex interweaving of different territories of different people.

6.1.3 Society's perception of the landscape

A society is a collection of individuals with a common historical experience, a common ethical and moral foundation. On these foundations, society is then governed by commonly agreed rules of coexistence. In creating these rules, it relies on a commonly felt or at least generally accepted ideology and according to this it creates its **preferential hierarchy of values**. It thus also has, to a substantial extent, common types of reactions to the outside world. These are partly innate (collective, crowd unconscious), partly determined by a common upbringing (history) in a common value environment. Either way, a society develops **a framework set of stereotypes for understanding** its environment.

The tertiary landscape structure, composed of **material symbols** (typical signs) **of our and our ancestors' ideas** (just as in a language we form a bound speech from word turns, and from typical signs we compose the language of the landscape), **was and is the basis of the cultural character of our landscape, and its beauty and distinctiveness are based on it.** The basic spatially functional tertiary subsystems include the whole broad category of aesthetic and compositional relationships in the landscape, cultic systems, emotional attachments to the landscape, psychological habitability of the environment, and tourism.

The goal of architecture, urbanism and landscaping should be to sense what makes a given space unique and beautiful, to draw attention to that uniqueness and beauty, and to use the composition of typical features to complete it.

Starting from individual territories, we have to look for game situations common to the games of all actors involved. This means understanding the social environment with a commonly perceived hierarchy of values and attitudes. We must therefore also look at the main social attitudes that are manifested in the imagining of a particular landscape. In the language of spatial planning, we have to examine and respect the specially emphasised requirements from the planner, but we ourselves often have to define other needs in the landscape that have been concealed by the planner – to complete and even create the "terms of reference" of the spatial plan or study. These landscape requirements are the focus of the following section:

- objective givens of the *primary, secondary, and tertiary landscape system*, evolving over time, perceived as a subjective **image of the real landscape within us**;
- objective facts about the landscape and its ecosystems, which speak to us in the **sign language of typical features;**
- composing taking place within the fixed boundaries of psychological territories, overlaid by the visual wholes in question.

6.2 Basic functions of the psychological territory

Every person moving or staying in an open space evaluates it from various aspects summarized under the term *habitability*. This is a characteristic of an environment that creates a sense of well-being. It is strongly related to the archetypes of the phylogenetic perception of the landscape and is shaped by the following factors:

- Perceived safety determined by the escape distance (40 m must be clear for a person to climb a tree). According to this, transparent forest (without shrubs and higher herbaceous floor), meadow with trees, beech and oak forests without lower floors (lighted forests), groves, park landscapes (characterized by clarity and protection – physical barriers such as protected entrance and fencing or walls, as well as steppes with good clarity (open steppes are less safe for hikers, however) are considered to be safe natural formations.

Fig. 181
City park with visitors, an example of a safe environment

- **A sense of healthiness** influenced by features of an apparently healthy environment. Such an environment is indicated by complete plant habitats (conifers – pines, junipers, and dense canopies of solitary deciduous trees – horse chestnuts and limes), visually undamaged and healthy stands, and also by the natural transformation of stands in spring (fresh plant growth, flowers). In autumn, on the other hand, the signs of health are lost (damage to flora by its consumers, natural rotting before leaf fall). Groups of the same plants complementing the same habitat, or species that are not palatable (not nibbled) or do not show it. That's why conifers (especially junipers and pines), thick-leaved herbs, perennials, etc. are so popular in parks.

Fig. 182
Healthy meadow and deciduous tree environment

- **The legibility of a place** is determined by the genuineness, authenticity of the place, where even a stranger must be able to tell from its appearance how the place is used, what the object is used for (appearance speaks of function). The function that predominates forms a matrix of objects similar in type and form (rural village buildings); a function that is exceptional in a given place may also be exceptional in appearance (a church with a tower). The legible site allows good orientation for residents and visitors.

Fig. 183
Village environment as a legible place

- **The beauty of a place** given by the symbols of fertility and the presence of natural elements in their safe form (fire, water, compositional harmony, but also symbols of fertility). Phylogenetically, we have the savannah of primeval man imprinted. The rarity of phenomena in place (singularity) appears as beautiful. This creates several basic types of landscapes. Typical is the oasis in the desert (the biblical model of the shepherds‘ paradise), or the clearing in the forest (for forest peoples and forest-cutting farmers) indicating orderliness. Today, paradoxically, the singularity consists of remains of wilderness. **The individual composition of view-related units** (supervisual, convisual and green chambers, and landscape interiors) can be a significant reinforcement of the beauty of a place.

Fig. 184
A forest creek as a beautiful, harmonious place in nature

- The memorability of a place given by our memories of pleasant or unpleasant moments of our lives (and lives of our ancestors) lived in certain parts of the territory.

6.3 Dream landscapes – subjective territories

Ornamental gardens and parks are the most significant manifestation of dream landscapes (subjective territories). But even these have their inspirations from real landscapes. The attributes of the objective territory – safety, healthiness, beauty, and memorability – are fully manifested here.

Safety and health have manifested both in the restriction of the entry of outsiders and the protection from neighbourhood dangers, usually by high walls. It is also manifested in the clarity of the garden, contrasts of shading and sunlight, small-scale residence architecture, and compositional games.

Memorability is manifested in the reminders of life there and the incidents that appeal to us through various artefacts – symbols.

The types of "dream" landscapes develop differently in different environments and are related to the conception of the beauty of the territory. In the treeless landscapes of steppes and deserts, the dream world is an oasis with water and lush vegetation. In forest landscapes, on the other hand, it is a relieving and sought-after world of transparent treelessness, in addition to agriculture sings and therefore food. In general, the dream landscape resembles uniqueness (singularities) as opposed to ordinary parts (matrixes).

One of the oldest and still valid archetypes of landscape is the biblical paradise, but with the factor of no dangers being present in paradise (the lion licks the doe). Paradise is thus more a utopia of a paradisiacal life, without danger, than an image of a real landscape where we want to live.

Fig. 185
Biblical paradise with Adam and Eve (P. P. Rubens, 17th century)

Far more realistic are the mentioned landscape singularities – i.e. rare landscapes significantly different from the surrounding, ordinary ones.

From them, the basic models of tertiary landscapes mentioned above can be derived, namely:
- oasis model,
- the grassy clearing model,
- the diminutive model,
- the wilderness model.

The oasis model

The archetype of paradise in the *arid, biblical regions* is logically a place with plenty of water, and thus green, i.e. an oasis in a treeless desert.

Fig. 186
Oasis in the desert

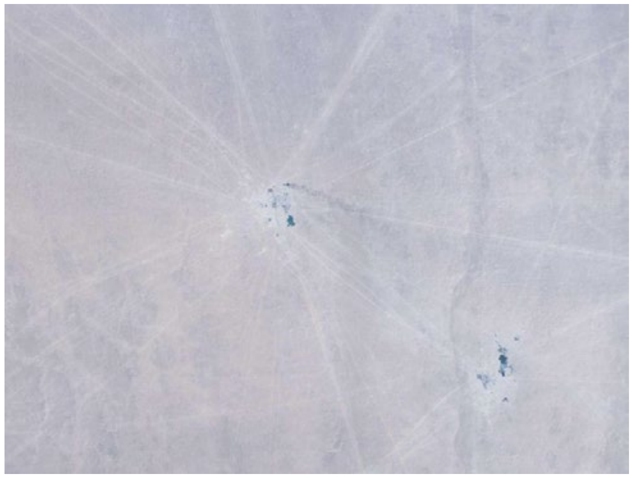


Fig. 187
Rarity of oases in the desert on an aerial photograph

The grassy clearing model

The image of paradise in *humid, forested areas is a deforested enclave with secluded house*, and in larger areas a village in the middle of a ploughland. This is the grassy clearing model.

Fig. 188
Deforested enclave with secluded house

Fig. 189
Homestead on the hills

The diminutive model

There has been little room for landscape composition in the agricultural landscape of East Asia since ancient times. Therefore, there is the *diminutive model*. The landscape is reduced to a larger scale or "cut out" to a small area, where only the signs – symbols of the real landscape (even individual tree branches) – are present, all under the Chinese slogans "everything can be contained by a mustard seed" and "the entire world fits into a teapot".

Fig. 190
Agricultural landscape in Asia

Fig. 191
Landscape of central China in an aerial photograph

The wilderness model

The opposite of cultural landscapes is a recent trend, namely the *wilderness model*. Due to the total enculturation of the rural landscape, the singularity of paradise is wild nature, especially its biota in specific habitats. It tries to interfere as little as possible with the natural habitat and discovers and presents the beauty of the natural and near-natural landscapes by which it is inspired. It is about presenting natural communities (primeval forests) and natural formations of cultural landscapes with anthropogenic communities. It also finds beauty and inspiration in synanthropic communities. This is of course possible in a completely safe landscape free of wolves, bears, feral dogs, and deviants of all kinds.

Fig. 192
Remnant of Central European deciduous primeval forests

Fig. 193
Flooded quarry

A number of historical garden compositions are based on these models.

6.3.1 The oasis model series

Reminiscent of the basic space of a Southern antique house, the peristyle – a garden is surrounded by a protective structure.

Fig. 194
Peristyle of an ancient house

This principle is also reminiscent of the enclosed space of the paradisiacal court of contemplative orders in a medieval monastery, where the cloister protects not only from enemies but also from secular traffic.

Fig. 195
Enclosed space of the paradise monastery court

These principles are partially followed by other Italian architectural gardens, where the separation from the surrounding landscape is still noticeable and clarity is crucial.

Fig. 196
Italian Renaissance garden

French gardens already signal both the eradication of all dangerous beasts in the countryside and increased security outside the walls, allowing free access to the countryside.

Fig. 197
French Baroque garden

6.3.2 The grassy clearing model series

It is particularly evident in landscape parks. On the one hand, the English romantic gardens formally adopt decadent, backdrop-like historical motifs from the “oasis” line (mostly from the cavalier journeys of young noblemen to the Mediterranean, and later to the entire world), on the other hand, they rely on the distinctly Atlantic climate of Britain from the forest line of the “grassy clearing”, which after deforestation favours grasslands. Simply put, the E**nglish park is a stylisation of the common seascape of sheep pastures, with romantic imitations of the buildings of the south thrown in.**

Fig. 198
Building imitation in the castle park

Fig. 199
Romantic alley

6.3.3 The diminutive model series

It is typical of the East Asian gardens of China, Korea, and Japan.

Chinese gardens are based on the concept of the sacredness of landscape in Taoism and Confucianism. There, the landscape is of two types – the first is the sparsely populated mountain areas, understood as a relationship between two components – mountains (rocks) and water. The second, the overpopulated plain type, is made up of vast areas of monocultures (rice, grain) wherever possible, with the edges of the areas being formed by jungle. Even the traditional Chinese garden symbolizes paradise in the world. However, the landscape here is sparingly presented by its section (sometimes limited to the composition of a single tree or branch). In the spirit of Taoism (Tao = way), the gardens alternate and fine-tune the scenes of the reduced landscape in a precise order. This creates a real path that, although made up of multiple scenes, maintains the unity of the whole.

Fig. 200
Chinese garden

Japanese gardens respond to the lack of space by reducing the entire landscape to the size of the layout area. This creates a *reduced model of the natural landscape*. However, after a lengthy period of imitation, Japanese garden architecture, unlike Chinese garden architecture, has developed a slightly different aesthetic of hints and symbols, including scale (e.g. bonsai).

Fig. 201
Japanese garden

An extreme case are the meditation scaled-down landscapes in *Zen Buddhist gardens*, where living nature is completely absent. The raked material is used to imitate the sea from which islands – boulders – protrude. The approach demonstrates that the landscape does not have to be represented only by living nature.

Fig. 202
Zen garden

6.3.4 The wilderness model series

It is a presentation of natural communities (primeval forests) and natural formations of cultural landscapes with anthropogenic communities. Nature becomes the imaginary singularity of paradise in the middle of the cultural landscape. This is of course possible in a completely safe landscape, which is presented as a living exposition of nature. The origins of this view can be found in terraristics and the design of modern enclosures in zoological gardens or in some natural singularities that may also be of anthropic origin (a flooded quarry). This approach often manifests itself in the artificial support of natural functions and appearance within maintained gardens.

Fig. 203
Run in zoological garden

Fig. 204
Abandoned quarry biotope

Fig. 205
Biotope of a pool as a garden pond

Fig. 206
Garden with retained refugia of unmown grasses

6.4 Real landscapes – objective territories and the differentiation of landscapes according to their distinctiveness

6.4.1 Areas in the composition of the rural landscape, landscape texture

As it was stated in the introduction, the distribution and effect of areas in the landscape, as its main landscape creation elements, is in no way decided by the artistic intention of the creator, but by the rational suitability and necessity of using the given area for certain functions, i.e. the potentials of the primary and secondary system production.

The compositional action of phenomena, hiding primary and secondary functions, creates typical landscape textures, through which we perceive functional areas. Landscape textures represent a visually distinguishable arrangement of typical landscape features (functional areas in cities, agricultural crops in the countryside, etc.), especially at the supervisual level, when we no longer distinguish individual features in detail, but their typically expressed composition.

Textures can be **modal** with a more detailed specification as a texture:
- dark or light (forest or field),
- colour or muted colour or black and white (sunny or cloudy in summer, or all in winter),
- glossy or matt (water areas or greenhouses or vegetated surfaces or tiled roofs).

Or they can be **combined** textures (mixtures of visually distinctive features) with more detailed specifications such as:
- mosaic (a mosaic of modal texture surfaces),
- coarse-grained (a fine mosaic of agricultural and forest cultures),
- fine-grained (Carpathian meadows with hamlets, orchards, scrubby lade),
- reticulated with edges of different orientation (field landscapes with accompanying vegetation along the lines),
- hatched with differently oriented hatches (vineyards, low-trunk orchards, hop fields, potato fields).

The more distant the observed texture is from the observer, the closer the combined, granular textures are to the *modal*, homogeneous type. It is the distant textures that are a key characteristic of the matrices and vedutas of supervisual complexes.

Fig. 207
Dark landscape texture

Fig. 208
Light landscape texture

Fig. 209
Coloured landscape texture

Fig. 210
Muted coloured landscape texture

Fig. 211
Glossy landscape texture

Fig. 212
Mosaic landscape texture

Fig. 213
Coarse-grained landscape texture

Fig. 214
Fine-grained landscape texture

Fig. 215
Reticulated landscape texture

Fig. 216
Hatched landscape texture

Textures can typically **change cyclically over the course of the year:**

Natural changes can be observed in forests and perennial crops – the orchard forms a combined texture of a black skeleton on a white background of snow in winter, and in spring it acquires a gradually increasing admixture of light green leaves and becomes coloured by inflorescence. In summer, the orchard is a modal texture of deep green with fruits shining through, in autumn the leaves turn golden, and then only black skeletons remain.

Artificial seeding changes are observed in the field crops – modal textures range from black fallow (or snow-covered plains) or greenish winter crop, to lush green in spring, golden colour at maturity, to black fallow again after harvest.

However, in the wider framework, with scattered permanent vegetation (e.g. baulks), it forms a combined texture at harvest and in winter on snow, with a colour contrasting, reticulated texture of dark lines of vegetation on gold or white.

Landscape textures are therefore an unmistakable reflection of use of a given area and cannot be changed without changing their function. The link between appearance and function is critical for landscape areas and determinant for landscape lines (paths, baulks, flows). The smaller the areas are, the less economic loss is incurred by changing their function. The smallest areas = points thus allow the existence of non-productive, tertiary functions in rural landscapes. Otherwise, tertiary functions only accompany lines and areas!

6.4.2 Landscape differentiation in terms of landscape character

Two approaches are used to differentiate landscapes in terms of landscape composition:
- typological subdivision (according to similarity),
- individual subdivision (according to unique, spatial, mainly visual contexts).

The two subdivisions are complementary, as in linguistics – individual "typological" words create unique sentences and stories in individual combinations. Thus, the types of landscapes and their parts form the basic "techniques" (compositional elements) of creation, and the individual articulations compose them into unique compositions.

6.5 Landscape character typology – landscape legibility according to similarities

The typological division of landscapes according to the scale of perception of their distinctiveness can be hierarchically constructed as follows:
- *European landscape megatypes* – they place our landscapes in a continental context,
- *framework landscape types of the Czech Republic* – they serve mainly to capture the broader relationships of the assessed dei- and supervisual units,
- *complex typical features of landscape textures* – used to describe mainly supervisual units,
- *combined and elementary features of landscape textures* – used to describe mainly convisual units.

6.5.1 Landscape megatypes of Europe

They describe the overall diversity of Europe's landscapes (a total of 30 megatypes in 8 categories), according to axes of climate change (north-south, altitude, oceanic-continental type), visual (open-enclosed) and anthropic influence (natural-anthropogenic landscapes). The following table gives an overview of the 30 megatypes of European landscapes (described in more detail in the Annex), published in the so-called Dobříš Report [EEA, 1995].

Table 2
Inventory of 30 megatypes of European landscapes [based on Meeus et al., 1990; EEA, 1995]

1. Arctic tundra	**16. Former open fields**
2. Forest tundra	**17. Central European collective open fields**
3. Boreal swamp	**18. Eastern European collective open fields**
4. Northern taiga	**19. Mediterranean open land**
5. Middle taiga	**20. Puszta**
6. Southern taiga	**21. Steppe**
7. Subtaiga	**22. Semi-desert**
8. Northern highlands	**23. Sandy desert**
9. Mountains	**24. Kampen**
10. Atlantic bocage	**25. Poland´s strip fields**
11. Semi-bocage	**26. Cultura promiscua**
12. Mediterranean semi-bocage	**27. Dehesamontado**
13. Atlantic open fields	**28. Polders**
14. Continental open fields	**29. Delta (artificial forms)**
15. Aquitaine open fields	**30. Huerta**

Fig. 217
Map of the distribution of European landscape megatypes [EEA, 1995]

6.5.2 Framework landscape types in the Czech Republic

It creates assessment frameworks for landscapes, facilitating comparisons within the Czech Republic. They are created by *superposition of three frame sets* of different landscape characteristics [Typologie české krajiny, VaV 640/01/03]:

(I) The settlement framework files (7 in total) describe the period of permanent settlement of a given landscape, which has been shown to be a connecting characteristic for other characteristics. Thus, they correspond perfectly with other phenomena, parameters, and processes such as climatic conditions – altitude and continentality, settlement development and mesoclimate for agriculture – altitude, population surplus and historical types of settlements and their ploughlands – farming methods, archetypes of vernacular houses, local raw materials (in this context, attention should be paid to the archaeology and dating of the settlements – the discovery of objects does not necessarily indicate a settlement, but only a passage).

(II) The land use framework files (6 in total) describe the structure of the current land use situation using their main textures divided as gemma into forested, elevated, and dark against selected light, treeless ones.

(III) The georelief framework files (19 in total) describe the relative ruggedness (elevation, not elevation), typical (and visible) arrangement of relief, and rarity of a given georelief within the Czech Republic (we mostly have relief No. 2 – the indented hills and uplands of Hercynicum).

Table 3
Individual framework sets of landscape characteristics in the Czech Republic according to the Typology of the Czech Landscape [VaV 640/01/03]

I. framework sets of settlement landscapes:	**III. framework sets of landscape reliefs:**
1 – old settlement landscape of the Hercynian and Polonian circle 2 – old settlement landscape of the Pannonian circle 3 – landscape of the high medieval colonisation of the Hercynian circle 4 – landscape of the high medieval colonisation of the Carpathian circle 5 – landscape of the late medieval colonisation of the Hercynian circle 6 – landscape of the modern colonisation of the Hercynian circle 7 – landscape of the modern colonisation of the Carpathian circle **II. framework sets of land use:** Z – agricultural landscapes M – forest-agricultural landscapes L – forest landscapes R – pond landscapes U – urbanised landscapes H – mountain landscapes	Common: 1 – landscapes of plateaus and flat hills 2 – landscapes of indented hills and highlands of Hercynicum. 3 – landscapes of the indented hills and uplands of the Carpathicum Rare: 4 – landscapes of plains 5 – landscapes of dissected plateaus 6 – landscapes of highlands 7 – landscapes of volcanic mountains 8 – landscapes of high plateaus 9 – landscapes of loose sands 10 – mining landscapes 11 – landscapes of broad river floodplains 12 – karst landscapes 13 – landscapes of distinctive slopes and rocky ridges 14 – landscapes of glacial kettles 15 – landscapes of incised valleys 16 – landscapes of isolated cones 17 – landscapes of cones and mounds 18 – landscapes of limestone cliffs 19 – landscapes of rock towns

The resulting framework landscape types are identified according to the above codes, where the first letter is the number of the settlement period file, the second letter is the designation of the land use file and the third is the number of the georelief file (e.g. 1Z1). The data gives us a prior indication of the characteristics that can be expected in a given landscape.

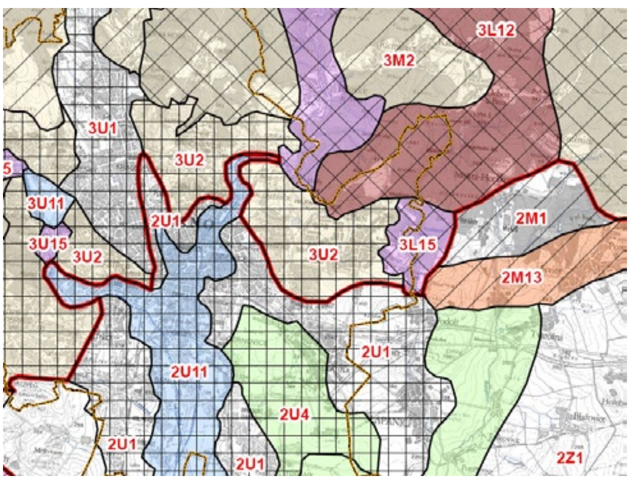


Fig. 218
Example map with framework landscape types marked with three-digit codes [LÖW & spol., 2015]

Fig. 219
Example of extreme framework type 2U11 – old settlement urbanised landscapes of wide river floodplains

Fig. 220
Example of framework type 3M2 – medieval, forest-agricultural landscapes of the indented hills and highlands of the Carpathicum

Fig. 221
Example of framework type 5L19 – late medieval forest landscape of rock towns

6.5.3 Comprehensive typical features of landscape textures

The landscape is divided into land blocks with edges (block margins) and these into plots. Land blocks are collections of land of the same function, bounded in relation to their surroundings by permanent, difficult-to-remove barriers (tracks and sections near ploughlands, forest sections in forests, urban districts, etc.) and are the bearers of complex typical features.

Thus, the *complex typical features of landscape textures* (described in the previous chapter) describe the typical features of textures created by the composition of *land blocks of distinct functions within entire landscapes*. These textures are essential for the description of supervisual units. They create *frameworks for combined and elementary typical features*. For the breakdown of typical features it is appropriate to use a breakdown separately between georelief and other features. Georelief features are the basis for the 17 **main types of georelief arrangements** described in Chapter 2.

However, there are over fifty complex georelief types and over thirty other types. Together with the combined and elementary ones they are described in the Catalogue of Landscape Features for Architects [Löw, 2011].

	Character	Type of character	Natural characteristics	Historical and cultural characteristics	Illustrative photo
99	Landscapes of the plains (4) - Lowland plain	**Relativně suchá**	Navazují většinou na nivní roviny v úvalech, pánvích a v nížinách. Jsou to ploché povrchy říčních teras nebo předkvartérních sedimentů překrytých různě mocnými akumulacemi eolických sedimentů (spraší a vátých písků s dunami). Jsou nenápadně členěny mělkými údolími dolních úseků menších přítoků hlavních vodních toků. Od nivy jsou často odděleny nevysokým stupněm. Součást RTRK 2, 4, 5, 8, 9.	Teplé a sušší roviny jsou osídleny již od neolitu, Ve využití území v nich silně převažuje orná půda, lesy a travní porosty se vyskytují jen na ojedinělých nepříznivých stanovištích. Kolektivizace zemědělství nahradila tradiční řemenovitá políčka velkými lány. Oblasti písků jsou dnes převážně zalesněny, na ostatních substrátech dominuje orná půda, někde kombinovaná s větrolamy (Znojemsko). Převažují silnicovky, návesní vsi a návesní silnicovky s traťovou a nepravou traťovou plužinou.	
100	Plateau		Ploché povrchy na (sub) horizontálně uložených křídových pískovcích, slínovcích nebo opukách, s malou výškovou členitostí. Jejich povrch je převážně mírně ukloněný a často mírně zvlněný mělkými, ale výraznými údolími, okraje bývají půdorysně složité, ohraničené nivami nebo kratšími strmějšími svahy. Tyto okrajové svahy však už do plošin nepatří. Zpravidla zde chybějí malé vodní toky (údolíčka jsou suchá, krajina je odvodňována do podzemí) a chybějí zde i rybníky. Součást RTRK 1, 4, 5, 17, 19.	Byly osídleny ve středověku až novověku, v závislosti na nadmořské výšce (klimatu). Ve vegetačním pokryvu převažují zemědělské plochy, ve vyšších nadmořských výškách mozaika lesa a zemědělských ploch. Významnými biokoridory jsou zaříznutá údolí. Jimi jsou plošiny typicky členěny. Převažují lesní lánové vsi se záhumenicovou plužinou. Původní členění plužin bylo z velké části setřeno v době kolektivizace zemědělství.	

Fig. 222
Example description in the Catalogue of Landscape Features for Architects [Löw, 2011]

6.5.4 Elementary and combined typical features of landscape textures

Elementary features describe the actual textures of individual plots according to their function and are usually modal, homogeneous.

Combined features describe the textures created by the composition of land within individual land blocks, often mixed, varying in grain, or typically zoned.

There are approximately one hundred elementary and combined typical georelief features, and approximately one hundred and thirty elementary and combined other typical features.

	Type of character	Character	Natural characteristics	Historical characteristics	Cultural characteristics	Illustrative photo
6.	Agricultural matrices	Texture of gardens	Plochy, s mírně vyšší biodiverzitou danou pestrou skladbou hospodářských i okrasných druhů rostlin. Hodnotu může snižovat vysoké zastoupení exotů, intenzivně obdělávaných a chemicky ošetřovaných záhonů a trávníků. KES 2	Fenomén 20. století., svázán zejména s uniformním bydlením ve městech, bez možností seberealizace. Zejména v blízkosti větších měst je v poslední době tendence k přestavbám na chatové rekreační objekty nebo na trvalé bydlení.	Většinou plochy s malými zahrádkami, zahradními domky a pestrou skladbou plodin a dřevin, často v pitoreskním měřítku. Důsledné oplocování každé parcely značně omezuje průchodnost krajiny.	
7.		Texture of mixed crops	Často ve svažitějších polohách v teplejších a úrodných oblastech. Díky pestrosti plodin má relativně vyšší ekologickou stabilitu. KES 3	Od středověku zejména v okolí měst v nepolních tratích. Bývalá svobodná pole a viničné tratě, rozdělená zčásti druhotně na pestřejší plochy využívání. Za socialismu přežily jako forma záhumenků.	Pestrá mozaika pásků polí, zeleninových záhonů záhonů, ovocných stromů, vinic, křovisek, stepních lad apod. Významná harmonická kulturní krajina typu italské terra promiscua.	

Fig. 223
Example description of combined textures [Löw, 2011]

The perception of the features of the whole by means of textures requires their truthfulness, the **harmony of their appearance with their function is important**, as a result of the intersection of natural conditions and modes of use. However, this principle has been violated in the past and continues to be violated today because of efforts to adapt our landscapes to leisure commercial activities. Whole complexes of imitations and replicas seriously threaten our rural landscapes.

6.6 Individual division of landscape compositions – uniqueness of the landscape according to the arrangement of features

As already stated, it is only the unique composition of typological features in a particular area that makes them a unique landscape.

Because we perceive the landscape and its distinctiveness primarily by sight, *visual compositional relationships are crucial* for individual articulation (but smells and sounds also operate in the background). The *spatial delineation* (what is visually related to it), i.e. the *visual whole*, and what separates it visually, i.e. its *boundaries,* are crucial for composition [LÖW & spol., 2005[24]]. Even though the landscape is three-dimensional, *it is perceived by us only from a height of about 170 cm* above the ground and thus lacks a top view, a view into the depth of the landscape space. Outside the forest edges, the landscape forms a *ground carpet;* in the simile of architecture, it is a floor without walls. The perception and the resulting composition changes as our level of observation rises above the terrain (the complex patterns of the park‘s broderies can thus only be observed from above, from castle terraces and windows of taller buildings).

The visual compositional units are bounded by fixed obstacles, but also by felt boundary relations (defined in our feelings) – completely (basin or courtyard), or partially (coastline or semi-square), or they are visually completely open (hilltops or roofs of buildings). Their maximum size and boundaries are determined by the *limit of visibility* at a distance. This is related to our basic physiological predispositions:

24 The individual division of the landscape into compositional visual units was first comprehensively used by J. Löw for the territory of the city of Brno

- perspective vision ends at about 1,000 m (1,200 m of figure resolution),
- full-colour vision ends at about 2–5 km (3.5 km resolution of an object of 1 m height, 4.7 km horizon distance according to the curvature of the earth),
- distance vision covers an area up to about 30–40 km (visibility under average atmospheric conditions).

The combination of these optical predispositions produces **two sighting distances** (painting plans) – close – up to about 3 km and distant – up to 40 km. At close distances, the perception of space transitions into the perception of area, where the distance is only guessable by the saturation of colours and ends in a hazy background.

6.7 Perception of the composition of the visual units

Perception changes according to the ways and speeds of movement in the whole – thus the scale of perception changes in relation to our psychosomatic abilities:
- a minimum 0.2 s for a nerve to respond to a visual perception,
- a minimum 1 s, but as long as 1.5 to 3.0 s to perceive (become aware of) a newly seen feature,
- a minimum of 5 s is needed to recognize and remember the new feature,
- a maximum of 5 min we are able to keep full (concentrated) attention on the feature, then thoughts turn elsewhere.

The concentric differentiation of space by the eye also changes. The eye achieves full differentiation in a very narrow area of *sharp vision*, in a wider area of effective vision we recognize objects but do not distinguish details, *external (peripheral) vision* – the informative part of the field of vision does not allow us to distinguish individual objects but is important for orientation.

Table 4
Simplified overview of concentric spatial differentiation by eye

	horizontally	**vertically**
sharp vision	4–8°	4–8°
effective vision	30°	20°
informative vision	200°	125°

Movement in the visual whole

A maximum of 30 km/h is the speed of movement that we are motorically and mentally able to control. At speeds higher than 30 km/h, the route of movement – the road – must be adjusted so that we have time to react to changes (road markings, road, and railway crossings, straight, large runways, etc.) and so that our vehicle does not deviate from the route due to inertia (radii of curves, road slipping). Furthermore, there is a fundamental difference in the perception of the environment *when I am driving* (I have to control the direction and speed of the movement) or *when I am being driven* (I don‘t care about the movement). According to this speed, the driver can pay attention to the surroundings for a maximum of 3´´ and for the next minimum 10´´ he has to follow the route again and correct the movement. So he can‘t recognize the surrounding signs well (that‘s why the advertising banners are large and close to the direction of travel and view). The same is true for cycling. However, the passenger can observe at will, depending on the speed.

Thus, our landscape is not designed for drivers of fast vehicles outside the strip around the roadway at the focal point of vision (even then, drivers perceive only in fragments). Higher speeds of movement (above 30 km/h) are also a particular constraint. Such traffic essentially traverses the landscape as an isolated corridor (pipe) with billboard catchpoints in the focal angle. The isochrones overview shows, among other things, that the segmentation of the side views from the observation route has a fundamentally different rhythm of change for the motorist and a different rhythm for the pedestrian, and even the cyclist has to stop. It also implies that you cannot build a common urban avenue for pedestrians on the sidewalk and drivers on the thoroughfare.

		1 s	3 s	5 s	10 s	5 min
aircraft	900 km/h	250 m	750 m	1250 m	2500 m	75 km
railway	90 km/h	25 m	75 m	125 m	250 m	7,5 km
motorway	120 km/h	33,3 m	100 m	166,5 m	333 m	10 km
road class III.	60 km/h	16,6 m	50 m	83 m	166 m	5 km
purpose roads	**30 km/h**	**8,3 m**	**25 m**	**41,5 m**	**83 m**	**2500 m**
bicycle	**20 km/h**	**5,5 m**	**16,5 m**	**27,5 m**	**55 m**	**1700 m**
horse gallop	**30 km/h**	**8,3 m**	**25 m**	**41,5 m**	**83 m**	**2500 m**
horse-drawn carriage	**15 km/h**	**4,1 m**	**12 m**	**20,5 m**	**41 m**	**1200 m**
pedestrian	**5 km/h**	**1,4 m**		**7 m**		**417 m**

Table 5
Overview of isochrones of perception in the visual unit according to the mode (speed) of movement [Löw, 2017]

where:
1 s is the time of registering a new sign,
3 s is the time of possible driver inattention while driving,
5 s is the time for detailed memorisation of the new sign,
10 s is the time needed for the driver to react when changing the driving route,
5 min is the time to keep attention on one typical sign.

Isochrons very generally but usefully give us a „raster of attention", i.e. milestones between which „something should happen" in terms of the movement of people in units:
- for pedestrians (up to 0.5 km there may be nothing new, then yes, only one stimulus for about 10 m, otherwise I can't process it) – in the raster of 10 m–500 m around the path something should happen in the composition of the unit;
- for passengers – bicycle and carriage – in a grid of approx. 30 m–1,500 m;
- for horse riders (dirt roads) – in a grid of approx. 50 m–2,500 m;
- rail and fast car passengers – in a radius of approx. 150 m–5,000 m;
- for aircraft passengers – in a radius of approx. 1,5 km – 75 km.

According to the size and the way of perception we can distinguish three levels of compositional units:
- deivisual units,
- supervisual units,
- convisual units (the smallest compositionally autonomous spaces), supplemented by two more in an uncluttered space:
- landscape interior (paysage intérieur, lat. interior terrarum), i.e. inner landscape,
- the green chambers (salle de verdure, lat. pretorium viridi), i.e. small visual units with a ceiling of vegetation.

Since the landscape is not a two-dimensional image with an observer outside, but a t**hree-dimensional scene with an observer inside**, its perception must be observed from all points within the whole (and not, as is often suggested in painting, from "typical viewpoints"). Thus, a moving video rather than a photograph is more appropriate to represent the whole. It is necessary to walk through the landscape from morning to evening like a pilgrim, taking in its space.

6.7.1 Deivisual compositional units

These are landscapes visible from the aircraft. The name is based on the old principle of message to God (Deus), because no one else could see them outside of the creator and God in the heavens. They are schemes marked out in numerous ways in the landscape, from prehistoric cultures in Peru to the Baroque scheme of forked vistas or roads. Yet the regularity of these compositions cannot be detected on the ground. The principle of deivisual units is also followed in the formalist designs of the floor plans of recent settlements and entire cities. Today, however, they are a common part of aerial views, available to everyone.

Fig. 224
Straightness of an alley between the castles/palaces

Fig. 225
The straightness of an alley lining a road is not always obvious from the ground as it waves in height

Fig. 226
Ornamental layout of the Brno-Vinohrady housing estate created above the map, from the ground it looks quite chaotic

6.7.2 Supervisual compositional units

A supervisual landscape unit is an individual part of a landscape space, defined by landscape boundaries and visually continuous within *top views* in supervisual views. Its greatest internal distance is governed by visibility under average atmospheric conditions and is as much as 40 km. The supervisual landscape unit is therefore the largest compositional landscape unit, internally structured and perceived from the ground. Because the supervisual unit often contains deep valleys that are hidden from most views, it is also possible to define so-called landscape basements, consisting of vertical stages of the convisual units.

As has already been stated, the delimitation of the units depends on the formation of the georelief. The functional designation of the surfaces in the landscape of supervisual units strictly determines their texture and forms their matrix. Similarly, the landscape lines are determined by the hydrological network, erosion protection and the need to serve the land.

The composition of the landscape of the supervisual units is therefore formed not according to the regularities of art, but according to the regularities of nature and production – the arrangement of the compositional elements is compositionally random, and the composition is thus incidental. Sometimes it is harmonious, sometimes not, and we can only “design” the result into more bearable forms. However, an incidental composition often creates an individual, unique landscape environment = determines its distinctiveness (spirit of place = *genius loci*).

Thus, fundamental interventions in the landscape are linked to the power over the use of the whole landscape, which was and is always a rare situation (formerly held by the church, later during the industrial revolution by the state and big capital – urbanization, transport, mines, factories). Nothing else of an individual matter can be found in the landscape.

In landscape composition we can only distinguish boundaries of units (vedutas, horizons, sight lines), landscape matrices and singularities of units (landscape poles, axes, and composed views).

Fig. 227
In the views from the hills, the landscape opens up to the traveller in the distance and creates large wholes

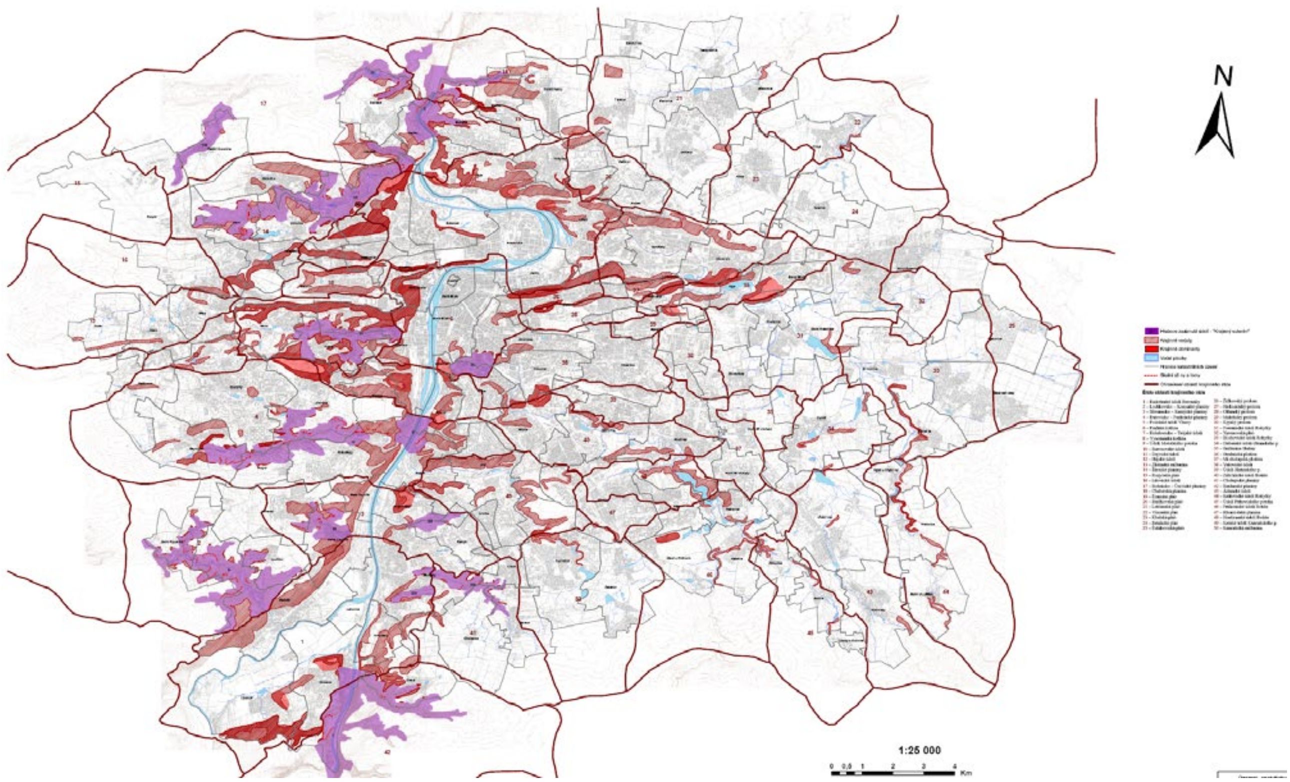


Fig. 228
Supervisual units of Prague: in the open boundary they are applied up to about 30–40 km, incised valleys and basins are often hidden in them and form a "landscape basement" (in purple), on the contrary, the frontal slopes and fronts of housing estates form distinctive boundary lines (in red) [LÖW & spol., 2008]

Fig. 229
Semi-open supervisual unit

Fig. 230
Open supervisual unit

6.7.3 Convisual compositional units

A convisual landscape unit is an individual landscape space defined by view boundaries, which is *internally* continuous from most observation points. (These are therefore units perceived by views predominantly from the basic landscape platform – 170 cm above the ground.) Even open parts should not exceed 3 km (2–5 km) in length. The convisual unit is the elementary, internally structured, and closely perceived, open to the sky, compositional space of the landscape.

Here too, the functional use of the land, particularly primary production, determines the layout of the unit. However, in rural villages and on their outskirts, smaller areas serving tertiary leisure functions in addition to residential functions are beginning to enforce.

Due to the land – the basic platform of the horizon, it is defined not only by the relief, but also by high tree vegetation and, in the case of settlements, by taller buildings. The distinctive compositional elements here are therefore close to the urban composition.

Much smaller, although significantly increasing in reach, are also the settlements of wealthy people, with a large reserve of leisure time, seeking entertainment in the landscape (parks, ornamental gardens = psychoecosystems). Here the composition is composed – created by **creation**: "*The main component of the landscape park in England is mown lawns on vast meadows in contrast to water bodies against a woodland backdrop. These are usually supplemented by clumps of trees, groves on undulating ground, and replicas of Hellenistic, Chinese, Islamic, ancient, Romanesque or Romanesque-like (or unidentifiable) monuments and temples, or Gothic ruins, bridges and other picturesque architecture, sometimes including caves*" [Wikipedia, 2020]. These are thus stylized pastures complemented by kitschy building imitations designed for leisure.

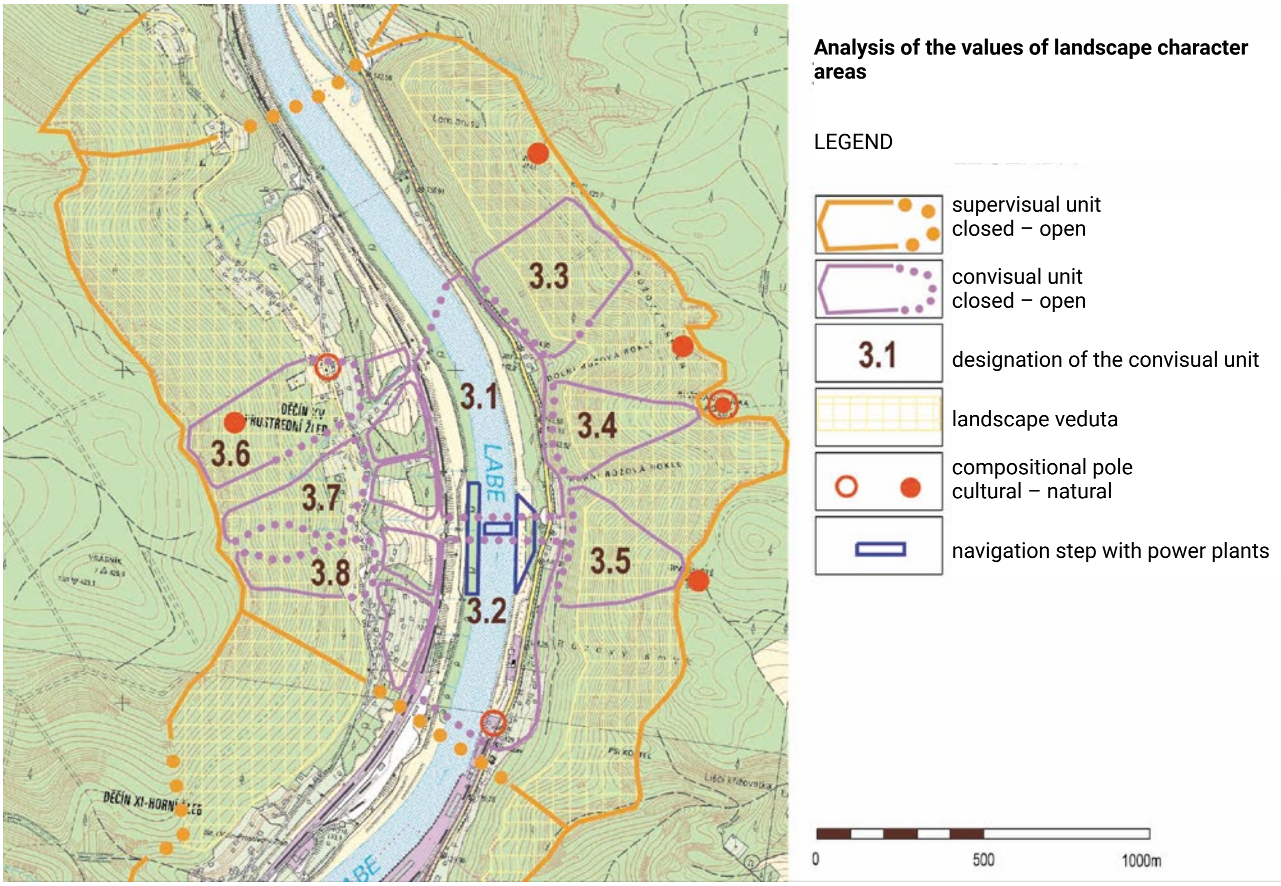


Fig. 231
Convisual units of the Elbe valley for the assessment of the weir project [LÖW & spol., 2015]

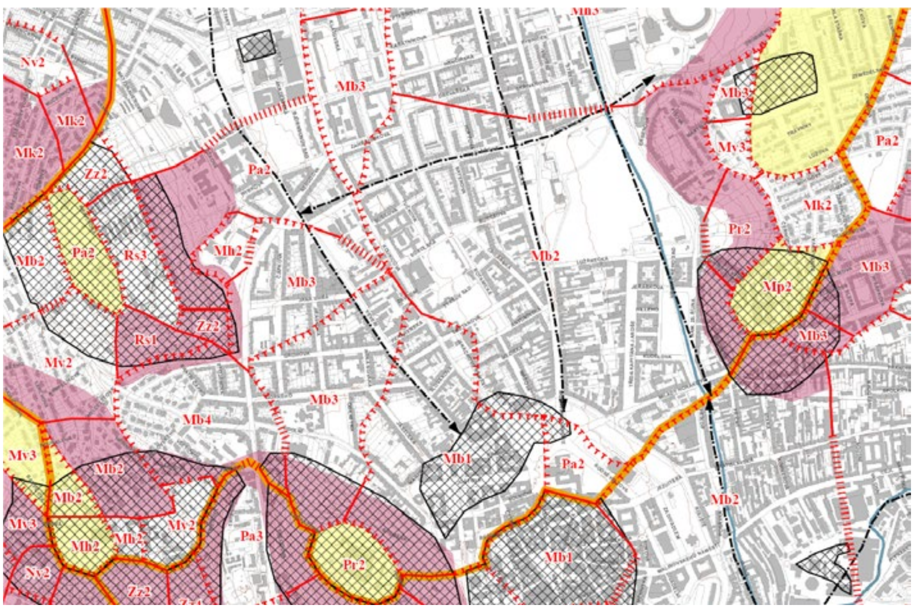


Fig. 232
Convisual compositional units of the landscape in Brno: closed (solid line), semi-open and open (dashed orange lines), in the frames of supervisual units (thick orange borders). In purple are the vedutas, in yellow the flat tops of the slopes, the black hatching are the compositional poles, the black arrows are the compositional axes, and the red codes define the textures of the matrices [LÖW & spol., 2009]

Convisual units in the urbanised area and in the landscape can be closed, semi-open or open. Within these units, the compositional links described above can be observed more or less clearly.

Fig. 233
Closed urban convisual unit

Fig. 234
Closed convisual units in the landscape

Fig. 235
Open convisual unit in the landscape

In addition to horizontal delineation, in landscapes with dramatic georelief of convex, deeply incised valleys, the composition of convisual units develops vertically. The lower elevation level of the valley floor forms one unit, the middle level of the slopes another (at the level of the supervisual units they are collectively manifested as landscape basements), and the upper level – the hills – a third.

Fig. 236
Top level of convisual units

Fig. 237
Valley level of the convisual units

In landscapes overgrown with forests or old orchards, there are often large areas completely outside the convisual units. The boundaries of the convisual units are the forest cover, but within the opaque stands the contiguous units do not occur. The interior of the stands is made up of the landscape interior (*paysage intérieur*), thus complementing the overall definition of the compositional units. The transition between the convisual units and the landscape interiors is formed by small open-view enclaves – the so-called green chambers (*salle de verdure*).

6.7.4 Landscape interior

The landscape interior (or paysage intérieur in French, translated as "inner landscape") is a closed and opaque environment in relation to the wider environment. Inside, however, it can be transparent. It is primarily a semi-transparent grid of trees where the transparency of the surroundings is below the escape distance. However, it can also be an urban interior with colonnades, the interior of halls with columns, or the interior of orchards, scrubby fallows, vineyards, hop fields, etc. The interior of uncluttered landscape formations can also be considered a landscape interior.

Fig. 238
Landscape interior of a forest

Fig. 239
Landscape interior of a high stem orchard

6.7.5 Green chambers

The green chambers (French: *salle de verdure*) can be understood as partially open spaces of the type of glades, which the surrounding vegetation and the branches above it outline as specific rooms at the limit of escape distances (up to about 40 m). Green chambers are widely used in parks where bosquets are defined. However, they also exist in ordinary rural landscapes. In the city, the green chamber is typical from atrium houses and smaller courtyards to clamped streets and piazzettas. It forms a transition between the outer, open landscape of convisual units and the inner landscape interior, especially in opaque landscape formations (e.g. rock cities).

Fig. 240
Green chamber in the garden

Fig. 241
Green chamber in the landscape

Fig. 242
Green chamber of natural character

6.8 Compositional elements within visual units

The composition of the rural landscape is usually based on the given factors of the primary and secondary system, while the tertiary one respects and maximally enhances them. Only rarely, in small areas, is the secondary system suppressed and the composition is then based on the tertiary system. The composition of rural landscapes is therefore not based on artistic rules, but on natural and productive ones – the arrangement of compositional elements is random, and the composition is thus given inadvertently.

Landscape **composition** – the word **composition** is used in the sense of arrangement, layout, arrangement and is therefore not reserved only for artistic activity. "*In linguistics, composition, or the formation of words; in art, pictorial composition in the visual arts – the colour and light composition* *of a picture, the connection with the shapes contained in the picture, etc. In literature, it denotes both the arrangement of the storyline in relation to the fable and the arrangement of text segments, e.g. preface, motto, chapters, etc., in music it is the composing of a musical work, in education it is a larger written examination, in chemistry and metallurgy it is a compound, mixture, alloy of several different substances."* [Wikipedia, 2019].

The so-called **landscape composition (orchard design)**, based on the compositions of parks and ornamental gardens, is made up of individual compositional elements that influence each other and form a unified whole (composition). These compositions include view landmarks, accentuated by overlooks, path tracing and opening views and scenes [Kulišťáková, 2013; Rozmanová a Pokorná, 2019]. Thus, paradoxically, the described landscape composition does not constitute a composition of landscape. It is formed in two diverse types of landscapes – urban and rural.

Urban landscape composition

Urban composition is applied in the urban landscape of urban development. Theoretically, the discipline is described in the works of a number of authors [e.g. Meduna, 1981; Hexner a Novák, 1996]. Some practical aspects are described, for example, in the publication *Principles of Urban Composition in Examples* [Rozmanová a Pokorná, 2019]. In an urbanized area, the composition of a whole intensively used by people takes on a new meaning, it is largely a reflection of the operational, spatial, and functional needs of a given settlement [Koutný, 2019]. Artistic, aesthetically understood compositional links in the territory change importance according to the preferences of the historical period and social organization. *Urban composition* represents a set of principles by means of which a harmonious whole is achieved, reinforcing, or eliminating the importance and effect of any of the elements, with the result that the best qualities of the *urban environment* are to be achieved (from the human point of view). The tools of urban composition are highly effective in an environment dominated and shaped predominantly by humans.

It can be summarised that *one of the objectives of urban composition is to harmonise* the above-mentioned characteristics of spaces and spatial units in accordance with the aesthetic demands placed on them. *Such a harmonisation, which is also in line with the functional, operational, and spatial requirements of the settlement or a particular area, then leads to optimisation of the spatial layout of the territory* (often a compromise solution respecting, for example, the requirements of transport or technical infrastructure), *to approach its best state at a given time and under given territorial conditions.*

In *urban composition*, the parameters of space and environment are monitored, which can be influenced to a certain extent also in the composition of the landscape at the level of the convisual unit, if we include among the elements of the composition such natural elements that can be spatially worked with. In the urbanised environment of settlements, these are then mainly elements of vegetation and water.

Among the observable and sometimes suggestible parameters of urban spaces are:
- height level of buildings and other material elements,
- the character of the skyline (vedutas) and silhouette (horizons),
- scale,
- proportions of spaces and elements, gradation, contrast and emphasis, rhythm of elements (characteristics of the landscape matrix),
- significant and dominant points,
- openings, view axes,
- symmetry and asymmetry,
- genius loci,
- image of a town or place,
- image of a place,
- location of the urbanised area in the terrain, i.e. in the landscape the distribution of the textures of the matrices in the whole.

The *urban structure* created as a result of the arrangement of *urban elements*, i.e. buildings and spaces between them (the result of urban composition considering the broader requirements of the territory), can take a number of spatial forms. In Czech towns and cities, there are usually mainly growing or founded structures of historic cores, 19th century block buildings, districts made up of terraced houses, semi-detached and detached houses, modernist housing estates and finally, beyond the city boundary, there are often new residential areas made up of detached houses in relation to the original villages. The aforementioned structures reflect two fundamentally different, creative ideological concepts, namely the concept of the compact city and the concept of the free-standing, modernist housing development or garden city [Wittmann a Kopáčik, 2019]. The advantages and disadvantages of both principles are discussed in the professional literature, while the clear advantages of the compact city concept often promoted by urban planners are not confirmed by some foreign research [Neuman, 2005; Hirt, 2007]. The results of domestic research also confirm this finding, albeit on a subjective level, and suggest that happier people tend to live in low-rise residential structures with plenty of green space, i.e. in structures conceptually close to the principles of the garden city [Kopáčik a kol., 2019[25]].

Rural landscape composition

The landscape composition of the rural landscape influencing the arrangement of landscape units differs in part from the *urban composition*. In the *rural composition* we can distinguish only a few typical features – the delimitation of visual units, their boundaries and internal character.

Individual *compositional elements* within the units manifest themselves (according to the rules of visual perception) in a simplified way, as:

- **types of landscape boundaries** – landscape vedutas, horizons, sight boundaries and landscape basements,
- **compositional matrices** (painterly "background", common texture types) – modal, divided or combined texture matrices,
- **compositional landscape singularities** (painterly "figures", exceptional, special textures) – landscape poles, orientation axes and composed views.

25 The publication entitled The Influence of the Character and Location of Urban Structure on Sustainable Development of the Territory, Case Studies Brno – Ostrava – Zlín is the result of the research project GA17-26104S *The Influence of the Character and Location of Urban Structure on Sustainable Development of the Territory*. The project, carried out in 2017–2019 at the Faculty of Architecture, Brno University of Technology, was funded by the Czech Science Foundation (GAČR).

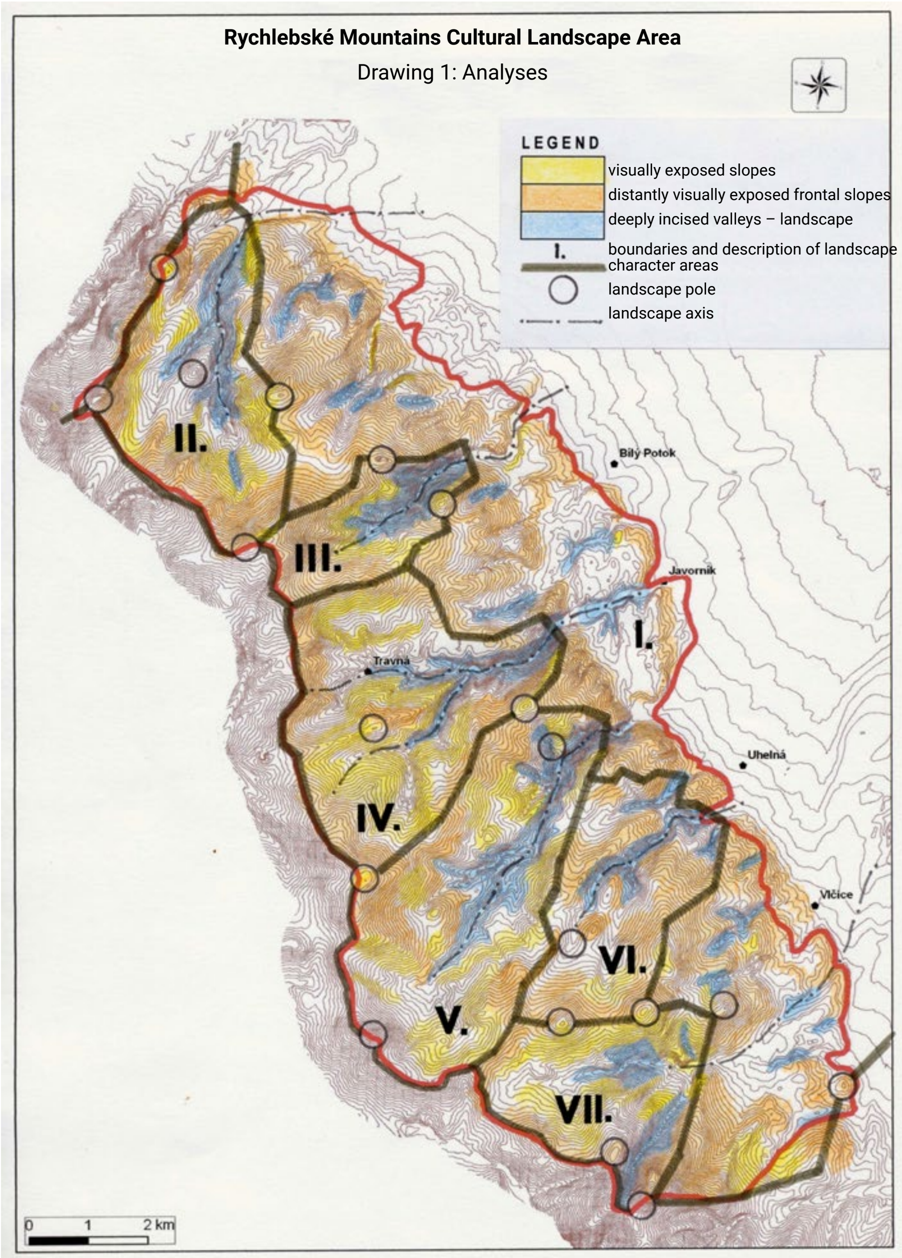


Fig. 243
Scheme of the compositional relationships of the rural landscape (landscape character area = supervisual unit) [LÖW & spol., 2010]

To further identify the visual spaces the rural composition also uses some urban characteristics:

- **Scale** (a property of the whole conceptual unit and its parts) is an essential typical feature of visual units. We distinguish the scales of monumental, large-scale, residential, intimate, and picturesque.
- The **distribution of textures** of matrices and singularities in the unit – the position in the composition – is another essential typical feature of rural landscapes. Individual textures may lie both on the unexposed boundary of the unit and in its most visually exposed position, differing according to the shape of the unit (position in the narrow termination of the unit, position on the long boundaries of the unit, or position in the middle of the unit).
- The **proportion** of spaces and elements (gradation, contrast and emphasis, rhythm of elements) as a feature of the landscape matrix and the arrangement of singularities.
- **Genius loci** = landscape distinctiveness (uniquely highlighted typical features of landscapes).

6.8.1 Landscape boundaries

The visual delineation of the edge of the landscape composition unit is formed either by a horizon with a distinct veduta (frontal slope) or only by a horizon or even just a nuanced line of sight.

- **Landscape vedutas** are the most distinctive boundaries and are formed by the elevated horizons of the landscape unit – either by frontal and therefore visually exposed slopes or by a high building barrier, but sometimes, in the case of convex units, also e.g. by the barrier of the edge of a tall forest or already two-storey buildings.

Fig. 244
Accented veduta

Fig. 245
Accented veduta

Fig. 246
Modal veduta

- **Landscape horizons** are formed by unelevated edges of the units – nuance ending. The singularity and variability of the horizon is determined mainly by the shape of the top of the slope (sharp ridge or edge, or flat top), but in convisual units it is also the character of the edges of the buildings, etc. The horizon lines can be nuanced, accentuated by singularities (poles and axes) and indented.

Fig. 247
Nuance horizon

Fig. 248
Accented horizon

Fig. 249
Divided horizon

- **The oversight boundary** is applied in open units, when the view barrier is absent and the boundary is the "third plan" in the background of the imaginary landscape image, on which the rule of visibility into the distance is applied (for convisual units about 2–3 km, for supervisual ones 30–40 km).

Fig. 250
Oversight boundaries

- **The landscape basement** is the aforementioned special case where a sharp and deeply incised valley in the superimposed whole is not visible at all unless you stand right on the edge of the valley. The landscape basement thus does not contribute to the overall picture of the supervisual unit and is visually separated from it.

Fig. 251
Lower convisual unit – landscape basement

6.8.2 Landscape matrix

It is made up of common and prevailing types of landscape layout with their typical features. The matrix also consists of a typical landscape mosaic of recurring individual elements. What is common and typical in a given landscape (visual unit) is logically also the basic platform for evaluating new, but otherwise common, interventions in it.

The natural matrix consists of the area-dominated, common ecosystem types in a given space.

The anthropogenic matrix consists of both common uses and common buildings and facilities.

In rural visual units forest, agricultural or mixed matrices with rural settlements predominate, while in urban units the matrices of diverse types of development predominate. They are manifested by the typical appearance of their textures. Mono-functional visual units have a modal texture, functionally divided visual units have a divided texture, and the mixture of functions of contrasting character creates combined textures.

Fig. 252
Modal texture of the forest matrix

Fig. 253
Modal texture of urban carpet development

Fig. 254
Divided forest, field, and village matrix

Fig. 255
Combined texture of the agricultural matrix

Fig. 256
Combined texture of a carpeted
built-up matrix

6.8.3 Landscape singularities

These are exceptional elements in the landscape, with a unique effect (in the composition of the city, they roughly correspond to the terms route, node, and landmark). They therefore form exceptions to the given landscape matrix and are always few in a given landscape unit. The exceptional appearance of their shapes and textures in the landscape also signals their exceptional function. Landscape singularities are compositionally divided only into landscape poles, orientation axes and composed views.

Landscape poles are places of exceptional effect, forming accents in a given landscape matrix of the visual whole. Landscape landmarks may also be part of the poles. Poles are both **natural** – distinctly special types of ecosystems and their typical textures in a given visual unit (exceptional, isolated georelief shapes, landscape types contrasting with the matrix types, etc.) and **anthropogenic** (a grassy clearing in a forest, a forest clearing in fields, a pond in fields, a central square in a settlement, high-rise buildings, composed complexes). Anthropogenic poles are also mere places of memory associated with general cultural awareness (museums, monasteries, castles, places of pilgrimage, etc.). Landscape poles can also be **artificial anthropic poles** – formed by functionally unjustified, built artefacts – imitations – in artificially selected places. They are also common in historic parks. For example, in the Liechtenstein Lednice-Valtice area, out of sixteen sallets in the parks, only 8 are linked to a specific function (e.g. the Moorish Pavilion of the power plant or the Hunting Lodge of the grove), and 8 are imitations without justification (e.g. the Minaret imitation, or the Border Mansion and Apollo).

However, landscape poles are often **combined** (a crucifix on a prominent rocky steppe hill). The pole figures must be few in the composition – above three landmarks in a row they already form an axis, above five landmarks in space they are already perceived as a type of matrix. This number varies with the distance of the poles from each other and the relatedness of their appearance (here, paradoxically, the principles of island biogeography apply). In a simplified way, two dominants less than 60 % of their height (golden section) from one another are one common pole.

Fig. 257
Natural pole – landmark – hill

Fig. 258
Texture pole – dark forest texture versus light agricultural matrix texture

Fig. 259
Natural pole – change in tree species

Fig. 260
Cultural pole – church

- **Landscape axes of orientation** are linear elements according to which the visual unit is spatially organized inside (orientation of main lines). They are therefore **orientation directions** – the basic (mostly rectangular) outlines of lines and they also form the main axes of movement through the unit. They can be natural (watercourses, valley bottoms, slope breaks) and anthropogenic (transport routes including pedestrian routes, orientation of windbreaks to the direction of prevailing winds, etc.). They are often parallel in valleys, often concentric or tangential on plateaus and basins.

Fig. 261
Natural orientation axes – edges (margins) of the valley bottom with a narrow floodplain

Fig. 262
Axes of natural orientation – valley bottom – watercourse

Fig. 263
In wide valleys with meandering rivers, the orientation axes are formed by the edges (margins) of the floodplains

Fig. 264
Orientation axes – main roads with windbreaks and perpendicular plots

Fig. 265
Orientation axes – main roads and perpendicularly subdivided plots

But beware – the motorway on the flyover forms a corridor independent of the surrounding landscape, which does not affect the surrounding landscape layout and is therefore not a landscape axis!

Fig. 266
Motorway flyover over the countryside

- **Landscape composed views** – view (not orientation and movement) axes in the territory, directed to a certain compositional pole – natural or artificial, often creating artificial backdrops for imitations. Views and slight overlooks are typical.

Fig. 267
View through the park from the Minaret imitation to the castle

Fig. 268
Composed view of a distinctive natural and cultural pole (Svatý Kopeček)

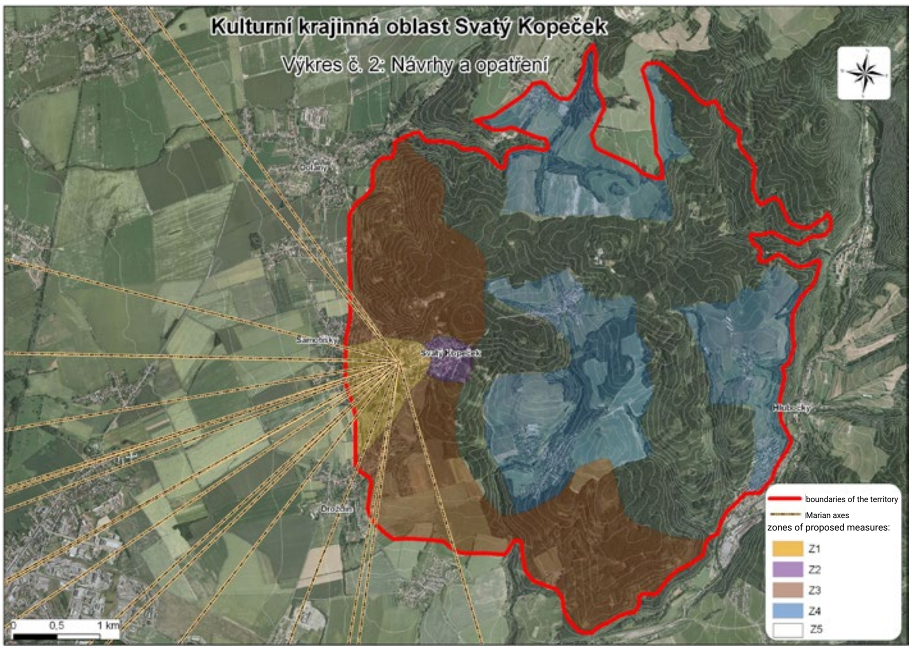


Fig. 269
Example of composition analysis at the regional level – a cultural landscape area Svatý Kopeček, including baroque axial overlooks and views of the surrounding churches [LÖW & spol., 2010]

The design of new or altered elements of the composition is, as is evident from the complex and extensive requirements in the landscape, very limited and changes are difficult.

6.9 Some principles of composition

6.9.1 Contextualism

Contextualism in the respective visual units respects and develops existing landscape characteristics and their typical features of the primary, secondary, and tertiary systems. These features are a major source of inspiration in the design of houses and land uses. The characteristics and their typical features are the content of each of the thirteen generels as described in the individual chapters.

6.9.2 Evolutionary contextualism

It distinguishes between feature contexts that have been confirmed by a sufficiently long evolution, demonstrating their sustainability and importance (sustainable features) and those features that are short-term, not yet tested by evolution (short-term or newly invented features).

The basic criterion for sustainable features is the duration of at least one of their functional cycles (see Chapter 1.5.1), which, depending on the characteristics of the feature, ranges from 50 years (for newer primary uses and most newer developments) to 500 years (demonstrating the sustainability of natural formations).

Additionally, in terms of the long-term constancy of the features, it is necessary to choose a time before or at the beginning of the industrial revolution (with a basic energy level). This is roughly 200 years. Younger features then need to be carefully examined for further trajectories of their possible evolution. From the contexts in Chapter 6.1.1, a range of enduring typical features of a sustainable and, in visual terms, typical design for landscape change and composition can be distinguished.

As can be seen from Chapter 1.5.1, the **primary systems** (the rock environment, including minerals and their use, the georelief, including anthropically determined landforms, climatic features, soils, STGs, the UGS and the actual natural areas in the landscape, including specially protected areas) have a very demonstrable long sustainability record.

Among the **secondary systems**, there are ploughlands and their organization (road network, primary production areas), their settlements (types of settlements and steps of their further sustainable development) and characteristic buildings (material design, roofs, use of local materials), building archetypes (common and exceptional buildings).

Of the **tertiary systems**, these are mainly historical events linked to the landscape, administrative organisations (manors, markets, etc.), building monuments (manor houses, sacral buildings, monuments, folk buildings, etc.), permanent attractions for cognitive tourism (museums, spas, inns, etc.), old liturgical systems (pilgrimages, feasts, procession routes, churches, recordatia of all kinds).

These systems show us forms of sustainable living in a given landscape in response to its characteristics. A learned respect for them guarantees the continuity of our new activities with them. Contexts that have been tested by evolution are also essential evaluation criteria for our contemporary life in them.

Basic historical information from 150 years ago about the area under study can be found in a number of documents, the main ones being the 19th century military mapping and the Stable Cadastre (they are also part of the mapping geoportals: The National Geoportal INSPIRE, the Geoportal ČÚZK – ZÚ archive). *The Moravian Homeland History* (gradually published by the Museums Association, later by the Museum and Homeland History Society) is still an important basis covering the whole Moravian territory uniformly, divided by individual districts of the Austro-Hungarian Empire, where we can find the most relevant local information. Some municipalities have already commissioned new works of local history, but these are still sporadic. Broader frameworks for this development of our landscapes are included in Chapters 9, 10 and 11.

6.9.3 Legibility and typicality of signs

The era of Romanticism and English parks brought into our landscape the fashion of imitations (the roofs of Karlštejn castle, the completion of St. Vitus cathedral, the neo-Gothic style of the most popular castles, etc.) and replicas (the so-called Minaret, Janohrad or the aqueduct in Lednice chateau park, Rabbit Island in Kroměříž, Le hameau in Versailles). They are typical of early capitalism when the new rich sought their own taste. Of course, in the first place, they copied the taste of history (which their ancestors lacked so much) and the play on antiquity became a command of the times and of their nationalist societies (factories as castles). They discovered their own style much later (the First Czechoslovak Republic).

With the growth of leisure, consumer life is filled with decadent entertainment and games, and these now increasingly fill the offers of travel agencies and are also sought after by individual travellers. Drawing attention to the real, non-virtual values of our landscape is therefore fundamentally important.

As has already been stated several times, we perceive the world around us by means of typical signs that identify reality. Virtual reality, based on false signs, then deceives us and presents a different world from the real one.

Typical signs are typical precisely because they inform us well about the true world. But this means that in the landscape and in a residence, **appearance must correspond to function** (even a layperson should know at a glance what is a church and what is a dental office). Common building functional types must have similar (not identical, of course) features, and the prevailing matrix must honour them. Only exceptional structural-functional types must be individualistic, drawing attention to the singularity. We can certainly tolerate decadent backdrops in the illusory complexes of Disneyland and water parks, but not in the real world of our landscapes.

Reflection of Chapter 6 in the system of generels

13. Analysis and design of landscape composition

Landscape characteristics – the character and typical features of the matrix and boundaries, their texture and granularity, the character and texture of the poles, the character and orientation of the axes and composed views in distinction to elements resulting from other generels and elements designed from purely compositional points of view.

7. TERTIARY LANDSCAPE SYSTEM – PSYCHOLOGY OF LANDSCAPE PERCEPTION

7.1 The social backgrounds of landscaping – guiding ideas

Because the landscape as a stage of life develops very slowly and conservatively, it is always somewhat behind the current needs of the "actors" and, moreover, it preserves the backdrop of past events. Human life in the landscape is essentially a journey through time that begins before us – in our ancestors and continues after us – in our descendants. Therefore, if we want to protect and appropriately develop the present landscape, we must also know and respect the values of our ancestors that created it.

From the 4th century to the mid-20th century, **Christianity was the decisive value environment in Europe**, drawing on ancient and Jewish traditions and creating a culturally and ideologically homogeneous society. Shared values, and with them shared symbols, have shaped a conservative, but extremely diverse and successful European civilisation for over 1500 years. Our contemporary landscape was, and still is, very much in line with this.

The landscape created in this manner is still our common living space and is still understood in Christian context by a significant part of society.

However, the current globalised, multicultural era is also characterised by the suppression of these commonly held and shared values of society and thus, logically, by the unintended suppression of their landscapes. Thus we live today, **somewhat paradoxically, as atheists and bourgeois, in a landscape that is Christian and rural.**

Even the most basic information about Christianity is no longer taught in schools today, and we are thus living in a time when the general population knows much more about Buddhism in Tibet than about the faith of their recent ancestors, which until 1950 also fundamentally shaped the development of our landscape. Therefore, the following insert is devoted to the issue of religious systems in our country.

The main religious systems on our territory

A number of religions have been present in our Central European territory over time. First, as everywhere in the world, polytheistic and only much later monotheistic.

Polytheistic religions – throughout prehistory and antiquity were valid practically everywhere. In our country they were followed by the natural religions of the older Quaternary (from the Pleistocene to 700 BC), the pagan religions of the Celts (700-200 BC), the Germans (indirectly also the neighbouring Romans – 200 BC to 500 AD) and the Slavs (500–900 AD).

They try to find logic in the manifestations of external phenomena and influences, inexplicable at that level of knowledge – the more unknowns around, the more gods and spirits we have. Every ethnicity, every tribe has its own mythically constructed set of gods. But because these deities in tribal societies must have always "solved" similar human problems, we can find deities with similar "resorts" in all cults at similar times (sometimes even spaces). This gave rise to a set of gods with different names, often worshipped differently, but with similar functional compositions (the leader god Jupiter = Zeus = Wotan, the goddess of the harvest Ceres = Gaia = Nerthus, etc.).

The gods are disparate and warring amongst themselves, man is often just a suffering appendage and an extra worry for them. To get people to notice the gods at all, they need to be bribed with sacrifices and enticed with magical rituals.

These religions are typical of tribal societies with collective responsibility. The basic unit of the society is the clan (kinship ties) and its goal is to survive, maintain and strengthen the genes of the clan. The individual is not essential and is often sacrificed for the benefit of the clan.

As the clan system evolved to larger formations (tribes and empires), polytheistic paganism gradually evolved to pantheism – i.e., belief in all the gods ever invented. Thus the ancient Romans not only identified their gods with the Greek ones, but added the gods of all the subject peoples, and, just to be sure not to offend anyone, had a temple dedicated to the (as yet) Unknown God. The command of ancient Rome was practically: worship our „state" gods as symbols of the state and add whatever you want.

Monotheistic religions – appeared much later, in our country only in the early Middle Ages. It was mainly the ancient Judaism (in our country not sooner than around the year 1000) and Christianity (in our country since about 800) and both last until today. Islam (which was founded in the 7th century) is sometimes marginally added to them in Europe.

The invocation of deities is invariably replaced by belief in a single, universal God.

Judaism – the basis of the religion is a „tribal god" who has made a special covenant with his tribe (the Jews) - the Jews are his **chosen people**, whom God will protect if they worship only him and follow the ritual rules he has laid down (the Ten Commandments and about 600 other commandments). The covenant and the instructive history of its fulfilment is contained in the Tanakh (Law), which is called the Old Testament by Christians. Judaism also originated in a tribal society of collective guilt, and the Tanakh contains a recurring pattern of people breaking the covenant with God and being **collectively** punished for it. At God's discretion and the strength of their repentance, they are then forgiven again. **The God of Judaism is strict but merciful** (similarly, Allah is merciful).

Jews have thus been a voluntarily closed, divinely chosen group of people since ancient times. Becoming a Jew outside of Jewish lineage is difficult. For one of their last transgressions against God, they were, according to their faith, expelled from the Promised Land and live as exiles in the Diaspora around the world, awaiting God's grace. To this day, many Judaizers still believe that they do not deserve to return to the Promised Land (Israel).

Jews in Europe have always been an exclusive group with their own, very different ritual needs. They were excluded from the feudal system and were always the direct property of the king (regal), to whom they were de jure subject. **In practice, until the end of the 18th century, they were not allowed to own land, cultivate the countryside or carry out agricultural activities. The influence of Judaism in our rural landscape is thus practically nil.**

Christianity – it is derived from Judaism and its Old Testament, but this is added to or even corrected. In order for the New Testament to change the Old, God had to make changes to the Covenant. But even He could not break the Covenant before Himself, so He had to redeem it. The Passion and Resurrection of Jesus Christ for the atonement of our sins and the opportunity to improve the Covenant with us ("this is a new and everlasting covenant") is therefore a key event of the New Testament and is constantly commemorated (the Feast of the Lord). So what has changed with Christianity?

1. By baptism God **abolished collective responsibility and guilt** – (hereditary sins) and thus the subordination of man to the human race = each man is responsible only for himself. Anyone can be saved who wants to be saved – **no more chosen nation and predestination**.
2. He also abolished the 600 ritual commandments, leaving only the Ten Commandments and placing the highest commandment before it as well: “Love your God with all your heart and mind .... and love your neighbour as yourself”. **The supreme command to man, then, is not to fear but to love.**
3. **God loves everyone!** (that is why He redeemed us by His death) and chastises us in earthly life in a fatherly way – the earthly pilgrimage is a teaching of goodness.
4. God will gladly **forgive anyone who sincerely repents of their sin** (confession).
5. **All are equal** before God‘s love.

The Christian God is so loving (and just)

The Christian vision in the old polytheistic family environment was a liberating revelation. Belief in Love revolutionized the entire Roman civilization in the 1st–3rd centuries AD. It reached out to the broadest segments of the population as well as the elites, and despite 300 years of state persecution, it eventually triumphed in a completely non-violent and humiliating manner. In 311 the persecution was stopped, two years later religious freedom was secured by the Edict of Milan, and in another 70 years Christianity became the state religion!

From the first centuries onwards, church life was gradually organized, a church hierarchy was established. It derives its structure from the New Testament and the apostolic succession. The Apostles, especially those sanctified by the sending of the Holy Spirit (hence the next Feast of God – the Feast of Pentecost), passed on and continue to pass on their ordination to their successors, the bishops, who lead the Church theologically and organizationally in the various territories (dioceses). The Bishop of Rome (the Pope), as successor of the first of the Apostles, St. Peter, has the highest powers (“you are Peter, i.e. the rock...”).

With the liturgical hierarchy, an organizational structure of administration and property emerged in the Middle Ages. This union created a new model of **common care for the people** at that time. In the model, the ruler represented the “physical” care, the church the “spiritual” care, and this model basically worked until modern times. Historical developments have been different in the East and in the West. After the collapse of the Western Roman Empire, the Pope became not only the spiritual but also the “secular” ruler in Rome, defending his independence, and the Church jealously guarded its independence, while in the East, where the empire persisted, the Church‘s dependence on the Emperor increased (caesaropapism). Here we may also look for the first causes of the religious schism between East and West, though the immediate cause was a dogmatic question.

The Church occupied an important and privileged position in medieval society. Being a senior cleric often became an advantageous security for the second-born (non-heir) sons of rulers. The peasantry was attracted to the lower clergy by the possibility of being freed from serfdom. The Church thus became a profitable “prebend” for them, and the priestly “divine vocation” often became secular security. Thus began the greatest and longest struggle of the Church – this time within itself. Efforts at redress led to a reorganization of the Church, culminating in the Council of Trent (1545–1563). By then, however, the reformed churches had already separated from the Catholics, and in the following period a power struggle ensued between them, culminating in the Thirty Years‘ War. According to the principle of “whose country, whose faith”, the Czech lands thus became almost entirely Catholic after the Thirty Years‘ War, while the lands to the north-west of us were entirely Protestant. People who lived through the horrors of the Thirty Years‘ War lost all illusions about the enlightenment and wisdom of the people. From these foundations grew a return to the ideas of Christianity and a growth in spirituality in all classes of the population and everywhere. **Spirituality became, until recently, an everyday, commonplace and exceedingly important part of the lives of all people.** Catholicism in this country has thus for centuries played a major part in shaping our landscape, and in some places continues to do so, while the influence of the reformation churches, banned in this country until the toleration patent, was marginal even after the relaxation of conditions.

Secularization

With the **Enlightenment** in the late 18th and early 19th centuries, there was a shift from the religious systems of Europe among the elite of society. Voltaire's statement "I myself do not believe in God, but I am glad my tailor believes in him, at least he does not steal from me" is typical of the elitist conception of the first atheism. The elitism of the Enlightenment was also reflected in the emergence of various "secret" power groups (from the 17th century onwards the Rosicrucians), from the 18th century onwards the Illuminati (= Enlightenment), the Martinists and the Freemasons. Most of the absolutist monarchs were also members, gaining in these small circles the certainty of correct rule. The Enlightenment was therefore not democratic, but learnedly absolutist. The Great French Revolution prepared by the Enlightenment was followed by bloody revolutionary upheavals throughout Europe. The Revolution soon drowned in blood ("devouring its children") and political restoration followed. But it broke through the existing dykes and opened the way for the militant antitheism of the 19th century. Thus, according to Marx, religion is "...the sigh of the oppressed creature, the heart of a ruthless world and the soul of soulless conditions. It is the opium of the people." Nietzsche wrote the famous phrase: "God is dead – and we have killed him". Secularization was set in motion by the Industrial Revolution in the 19th century. It is based on the axiom that "it is normal not to trust", to be an atheist, and that obscurantist beliefs are only tolerated. It is manifested in particular by the unceasing attacks on the main European religious systems, i.e. Catholicism in particular, and partly also on the large Protestant churches. Social or political antitheism excludes religions and churches from public life, minority European religions are not considered dangerous and are therefore exempt from attacks (paradoxically, the coming Islam and the systems of the East are also protected). Christianity is now in ruins in some countries, but even in these countries deism (belief in something) is newly prevalent, leading to the emergence of new exotic cults (Celticism, Neo-Paganism, etc.) and tolerant agnosticism. The struggle with Christianity is also a struggle with Christian ideas and value systems. To the incoming Muslims, Europe thus appears "empty and ideologically inferior".

Agnostic secularism - (agnosticism is a philosophical view claiming that "the existence of anything that cannot be known by experience, e.g. God, can neither be proved nor disproved" – David Hume). It is based on the fact of the unprovability of the existence (or non-existence) of God and refers all theism and atheism to the same level, **beyond rational knowledge** to irrational belief. It ends with attacks on religious systems, and these are equated in protection with atheism as one way of seeing the world. This is probably the most promising direction of development in Europe today.

7.2 Societal inputs for the rural landscape

The main creators of our landscape were the peasants and their agricultural and complementary spiritual needs. Just as the basic ideas and, in principle, agricultural technologies have not changed over the centuries, neither has our landscape changed in any fundamental way compared to modern history.

However, as the whole of modern society diversifies, differential pressure on tertiary systems in the landscape is increasing. Gradually, the influence of different social interest groups is becoming increasingly pronounced in the landscape. This pressure is supported by an increase in leisure time at the expense of bound time.

Throughout the history of mankind, the time of life has been linked to the fulfilment of the basic needs of life, ranging from the physiological (sleep, subsistence work, housekeeping) to the necessary rest to regain strength (re-creation) to spiritual needs. This permanently **bound time** is fulfilled by the obligatory activities associated with it, including the effort to beautify the spaces of everyday life (and to give them spiritual meaning as well). Fulfilling the needs of bound time was and is the basis of the tertiary landscape structure.

As productive surpluses for diverse groups of the population increased over time, the need for bound time diminished in favour of **leisure time**. Thus, leisure time varies in size at various times and for different population groups.

Thus, the importance and type of leisure activities increases with the increase in leisure time – daily (less working hours), weekly (weekend length) and seasonal (more holidays).

Nowadays, leisure time in developed societies accounts on average for about 30 % of total time, and its demands on the shaping of landscapes are becoming increasingly important. Leisure time can be defined in summary as the time during which people engage in selected activities – **leisure activities** – on the basis of their own free choice.

The emergence and development of leisure activities has been long and gradual - from the highest and most educated strata of society through the middle classes, and finally to the lower classes.

The emergence of leisure in both ancient and medieval times was made possible by the differentiation of society (slaves working for masters, serfs feeding the feudal lord, etc.), only in the 20th century with egalitarian social systems does it extend to all classes.

The first definition of leisure comes from the ancient period, by the philosopher Aristotle, who understood leisure as time for **personal development activities** (progressionem actiones) in reasoning, reading verse, meeting friends and listening to music, i.e. expanding knowledge and developing skills. In practice, however, even then there was a marked tendency to merely „shorten the long time" of the lazy Roman people – **short-lived activities** (otium actiones), the motto "panem et circenses" = bread and games.

In the **Middle Ages**, leisure time did not exist for the majority of the population outside of Sundays; it was only available to a narrow class of nobles, who had to use it mainly to practice their military skills, e.g. by hunting or jousting. Already then, however, a specific leisure court culture (courtoisie = court) of chivalry was emerging. Leisure activities thus focused mainly on the honing of military skills and romantic culture.

I**n the 15th to 18th centuries,** the circle of people with leisure time extended to the wealthy urban classes. It became known to us on a large scale among the nobility and the patriciate. In the Aristotelian spirit, leisure time was devoted to culture (painting, music, poetry, self-education, collecting, etc.), but also to gallant or sporting games in specially adapted environments (chateau parks, hunting grounds, ballrooms with exotic contraptions, etc.). There were also cavalier journeys of the richest to the Mediterranean, and later to the Alps, India and Indochina.

The vast majority of the population, however, still lived only in the bounded time with its spiritual and cultural interconnectedness.

From the 19th century to the mid-20th century, leisure time (about 10% of total time) slowly changes from a time for personal development to a time for passive entertainment – shortening long moments = pastime.

At that time, leisure time is also enjoyed by the middle and lower classes, but it still takes place in the cognitive zone of personality development: day trips to the surroundings (excursion routes, pubs), marked hiking trails, seasonal stays by the sea (Riviera, Opatija, etc.), stays in our high mountains (guesthouses, hostels), and for the poorer ones, summer apartments (holiday stays in the countryside).

These were individual activities, but even these were already economically beneficial for the locals. Its typical style is Romanticism and the period of historical styles.

However, there is a growing awareness of the lower education of the broader classes, which leads to a rejection of the Aristotelian model and a tendency towards entirely consumerist pastimes.

From the middle of the last century until the Velvet Revolution, the share of leisure time has been growing rapidly and accounts for about 20% of the total.

Today, its share is increasing, and global tourism is developing. The short-lived, consumerist concept of leisure time is already strongly prevailing, and our landscape is gradually changing from a space for the life of locals and for the admiration and enlightenment of people from abroad into an exploitation for games and their consumerist Disneyland scenery. After all, a large part of our population has lived their entire lives on a ninth-grade level knowledge of history, geography or philosophy, and measure our complex world by that knowledge.

Thus, when examining the psychological needs of contemporary landscape users, we need to distinguish between:

- **bound time** (work, living, rest – recreation, sleep...)
- **leisure time**: - **cognitive** (personal)
  - **consumption** (pastime)

In addition to leisure activities in the place of residence, it is customary to change the environment and seek entertainment elsewhere – this is the essence of tourism.

Since the 19th century, therefore, the influence of its various interest groups has gradually increased with the structuring of society, and they have increasingly expressed their views in the landscape.

The socially distinct users of the landscape can be divided into several relatively consistent groups, depending on what interests they promote in the landscape and what they expect from the rural landscape. This gives us a general social order of what we need to address in the tertiary structure of the landscape. These are both general interests – all users – and logically group interests that have specific demands on the landscape.

Societal interests in the agricultural landscape – its main users and co-creators:

I. Peasants, II. Large-scale producers, III. Organic farmers, IV. Agrarian romantics,

V. Non-agricultural rural population, including cottagers;

Group interests of homesteaders:

VI. Folk gamekeeping, VII. Fishing;

Group interests of out-of-towners:

VIII. Tourism, IX. Camping, X. Hunters in reserved hunting grounds, XI. Collectors of forest fruits and natural resources, XII. Hikers, XIII. Cottagers and gardeners, XIV. Conservation and ornamental societies.

These main groups can certainly be supplemented by other interest groups and the views of these groups on a particular landscape should always be considered and taken into account where possible.

Of these 14 interest groups exercising their interests in the common rural landscape, 3 can be considered as time-bound needs (I, II, and III), the rest in leisure time, 7 of them in cognitive form (V, VI, VII, IX, XI, XII, and XIV) and 4 in consumptive form (IV, VIII, X, and XIII).

What are the characteristics and needs of these approaches to landscape?

7.2.1 Societal interests in the agricultural landscape – its main users and co-creators

I. Peasants

They make up about 10% of farmers and cultivate about the same percentage of agricultural land. They are small, partly medium-sized farmers, mostly farming on inherited and restituted land.

The remainder of the formerly homogeneous, complete rural population (the vast majority of the population lived in the countryside - even today one in three Prague residents comes from the countryside) = the **creators of the landscape** until the 1950s.

Their way of life and demands on the landscape are practically a continuation of rural life before socialism. They are overwhelmingly Christians, and as has already been stated, the current shape of our entire landscape still corresponds to their values and way of life. It is therefore a decisive historical layer of our landscape which has played a fundamental role in its final appearance and is still an important carrier of tradition today. Even modern, apparently secular traditions in the countryside have their basis in this Christian history and are consciously or unconsciously derived from it.

Christian landscaping therefore needs to be given increased attention as the basis for all other activities.

The contemporary **Bohemian landscape** is directly shaped by a large number of churches and smaller sacral buildings, but also by the often imperceptible lines of the ploughlands and the everyday used dirt roads within them. At a time when the **only mobile energy** was the muscle power of the peasant and his animals, this energy had to be saved as much as possible, and one can observe the admirable ergonomic arrangement of not only tools, but also plots of land and entire ploughlands.

For peasants (and this was the vast majority of all inhabitants) the most important was and is the **field, the granary and the barn, and only at the end of the line was the dwelling itself** (in the 19th century it was still common to sleep in a stable or on hay, the cattle being watered first, then the farmer). The main threat to the farmer, apart from fire, was severe weather in the field and contagious diseases in the stable. Both could and often did cause crop failure, which in an era without guarantee funds and insurance companies could and often did mean starvation in the pre-spring. Even the most industrious peasant, who worked the land properly and carefully and sowed till death, **watched the sky anxiously every morning. The only way to protect the crops from the weather was through supplication rituals** (indeed, even today modern, educated people visit fortune tellers and healers and believe in auras and magic circles and fear Friday the 13th). Therefore, in the course of the year we almost always find particularly intensely experienced liturgical Christian periods, corresponding to the phenological periods when certain weather patterns are particularly important for the growth and harvest of crops. The rituals of supplication took place in the open countryside and have left their distinctive traces in it to this day. Far from being an expression of anxiety, the rituals were also an expression of gratitude for a good course, and the **belief that "God will not forsake us" provided the necessary perspective and assurance** of a regular life, which is still true today.

Christian liturgy in the landscape - daily, weekly and yearly

As in nature, the sequence of phenomena played a fundamental role in the life of humans. Liturgical cycles, of course, have always **respected the cycles of nature**, especially the position of the sun in the year, the moon in the months, and the cycle of the day. Into this cycle enters also the seven-day weekly cycle described in the Bible (creation of the world).

Daily rituals

For personal piety in the family community, the daily cycle was the most important, which had an intimate, personal character and was experienced in the everyday farm and ploughland space as life with God.

The **daily prayers** were the basis of the cycle. Their number varied, growing out of the biblical tradition, but there were basic three – at dawn (and thus the awakening of the family) it was morning prayer (monastic and cathedral communities prayed morning praises – laudes), at noon and in the evening (at dusk it was evening prayer, in monasteries vespers – vesperales). Morning and evening prayers, as well as the noon prayer, had their exact order, and these prayers were always opened with the "Angel of the Lord" – hence their name. Therefore, in the morning, at noon and in the evening (people did not have watches), the bells were rung for the "Angel of the Lord", at which time everyone knelt to pray (hence the kneeling).

This rhythm took place against the backdrop of the ploughland and home. In the ploughland there was a whole network of small sacred buildings – with the function of "**reminders**" (recordatio), which were meant to remind the passer-by of God's love. These reminders vary in their focus and reach. Depending on their importance to the village, they were:

Reminders individual, personal, private – from memorial (someone saved their life or lost it here –

usually marked with a cross or a holy picture or divine torment), votive (e.g. a promise for the return of a son from the war – very often chapels), to reconciliation (a wrong has been done and atoned for by repentance) and many others.

Communal, universal, *community reminders* – from intercessory collective protection by a saint from the elements to the celebration of patrons of a particular way of life. The whole community (parish) participated in the construction of these reminders and the whole community was served by them. The most significant and numerous were St. Florian standing in the village against fire and St. John of Nepomuk standing by the watercourse against floods, corresponding to the greatest threat to the community – fire and torrential rain. St. Mary at the church or in the village square was against disease.

Each reminder had to have a guardian (custodian, patron) – the one who built it and "forever" took care of it – in the case of personal ones a given family, in the case of community ones the whole village (formerly the feudal).

The reminders create a variety of building and sculptural types, but these are usually unrelated to the reason for their construction. They have evolved from the possibilities of depicting reminders of divine intervention – from divine torments (the pillar, later the pillar where he was scourged), crosses (on which he was crucified), to holy images (with motifs of protecting guardian angels), but rarely also pieties (the dead Jesus in his mother's arms). It is clear, then, that the building form alone does not tell us much about the reason for the building and its significance. Much more significant was the cost of construction – greatest for stonework, less so for brickwork with stucco, and even less so for carpentry. Some significant reminders, however, may not even be constructional – they may be merely symbolic, such as a rectangular crossing of paths, an exceptionally gnarled tree or a prominent boulder by the roadside.

Fig. 270
Reminder in the form of masonry divine sacrifices

Fig. 271
Reminder in the form of a stone cross

Fig. 272
Reminder in the form of a wooden cross

Fig. 273
Reminder in the form of a wooden cross

Fig. 274
Reminder in the form of a holy image

Reminders are the main material signs of spirituality in the landscape, and at each one, on their way to work, the peasant bowed, crossed himself and joined in the spirit of intercession.

The daily life of the peasant thus became a storyline with tightly bound work and ritual rules that continually complemented each other and together gave deeper meaning to his daily life. I argue that this "continuous" worship shapes the landscape as much as economic needs and is the spiritual basis of its distinctiveness – our landscape is "full of prayers", so to speak.

Weekly rituals

They follow a seven-day cycle, beginning earlier on the Lord's Day – Sunday (dominica) and ending on Saturday (sabbath). Friday was a lent from meat to commemorate the crucifixion of Christ, and Wednesday was often a lent day (but only from dairy products). No work was done on the Lord's Day, although the parish priest might grant an exception, which was often done at harvest time. In any case, the Sunday Mass was also a basic information base, where the parish priest (formerly the only educated person in the settlement) announced a week in advance the important feasts of the calendar and the agrarian deadlines of the phenological phases, as well as the main social events (weddings, baptisms, confirmations, funerals).

Annual rituals

The church year is based on two sources that are not very compatible with each other. The basic division is provided by the Gregorian calendar (introduced by Pope Gregory XIII in 1583), based on the phases of the sun, with which it laboriously reconciles the length of the year and the artificial boundaries of the months. This calendar incorporates the ancient Jewish lunar calendar (from the time when Jesus lived) with its special customs (the month begins at the new moon, the day ends at sunset, etc.). Yet the only fixed date in the Bible that is known from the life of Jesus Christ, Easter, is according to this calendar (he was martyred on the eve of the Jewish feast of Pesach). Other key events in the New Testament are then counted down from this date (Pentecost – 50 days later) and backwards (Lent from Ash Wednesday – 42 days ago). Thus Easter falls at a different time each year in our Gregorian calendar. The basic rule of Easter – **the first Sunday after the first full moon of spring** – means that Easter can be any time between March 22 and April 25.

The rest of the holidays were gradually established by tradition on the days of the basic, solar calendar and thus always have their fixed days! This gallimaufry could not be untangled by an uneducated peasant, and the function of announcing in church – when and what was to be this year – was (and often still is) crucial. The biggest feast is Easter, then Christmas and Pentecost (the sending of the Holy Spirit). These are called God's Feasts and during them one did not work and lived out the messages given, often figuratively (themed plays, readings, etc.).

The set of the most important feasts and seasons begins with the fixed beginning of the church year – Lent Advent (ad ventum = before the coming), 4 weeks before Christmas. Then there is the fixed feast of the Nativity of the Lord (Christmas – in German Weihnachten = holy night), followed 10 days later by Epiphany (Epiphany and Three Kings) and Groundhog Day (presentation of the Lord in the temple), which marks the end of the fixed Christmas season. Then come the movable feasts – after an intervening period of varying lengths, the 6 weeks of Lent before Easter. Meat fasting begins on Ash Wednesday, following the exuberant folk carnival (meat leaving = carne vale). Easter Friday, Saturday and Sunday are the biggest feasts of the year – Christ was martyred for us but rose from the dead. They are followed by 7 weeks of joy in the resurrection and the 50th day – the Feast of the Holy Spirit (Pentecost). 11 days after that, the season of moving feasts ends with the Feast of Corpus Christi. Then follows a long-fixed period without major feasts – until Advent.

From the point of view of landscape and folk devotion, we should mention the feast rituals of Christmas caroling, the blessing of estates on Epiphany, the well-known "kings' rides" of boys on Pentecost Monday and the now unknown opening of wells and "pink festivals" of girls (hence the Pink meadows and hills in the maps), as well as the famous processions of Corpus Christi through the village, and also the bringing out of the grim reaper on Lenten Death Sunday, etc.

Apart from these feasts, the feasts of the individual saints of the Church are traditionally assigned to each day of the basic calendar. **According to their means of subsistence and the manner of their martyrdom** (hence their attributes), groups of inhabitants choose from among them suitable intercessors with God – personal patrons. Thus, every human activity has its patron saint (St. Barbara – patron saint of architects and designers – December 4).

In the open countryside, activities are periodically repeated, and therefore the opposite system arose – according to the agrarian deadlines and phenological phases, symbolized by meteorologically "critical" days, the saint who was just celebrated became the intercessor of that period. Their significance was often presented in the form of folk saying. Thus, they are intercessors that it be warm or that it rain, or vice versa, that there be no storms, etc. – they were and still are particularly revered.

The most important intercessor was, of course, Virgin Mary. She has always had a privileged position in intercession in all situations of life and nature. In addition to the entire month of May dedicated to her (the May devotions), there were thirty other feasts of the Virgin Mary in the Baroque period, today slightly fewer. Almost two-thirds of them are in summer and autumn, when there is a long liturgical interregnum, and so the feasts in a way fill this vacuum. Even of the Marian feasts, more than a third of them were also related to ordinary peasant life.

The **dedication and consecration of local churches** played and continues to play a significant role. It is necessary to distinguish the date of the consecration of the church ("birthday" – this festival is called the Parish Fair") – the feast of the patron saint to whom the church was dedicated ("name day" – this festival is called "pouť" (a pilgrim wake) in Bohemia and "hody" (a feast) in Moravia.

Fig. 275
Pilgrimage Church

The processions for the harvest are linked directly to:

The processions of the **farmland** – they were held on two dates: on St Mark's Day to keep the weather warm and rainy, and on the Days of the Cross (40 days after Easter) to keep the crops rich and protected from storms. The ritual is similar for both – early in the morning a procession of all the peasants passes through the whole ploughland with singing and prayers, the priest blesses all the land, and a short devotion is held at the four ends of the ploughland, at the appropriate reminder. On St Mark's Day the procession is only once, on the Days of the Cross (also days of supplication) the procession goes four days in succession (Monday to Thursday), always by a different route.

Apart from these ceremonies, which are crucial for a successful agricultural year, there were smaller **processions associated with folk piety** (bordering on superstition):
- on St. George's Day (24 April), a decorated tree was taken out of the village in a procession and thrown into the river;
- on St Philip and St James (1 May), old, worn-out things were burnt as a symbol of the end of the old and the beginning of the new (worn-out brooms were also burnt and thrown down the slope = "witches");
- fires, but already clean, were also burned on St. John the Baptist's Day (24 June), as the smoke (since the Old Testament) purifies and drives away evil (storms, illnesses, etc.);
- on St. Lawrence (10 August), a procession with candles was held to the vineyards to give a warm season for the ripening of the grapes;
- on the Feast of the Assumption of the Virgin Mary (15 August), to which most of the pilgrimage sites were dedicated, the main pilgrimages and processions were held;
- on the feast of the Birth of the Virgin Mary (8 September), the rite of the planting of the vineyards took place;
- on All Souls' Day, according to an old tradition, the souls of the dead come out of their graves

and wander – to get back, processions were held on the eve of the feast to the cemetery and to the crosses, and candles were lit there;

- on St. Martin's Day (11.11.) the fieldwork ended, and the **land had to be left to rest until spring** – on this feast day the whole farming year ended, and the farmer settled accounts with the staff (and roasted the goose), negotiated new annual contracts and everyone prepared for Advent.

Beyond these processions, small but strongly connected with home, there were an entire range **of large pilgrimages**, organized to important places of pilgrimage. Pilgrims come from everywhere to seek reconciliation with God and man.

The major European pilgrimages, organised from time immemorial, were to the Holy Land, Rome, Santiago, Loreto, Mariazell, etc. These, however, have been made by few, and if so, once in a lifetime.

The main pilgrimages are organised at regional level, usually as two-day pilgrimages, with flags, music and ceremonial costumes. The map of the pilgrimage sites clearly shows a raster of their distances in an isochrome of 2 days – about 15–20 km.

Fig. 276
Pilgrimage area

The pilgrimage begins with the blessing in the home church and the procession goes out, with the cross at the forefront, then the children and youth, then the priest, then the standard, possibly a statue of the saint on a stretcher, then the music (if any), the chanter and others. At the boundary of the ploughland was the pilgrim's cross, where there was a short farewell devotion, then the procession and the statue (and young children) were loaded onto a cart and the procession continued on its way with singing, prayers and silence. Gradually, individual reminders were added to the destination, where the procession prayed, rested and had refreshments (hence the mature trees and often a well). Within sight of the finish line, the church bells rang out in greeting, the procession lined up again and walked to the church for Mass, singing. Then there was the accommodation (with locals in hay, inns, pilgrim houses, but commonly on the ground in the cloister around the church – which was its main function). In the morning there was the main Mass and after that the return home. There was a festive welcome by the others at the boundary of the home ploughland and a communal thanksgiving service in the church.

Fig. 277
Procession

Calvary (calva – Latin for skull = Golgotha) – Christ was crucified on this mountain. That is why our ancestors often gave its name to many of our stony hills, which were then decorated with some artistic representation of the crucifixion of Christ or at least three crosses.

Fig. 278
Calvary

Usually, the **Way of the Cross**, which was supposed to represent the way of Christ to the crucifixion, led to such hills (as well as to pilgrimage temples). Therefore, fourteen chapels, or at least fourteen images, were placed along the way, at which pious pilgrims would stop as they climbed the hill and contemplate while resting. Paths of the Cross are also an obligatory part of church interiors, and at pilgrimage sites they are often outside, surrounding the church.

Fig. 279
The Path of the Cross

So much for the ideas and their labels of the surviving peasants and ancestors of all of us still present in our landscape. This is the basis of our cultural rural landscape, the landscape of our ancestors, which we still visit and whose attributes we admire - perhaps more enlightened after reading this chapter [see also Kopeček a kol., 2015 for a closer look].

II. Large-scale producers

This is a continuation of the trend from the socialist period, when various transfers placed former state-owned farms in private hands, mostly of former management. Today they are mainly large-scale joint stock companies. Approximately 90 % of our agricultural landscape is in the use of this group of large and medium-sized enterprises.

The predecessors of these large estates – state-owned farms had a somewhat different position in the village, often practically taking over the historical function of patronage manorial estates. They were the dominant investors and supporters, from the construction of multi-purpose halls in the administrative buildings, public catering for the village, technical and material assistance in the construction of so-called Action Z ("voluntary" work), to preferential material assistance to the inhabitants (building materials, machinery for construction, kind for small livestock). They were also the source of their small but persistent thefts (fodder, fertilizers, chemicals, etc.). In addition, members of cooperative state-owned farms were given so-called crofts, which, in conjunction with the resources from the cooperative's operations, enabled small but profitable private businesses. The crofts were not large but were usually on the best quality land in contact with the settlements. However, even they did not pay attention to the surrounding countryside outside the allotments, did not look after it, and with the loss of material support from the cooperative they quickly virtually disappeared.

This group is a direct result of the forced collectivisation of agriculture in the 1950s. Not only the ownership but also the **emotional relations** of the rural population to their landscape were severed. **The landscape was emotionally abandoned by the people** because they could neither protect it nor shape it (see the basic conditions for the existence of a psychological territory). Even of the whole rich range of customs and traditions associated with the landscape, only the torso remained, and the decisive, newly created festivals were the annual membership meetings of the cooperative farms (often associated with a dance), public meetings of the Communist Party of Czechoslovakia, and the harvest thanksgiving (local, district, regional, and national) organised from above.

The new, narrow group of owners of large estates after the revolution are without hereditary property relations to the landscape, they do not work directly on it and their inner lives take place elsewhere and differently. Agriculture in this conception is a normal, albeit highly subsidised business with all the attributes, including the main goal = making a profit. **The landscape is merely a space for production** that must adapt to its technological needs and market opportunities.

Fig. 280
Large-scale farming

The indigenous farmers themselves are partly wage labourers who also relate to the landscape as a space for the work they are hired to do. Conceptually, they fall into the following group. Farming or forestry is **merely an occupation** for them. There are about 300 large estates today (as there were at the beginning of 17th century!). Access to the land is limited to the main agronomic periods of sowing and harvesting and chemical treatments in between.

Because the land is large and the employees are often not local, it is necessary to introduce information systems in the landscape (e.g. targets for aerial cultivation) and sometimes shelters for work breaks (snacks, lunches, shelter from the rain, etc.).

From the management side, only the agronomist who monitors the production processes in the fields enters the landscape. It follows that this group of users introduces into the landscape at most elements that improve cultivation and, if forced to do so by the state, also elements of erosion protection.

This second group of users therefore shapes the landscape significantly, but without tertiary ambitions. **The concept of landscape of this group thus falls entirely within the secondary, i.e. exploitative system**, governed only by economic laws.

III. Organic farmers

Organic farming seeks to avoid polluting the surrounding ecosystems, fauna and flora with alien substances and to produce the healthiest food possible. It therefore mainly avoids chemical fertilisers and pesticides that leave residues in the food chain and in the soil. Instead, it uses natural methods – adding nutrients to the soil through livestock manure, compost and green manure, and combating pests and weeds either by prevention or mechanically – including hand weeding.

The ideal eco-farm is close to a “closed system”, trying to use local resources as much as possible and minimising dependence on fossil resources. It uses spontaneous natural processes, biological and mechanical plant protection. As in nature, waste (from plant residues to animal excrements) is a valuable raw material, part of the nutrient cycle. Lower energy inputs are made possible by greater stability of the farm ecosystem and by solving problems by prevention instead of fighting nature later.

Fig. 281
Small-scale management significantly increases biotope diversity

Agri-environmental measures are an integral part of organic farming because organic farming is not just about food production, but also about restoring natural processes in the landscape that have been destroyed over decades – both on the farm and in the surrounding area. It grows a wide range of crops and varieties suitable for local conditions. Many non-productive organisms that are ruthlessly destroyed in conventional farming also have a place on the farm. Eco-farmers restore the diversity of habitats in the agricultural landscape (interacting elements of the TSES – meadows, groves, forest borders, shrubberies, wetlands, solitary trees, dry walls, pools, etc.). They respect the needs of local fauna (e.g. timing of haying according to the nesting time of the corncrake) and do not eliminate wildlife habitats by chemical means. Other farming systems are similar: the ANOG system, the Lemaire-Boucher organic farming system, the Howard-Balfour organic farming system and the Organic-biological farming system.

In simple terms, these farms can be described as modern, but based on traditional, nature-friendly practices from before the energy revolution. However, production is more expensive and lower. The main objectives in the landscape are:

1. making the most of spontaneous natural processes in ecosystems, maximising the use of local natural conditions and preventing destabilising processes;
2. restoring the non-productive structure of the landscape - natural habitats and interacting elements of the TSES;
3. maintaining a high biodiversity of crops, varieties and crops, as well as livestock;
4. not burdening natural food chains with chemicalization - organic fertilization only, mechanical weeding, using the latest scientific knowledge.

Fig. 282
Goat grazing – today practically only in organic farming

This type of landscape users is close to Group I (peasant) in its requirements, although its technologies are much more demanding and costly.

Community rituals are sought outside religious systems, although a return to Christianity is common. Typical, however, is the search for the meaning of the world in the overall harmony of nature, without magical or other spiritual ideas. The result is something like a belief in respectability, sometimes even radical environmentalism.

The emphasis on naturalistic approaches leads to a preference for open, semi-natural landscapes and the most diverse agro-ecosystems. The landscape thus has a forest-field character with a mosaic of smaller and differently used areas. For the application of ecological principles of management, autonomous areas of energy and material separated from the surrounding area are important, preferably with their own, independent catchment or at least its upper, tributary-free parts. Protection against runoff from other people‘s land must otherwise be laboriously built technically (e.g. catchment and drainage ditches).

It is gratifying that, despite various obstacles (including legislative and administrative ones), this group of farmers is growing, as is its production.

IV. Agrarian romantics

It is a variant of the previous group, with the difference that it is dominated by the spiritual mystical side of things as part of the search for new meanings of life. Mostly young, inexperienced people from the cities strive for self-sufficiency, both spiritual and economic, in the realisation of their romantic life ideas.

1. The basis of the group is an escape from the mainstream, consumerist population (like the once contemplative monastic orders and their monasteries) to nature – to a small group of like-minded people.
2. The search for models – archetypes as the foundations of a new existence consists, on the one hand, in a return to primitivism – the myth of the harmony of natural peoples, the search for Livius´ “aureum saeculum” (in our case of the Indians, or the Celts, or the Tibetans), on the other hand, in the revival of witchcraft, hermeticism and esoterism (“sacred geometry”, magic, cosmic energies and their dynamization, etc.).
3. The search for community rituals = the materialization of magical thinking – fundamentally

different from the ordinary rituals – giving rise to closed religious sects, building on ancient folk superstition. Magical stories have always been a complementary system within the so-called folk piety. Since prehistoric times they have been feared and often persecuted. The emergence of witchcraft is linked to ignorance of the real context – when I don't know it, I believe in the context for sure, which is also very superficial and random (from Friday the 13th, to "I have to knock it off", to card reading, to divination, to bewitchment).

4. Finding sustainable agrarian systems by engaging as closely as possible with natural ecosystems – as close to natural processes as possible, without artificial inputs. Approaches of this type are used by permaculture, biodynamic and macrobiotic agriculture as well as mazdaznan agriculture.

Fig. 283
„Magic spiral" in the garden

The emphasis on the naturalness of these old approaches leads to a preference for an open, semi-natural landscape and its "magical" arrangement. The spiritual dimension enters the landscape primarily as "places of great cosmic energy" (which cannot be measured, but "everyone feels it"), both positive and negative. These are the preferred sites of various activities, especially sabbats, meditations, and other ceremonies. Man-made meditation artifacts (sculptures, stone or wooden sculptures, "Celtic" crosses, etc.), with a typical view of the sky (precisely because of the cosmic forces), can be a substitute for the lack of energetic places. According to some theories, magic circles serve to protect people from evil energies. These are best made of unnaturally stacked natural stones or of alleys planted in a circle (e.g. the Cacovice "biocentre" in Brno), but also with temporarily marked circles, including grain. Due to the lack of their own traditions, these rituals are often connected to other established concepts such as the Ways of the Cross, chapels, divine torments, etc., with which they have nothing in common in terms of substance.

It should be noted that the premises of the presented psychological-agricultural systems are related to the so-called hermeticism or esotericism, about which the well-known scientific association Sisyfos notes: *"they deal with the unreal, immaterial and unknowable world and the technical means or methods of science and are incompatible with the critical-rational approach of science ... hermeticism is widely used by healers and charlatans of all kinds..."* [Sisyfos, 2007].

Even this condemnation, however, does not erase the fact that small but often influential groups of rural residents believe in it and make these views forcefully manifest in the landscape.

V. Non-agricultural rural population

At present, this is the largest group of rural residents who, although they own nothing in the landscape and do not live in it, have significant selective demands on the appearance of the landscape. It is necessary to distinguish between local natives = **old residents**, newcomers to suburban housing = **new residents**, and temporary users of old housing stock = cottagers (they are "overlanders" but try to blend in with the old residents).

Old residents

This part of the population is a continuation of the former cottagers, part-time subsistence farmers and village families, i.e. those who did not own land. They have been joined by a large part of the population of peasant background, but now working elsewhere and refusing to return to agriculture. They have sold or rented the restored land, do not participate in its use themselves and for them it is mainly a source of speculation (when to sell and for how much). This entitlement group also includes the agricultural employees of the "large-scale producers". The basic requirement of this group is the habitability of the landscape within reach of their housing.

Not only in the villages, but also in many urban areas, there is now an attempt to renaissance the old social customs (but with knowledge distorted by communism). A common feature of these settlements is the existence of local self-government (which also proves its fundamental importance), which is co-organising this renewal. The real organisers are traditional associations – volunteer firefighters, gamekeeping clubs, sports clubs – Sokol (falcon), Orel (eagle), fishermen, etc. However, it is now difficult to distinguish which traditions are inherent to the local old-timers and which are organised as attractions to increase the economic benefits of tourism.

New social customs in the village

Social customs in the countryside are, in addition to the generally applicable ones, also specifically rural. There is a set of customs and their material attributes symbolizing the course of the year and of human life, which are related to the Christian customs they often seek to replace. However, only a part of them is applied in the claims on the landscape.

Thus, we have in the village (bolded actions taking place in the extravillan as well):

- Welcoming of citizens (instead of baptism), in the ceremonial hall of the village
- St. Nicholas' Day party
- Christmas markets and fairs
- Santa Claus instead of Christmas
- New Year's Eve
- **Mardi Gras** (carnival, relics) – parade through the village and beyond
- Easter as a celebration of spring (regardless of the fact that the date of Easter varies by a month)
- **Witch burning** – St. Philip and St. James (behind the village)
- **Solstice** – instead of Midsummer Night (behind the village)
- All Souls' Day (cemetery)
- **Parish fair** (originally the church's name day and birthday), all with an emphasis on commercial activities (in the village square or feast grounds)
- Celebrations of important anniversaries of citizens
- **Sports tournaments** (in sports grounds near the village, seen as a social event with refreshments)
- **Swimming** (mostly natural reservoirs = "bathing biotopes", but also small swimming pools)
- **Celebration of inter-village competitions** (Village of the Year, etc.) – in the village square or in the feast grounds
- **Regional attractions** (fruit picking, pig-slaughtering) – at the village square or in the feast grounds
- **Small animal exhibitions** – a t the village square or in the feast grounds
- **May Day festivities** – at the village square or in the feast grounds

- **Victory Day** (parades, weapons demonstrations) – at the village square or in the feast grounds
- Children's Day – behind the village
- **Venetian nights** on the water – behind the village
- **Harvest festivals** (municipal, regional) – at the village square or in the feast grounds
- **Grape harvest festival** – in the village square or in the feast grounds
- **Folklore festivities** (Ride of the Kings, festivals, etc.) – in the village or in the feast grounds
- Lantern procession – formerly on 6 November, now usually at other times, etc.
- Gamekeeping festival

Many of these celebrations are increasingly hijacked by commercial interests, and carols are being thus being played since September.

Fig. 284
Mardi Gras

Fig. 285
Parish fair

The old residents have been joined, especially in areas of suburbanization, by new immigrants looking for a quiet place to live in family houses – the new residents.

New residents

While the old residents represent the normal sociological rural structure with a mix of all strata of the population, the new residents, as a result of suburbanisation, are selected by property and employment status. They are practically only the economically well-off middle class. These differences have been evident for a long time and are signalled in part by different demands on the landscape. Newly settled people look primarily to the landscape for the natural surroundings of their small building plots. In the case of carpet development, this is manifested by the desire for the most extreme location – land surrounded by buildings loses significantly in price. The size of the plot itself with its park-like, enclosed "green chamber" form then plays a key role. The houses are typologically primarily catalogue Victorian archetypes, reinterpreted through California. They tend to be smaller (apart from the garage, they don't need an outbuilding), but they are typically characterized by, paradoxically, very small lots. Although they are prestigiously passed off as villas, not a single really large tree fits on their lot, and so the house-to-lot ratio certainly does not reach that of a villa (min. 1:5), let alone a residence (min. 1:15).

The old residents maintain cultural homogeneity with others (customs), they perceive and try to defend the existing state in the landscape first of all (unless they are paid for its loss). New residents do not accept the old culture or give it a different, romantically superficial meaning ("for the sake of the children"). They do not form a new united community with the old residents for a long time, and their association remains at the lowest stage of protection from other "new" ones. They are motorized, out of the village all day, and use most services elsewhere, in the city where they work. However, the loneliness of mothers with young children in households sometimes becomes a problem. It takes decades, but sometimes even two generations, to bring the two groups of settlers together. The main factor in the gradual rapprochement seems to be the common schooling of children and their leisure activities in the village.

Fig. 286
Carpet development

While for the old villagers, activities related to village social life (from village events to team sports) are usually decisive, for the new residents leisure activities are shifted to more demanding exclusive physical sports such as:

- golf (in a separate area, mostly built as a practice facility for local use),
- tennis (often a compulsory part of sports complexes),
- equestrianism (in this case mainly show jumping, practised in a special area),
- natural gyms (optimally part of sports complexes or playgrounds),
- fitness runs – jogging (off-road walking circuits for easy running).

These sports usually require separate facilities outside or on the outskirts of the estate and users often seek an exclusive club-type regime. Due to the unsettled nature of new residents, their interest in local monuments and memorials in general is lacking.

Weekend cottagers

Weekend cottagers occupy the vacant house stock of the village, with an apparent preference for the old surviving houses. They generally embrace the old culture, repairing the old houses in the sense of reconstructing their original state, but they give a different, often romantically superficial meaning to village life and try to integrate themselves culturally into the local community.

Their demands are virtually identical to those of the two previous groups, except that their desire to preserve village values and rural character is limited to buildings and gardens, and they are mostly indifferent to the use and protection of the surrounding landscape.

They use the cottages as second homes, but often move into them permanently in old age.

Fig. 287
Romantic cottaging

Joint results of coexistence

Most of the events of these groups take place in the village and have no impact on the open countryside. Only some activities require access to the countryside and are connected to it by walking routes. Thus, the following can be identified as the main spaces for village activities:

Sports facilities (for traditional village sports as well as for tennis or natural gyms). These include mostly football and volleyball pitches, used as ice-skating rinks in winter, sometimes tennis courts, clubhouses, changing rooms, refreshments. Where it also serves a local school, it is supplemented by athletic tracks. The optimal location is on the outskirts of the settlement.

Fig. 288
A football pitch tends to be the typical core of a village sports complex

Feast grounds (for all cultural events – from feasts and festivities, through May Day celebrations, commemorations of memorial days, children's days, harvest festivals, vintage festivals, folklore festivals, exhibitions, fairs, etc.). They mainly include a dance floor with a place for a maypole and tables with benches (an amphitheatrical arrangement is preferable, like a summer theatre). A covered stage for musicians and refreshment stands are also common. The optimum location is in the village square or on the edge of the settlement or within reasonable walking distance, e.g. by the wine cellars.

Fig. 289
Feast area in the village square

Fig. 290
Folklore festival

Equestrian area (sometimes it can be connected with the previous ones). The basic condition is a flat, sufficiently large field with tool storage and adjoining stabling and paddocks.

A *place with a distant view* (witch burning, midsummer night, solstice). It is a view, at least from some directions, of an open hill with a clearing at the top and down the slope, fire safe.

Fig. 291
Witch burning

Practice golf course (space-intensive sport in a separate area). The practice course can only contain two holes and a practice tee with club facilities.

Natural place with water area (Venetian nights as a place for water-related summer festivities, natural swimming pool, ice-skating rink). Ideal is a water area for swimming (bathing biotope), with a pontoon at the shore for music and dancing.

Fig. 292
Water area especially for swimming

Other activities take place within the settlement or on the surrounding roads and therefore do not require additional facilities in the undeveloped landscape.

Secular recordatia – secular monuments and memorials in the landscape

Although the current vast majority of non-agricultural residents have abandoned Christian principles of life, some attributes remain as part of the landmarks of the local living space, analogous to reminders – monuments and memorials. Monuments of all kinds are essential tools for the presentation of remarkable events. The decisive factor for a monument is therefore the idea whose message it carries. This determines both the form of the monument and its location. The placement is based on two approaches – the first tries to place the monument in the location of the commemorated event (e.g. Austerlitz Battlefield), the second prefers to locate the event before its general significance and thus chooses places that are urbanistically prominent and widely visited (e.g. the statue of the Red Army in Moravské náměstí in Brno). The first approach prevails for local themes, the second for themes that are society-wide.

In order for a given work of art (sculpture) to become a monument, it must meet several criteria:
- it must contain the message of a given idea (otherwise it belongs to the category of “applied sculpture”);
- it must be generally comprehensible, the ordinary citizen must know (without reading the inscriptions) what the monument commemorates;
- it must give a credible account of the subject of the reminder;
- it must have appropriate urban design priority, according to the importance of the message it conveys;
- the degree of abstraction of the memorials must be appropriate to the degree of abstraction of the message conveyed.

Fig. 293
Monument to Margrave Jošt (lived in the 14th century), equipped with anachronistic Tartar armour and meaningless symbolism – more like an apparition from Star Wars than a medieval ruler

The ideas and deeds that are reminded can be divided into:

Exemplary lives of personalities – people who contributed to the community and the world with their lives and work and are role models for us with their lives (scientists, artists, politicians and patrons) – a type of memorial or monument commemorating the specific life of a particular person, often in the form of "native house":
- monuments to monarchs, especially the popular Joseph II (mostly demolished during the First Republic),
- monuments to the leaders of the workers' revolutionary movement (Lenin, Stalin, Gottwald, Šverma … now mostly demolished),
- monuments to famous native people (writers, national revivalists, artists, etc.).

They must be logically realistically personal, they do not occur in the open landscape.

Exemplary act – celebration of a specific act of a person or group of persons (their whole life does not have to be an example and often is not). These are usually attitudes at key events in history (resistance fighters, liberators, etc.):
- monuments to legionaries from the village (mostly demolished during communism),
- monuments to resistance fighters and partisans.

The monument must be realistic, especially in the act celebrated; it can be abstract in the persons – they are rare in undeveloped landscapes (e.g. the stay of partisans).

Commemoration of innocent victims of wars, terror, social storms, plague, but also traffic accidents. They are a message of injustice and unnecessary suffering. It is precisely the unnecessity of the life losses and the warning of this fact that distinguishes memorials from cemeteries (the natural place of burial of the dead and memories of them):
- memorials to mass crimes – Terezín, Lidice, Ležáky, Ploština, Lety u Písku, etc.,
- memorials to the named fallen in World War I (often with the fallen from World War II added later in a pragmatic way).

Thus, a monument or memorial must be a symbol of unnecessary and undeserved suffering – the most common memorials in our country, in the village and sometimes outside it (at road junctions).

Thanksgiving Reminder of rescue, surviving disasters and significant development milestones. It includes a range of commemorations of the end of various disasters, without a specific addressee

of thanks (e.g., the monument to the end of the Napoleonic Wars, memorials and monuments to liberation, especially by the Red Army):
- memorials of war operations and war victories - Ostrava Operation, Dukla, etc.,
- monuments to the workers' revolutionary movement (now often demolished).

This type of memorials tolerates a high degree of abstraction and is often in the open countryside, where it is linked to Christian recordatia.

Reminders of abstract ideas and virtues – reminders – symbols of justice, wisdom, wealth, humanity, social and educational acts, etc. Since antiquity, ideas have been represented by allegories of the respective gods and demigods, in Christianity by attributes or whole portraits of the respective patrons and intercessors (saints), during the Enlightenment only attributes (Phrygian cap, Mariana, Masonic symbolism, etc.), today abstract monumental attractions of various mythical beings (Radegast on Radhošť Mountain...). Symbolism of literary figures is frequent.
- monuments of literary well-known and well localizable stories and legends (the monument of Babička in Ratibořice, Přemysl Oráč's castle in Stadice, a number of memorial plaques where Jára Cimrman was seen, Žižka's oaks, etc.),
- statues of Justice, Freedom, Unknown Soldier, etc.

In the case of these monuments, too, an abstract conception is possible only to the extent that allows one to know what virtue is in question.

For larger building complexes with expositions, the term **memorial** was used, for small buildings or sculptures the term **monument**.

Memorials appear in the undeveloped landscape as commemorative areas. Outside settlements, however, they are rare. Their integration into the wider landscape composition and their connection to the road network with parking areas are fundamentally important.

Monuments – new community recordatia. Outside settlements they are rarer, but all the more visited. Good pedestrian access and maintenance of the surrounding area is therefore important. They are important attractions on walking routes.

Even today it is customary to hold pilgrimages = marches and ceremonial gatherings to these memorials and monuments on the appropriate date, usually with various delegations.

Fig. 294
Ceremony at a monument

As with the sacred reminders, there are also **small personal, family monuments** in addition to community monuments.

Personal monuments (mostly to tragic events) – individual recordatia. They are mostly along roads and railways. Public monuments are mainly sites of tragic accidents to loved ones and incidents of our own – especially pictures at the sites of car accidents and other misfortunes.

Fig. 295
Reminder of a personal tragic event

The unrecognized monuments to personal intimate events are usually associated with the usual walking places (groves in the fields, corners by ponds, surroundings of local festival grounds, etc.)

Monuments and reminders are still being created today and will certainly continue to be created in the future. It is therefore important to remember the few basic rules of their morphology and location.

7.2.2 Group interests of local homesteaders

Within the enumerated general groups can be found a number of special interest groups that prefer certain specific facilities in the landscape.

VI. Folk gamekeeping

Today, it is an interest organization with a modern function as a replacement for large apex predators in the rural landscape. The old nickname "armed volunteers" is apt. Folk gamekeeping societies survive today.

The interests of gamekeeping in the landscape are only partially identical to those of nature conservation. The real interest is to support game species even at the expense of others. In this way, both breeding and hunting competitors of game are restricted in the landscape, and especially (although tacitly, because it is illegal) predators of game.

For the sake of game in the landscape, gamekeepers improve and maintain the places where game congregate (water, shelters) by building feeders, modifying watering places, planting groves for game shelter and sustenance, etc. However, shooting high seats are also important at these sites.

Fig. 296
Racks and salt licks for winter feeding of game from minerals in salt to berries and hay

Fig. 297
Shooting high seats of diverse types allow not only better aiming but also identification of the individual species

The natural interest of gamekeepers is also the development of artificial breeding of scarce game, with reintroduction into the landscape. Breeding facilities are more often in the hands of hunters in reserved hunting grounds, but they are the most demanding facilities even in regular hunting grounds. These are:

- aviary rearing of pheasants, which is the most common;
- aviary rearing of partridges, ducks (on the water surface, nest boxes), grouse (grouse, black grouse – particularly specific and demanding), farm rearing of hare (cage rearing with pens) or wild rabbit (rearing with pens).

It is important to isolate these nurseries from human movement.

Outside of these activities, gamekeepers often play a key role in the social life of the villages.

VII. Fishing

Fishing is organised by the fishing association. It takes care of the fish stock of the watercourses (compensation for the interruption of the river continuum, destruction of natural spawning grounds, but also intensive fishing), cleanliness and accessibility of the banks of the watercourses. Due to the state of our streams and the pressures on catches, artificial restocking, with associated basic storage and breeding ponds, is now important.

Fig. 298
Fish storage ponds

An important attribute of folk fishing is the accessible but quiet banks of streams and reservoirs. A virtually obligatory function of watercourses is the aquatic TSES, which places demands on the naturalness and undisturbed nature of the stream environment.

For sport fishing and its competitions, reservoirs are also established.

Fig. 299
Sport fishing

7.2.3 Group interests of non-local people

VIII. Tourism

Tourism is an economic sector benefiting from psychosocial characteristics.
- *Organized tourism*, using leisure time mainly in a consumerist way, is big business – travel agencies take over everything and organize everything. It is economically very profitable (it feeds whole countries), it tries to make the most of everything, but it often leads to the devastation of the landscape (e.g. the Riviera is now so overpopulated that the real rich have moved elsewhere) – tourism eats its landscapes.
- *Individual tourism* is difficult, although profitable services (campsites), refreshments, attractions etc.) are organised for it too.

Tourism is therefore a form of leisure outside the home = a set of organised leisure activities undertaken outside the normal environment. They mainly satisfy the demand for education and entertainment, while the diverse interests of the participants are exercised. They enter the landscape of tourism needs as a set of attractive places along the path of destination visitors and access routes to them. Other sectors of the economy such as accommodation, catering, culture, sport, and commerce weigh on them. In effect, therefore, it is a commercial activity using the landscape as its resource.

At the core are attractions, natural or man-made, new or old, physical or organisational, used to increase visitor numbers.

Two ways of tourism

They derive from the above psychological scheme of subjective and objective territory and leisure:
- **Consumption** (consumerist, subjective), reflecting short leisure time – I go to my vision of reality (I want my environment everywhere) = leisure industry, based on the principle that the payer has everything he imagines in a given place. This leads in effect to the creation of virtual reality (holiday resorts in the Nubian desert, reed parasols by the Greek sea, etc.). In reality, these facilities can be

anywhere (even around the corner from where you live), completely separate from the real world (see e.g. water parks, Disneyland, country towns, etc.). These dummies do not really belong in our free landscape.

- **Cognitive** (exploratory, objective), reflecting personal leisure – I am going to discover a new reality (I'm quiet, I don't interfere and I observe the behaviour of the locals) = nowadays more and more in demand, adventurous people wander around the world, often in dangerous areas, settled people choose again mainly the form of thematic tours, both collective and individual (gastronomy, sightseeing, nature, etc.). This type of leisure activity, in contrast to the previous type, therefore seeks out the local, unadulterated values of the countryside, including the typical life there.

Importance of tourism potentials

World Tourism

The decisive destinations at the **global level** are in the high mountains and, on the contrary, on warm seas, which is not the case here. Therefore, outside a few exceptional destinations, our tourism is **only of cross-border, regional or local importance.**

Cross-border tourism in our country

At the cross-border, national level, the biggest attractions of tourism in the Czech Republic include historical monuments (especially those on the UNESCO cultural heritage list), spas, winter sports facilities and natural monuments. The Czech Republic is a big trend at the moment, even though the gains for the local population are actually small (which is why investment in it in this country is often paid for with EU money).

- *Cultural and historical monuments*

They are of the greatest importance in our country. Their use by tourism is due to their unique, artistic, and historical value. Only the most valuable and famous ones are of significant importance, the others function as additional attractions. Among the most attractive are architectural works of historical styles (often rebuilt according to the fashion of the time), modern architecture, but also various utilitarian buildings as individual objects or concentrated in certain complexes. Their sculptural, painterly and carved decoration is also of interest. The modernisation of transport has made it possible to extend the accessibility of these monuments.

- *Cultural facilities, cultural and other events*

Cultural facilities form a set of attractions, most of which act as a complement to other monuments. Many cultural facilities are characterised by a point-centred distribution. According to their type, they are then divided into facilities that concentrate collections of various kinds, such as museums, galleries, libraries, etc., and facilities through which cultural and other events are organised. Museums and galleries of various categories, more or less specialised, are of the greatest importance for tourism. The importance of some cities is multiplied by theatre and opera performances. There is a great interest in various festivals – music, drama, folklore and others (e.g. Prague Spring and many others).

- *Sports and entertainment facilities and events*

In connection with the mass participation of the population in these types of events, the importance of these facilities in tourism is growing. The number of spectators is many times higher than the number of those interested in more demanding forms of social activities. The facilities built for these purposes are therefore often of colossal proportions. Regional championships in various sports attract large numbers of spectators to their venues. They include traditional carnivals and other folk festivals. The various theme parks also maintain their place in tourism.

Local tourism

At the local level, complementary attractions „along the way" (local expositions, monuments, festivals, etc.) are complementary to the overarching forms of tourism. This level is obligatory in the landscape.

The main destination attractions are:

- cultural and historical monuments – castles, chateaux, monumental towns, churches, open-air museums, museum expositions;
- cultural facilities – picture galleries, celebration grounds, festivals, congresses;
- natural monuments – extreme reliefs (canyons, rock formations);
- sports conditions – motocross, cyclocross, ski resorts, etc.;
- attractive natural habitats, safaris;
- spas;
- exhibitions and shows of gastronomic products – vintage, vine picking, livestock shows, etc.
- festivals of regional specialities, etc. – potato pancakes, goulash...

Accompanying and artificial attractions to attract visitors to the area:

- local cultural monuments and memorials, saletas in parks, mock ruins;
- agro-tourism facilities – follow the former summer apartments;
- trendy Euro-observation towers, nature observatories;
- legends, fairy tales and spermons – also here is the intersection of the consumerist direction – pretended attractions (pseudo-historical expositions and performances), "real" stories.

Factually, it is about construction:

- *specific gathering facilities* (concert amphitheatres, open-air dancing areas) with the main problem of huge one-off concentrations in traffic, parking, hygiene, etc.;

Fig. 300
Music festival grounds

- *specific attractions* (spas, aquaparks and natural swimming pools, hippoareals,);

Fig. 301
Swimming pools with attractions

- *purpose-built sports complexes* (cross-country, mass runs and marches, road races), where again the issue of transport arises, but also the protection of the basic values of the rural landscape – they should be directed into already damaged landscapes (e.g. after mining);
- *kitsch country towns* – performances= pretending we are in America, here too the concentration of visitors places enormous demands on transport;

Fig. 302
Country town

- *golf courses* – these are practically large segments of landscapes, artificially (but often unnecessarily) reshaped according to golf stereotypes (in our case, apart from landslides of artificially undulating terrain, unnatural imitations of sand pits, terraces, ponds, etc.), while the essence of golf can be fully accommodated by our ordinary landscapes;

Fig. 303
The “links” type of golf course – the prototype is the moors on the Scottish coast

Fig. 304
Type of golf course “park lands” – English pastoral landscape, but also our ploughlands beyond the village borders

- *winter sports complexes* (ski resorts) – outside of the high mountains completely consumerist, striving for capacity and year-round profitability – huge problems with terrain, water, access and parking;

Fig. 305
Medium-sized ski resort

- *service facilities* (hotels, hostels, restaurants, rental and service stations, car parks) – these are accommodation facilities within easy reach of the main attractions – accommodation is crucial for residential attractions, while transport services are a major issue for one-off but massive events.

Fig. 306
Excursion restaurant by the water area

Tourism facilities and their demands on the landscape are highly individual and need to be responded to from place to place. Localisation refers to destination attractions as well as attractions within the wider travel scenario. A substantial proportion of attractions take place in towns and do not intrude into the rural landscape.

What is crucial for tourism attractions and their use is their compatibility with the values of the landscape!

IX. Camping and tramping

The origins of **camping** can be found in the Scout movement of the First Republic. Scouting focuses on being in nature, whose natural laws it wants to understand and be its intimate expert and protector. However, nature is not only the forest and its freedom, but also man and everything beautiful that he has created. Scouting gradually took on the form of independent Scout camps, through the Junák organization and later the centrally organized Pionýr camps. Originally, the camps were the culmination of the year-round activities of the Scouts (Seton, Foglar – Junák and co.) in nature and with backwoods skills. Later, they became an alternative stay for children during the holidays, loved by some, condemned by others.

Fig. 307
Scout camp

Fig. 308
Children’s holiday camps – often a “dumping ground” of children

The **Tramp movement** is primarily based on friendship or camaraderie, natural humanism, elementary respect for the other person, love and respect for nature, as well as respect for the freedom of every human being. The foundations were laid by Sunday outings, especially by working-class youth from the cities, romancing the Wild West game (hence the name). Tramping gradually created completely independent groups of adult tramp settlements. They created their own distinctive natural "woodsman" (country) culture (huts of the tramp art type – natural, unprocessed materials – timber logs, natural shapes of stones – and half-timbered houses, totems, etc.), derived from romantic notions of the North American wilderness and woodsman life in it.

Fig. 309
Tramp (scout) colonies – permanent campsites of tramps, mostly built without permission, later privately owned

Fig. 310
Residential campsites – occasional stay not only for tramps

X. Hunters in designated hunting areas

It is basically the leasing of hunting grounds to elite private entities, backed by a game of feudal lords. In addition to leased hunting grounds, the main facilities of the reserved hunting grounds are game preserves and pheasantry, i.e. special purpose forests with a preference for intensive game breeding and hunting. In addition to the use regime, which is usually highly damaging to nature ("over-gaming"), these facilities also include various structures – fences, feeding stations, high seats, grazing areas with fields for feeding game and fruit-bearing trees. There is a complete ban on entering them at certain times. An important attribute of these hunting grounds is often a hunting lodge, which also serves as accommodation for clients and visitors.

Fig. 311
Hunting lodge

XI. Collectors of forest fruits and natural resources

Collecting berries and mushrooms is a Czech “national sport” and is seen as a useful outdoor activity outside the home.

However, to these should be added much smaller groups of collectors of other natural resources (semi-precious stones, rocks, fossils, archaeological artefacts, treasures, etc.). Here, a suitable geological setting and its accessibility (quarries, spoil heaps, exposed soil after rainfall, etc.) are a prerequisite. However, these collections, especially of natural objects and treasure hunting with metal detectors, are severely restricted by nature and cultural heritage protection laws.

A special, new industry is geocaching. The basis of collecting is an accessible landscape.

XII. Hikers

Hiking is the movement along selected marked trails, including nature trails. Its roots lie in medieval pilgrimages. Hiking is nowadays confused with tourism and the term outdoor activities is now used for it. Formerly mainly hiking and horse riding, nowadays also cycling, and paddling sports. Their demands on the landscape are therefore vastly different. They also differ in their speed of movement (and thus in the scale of perception of the landscape).

- Hiking (5 km/h) marked hiking trails (Czech Tourist Club – since 1874), comfortable paths where is no other traffic (especially not cycling), ideally with some shelter from the rain.
- Cycling and wheeled carriers in general (approx. 18 km/h) is in conflict with pedestrians and therefore requires its own cycle paths, better wider routes (often shared with in-line skaters), staged resting places at key viewpoints – the cyclist cannot enjoy too much while riding.
- Hippotourism (approx. 15 km/h) – special softer trail surfaces for hoofs and out of the way traffic (horse stampeding) – from comfortable, quiet trails to cross trails.
- Paddling (approx. 5 km/h but can be 20 km/h) depends on river continuum (clear flow from branches, safe weirs), accessible banks and campgrounds by the water.
- Ski touring – cross-country skiing trails, possibly skialpinism

Paragliding and mountaineering are at the interface between sport, hiking and tourism.

Hikers' demands on the landscape can be divided into:

- destination attractions – sights, pubs, campsites, resting places – isochrome max. 1 h = approx. 5 km, (similar to pilgrimage reminders), preferably the destination pub;
- characteristics of the path itself – shade and views, shelter from the weather (gazebos, rest stops), variety of environments (within 400 m a new stimulus!) and intimate interior scale;

Fig. 312
Hiking route

the wider landscape through which hiker passes – preference for habitats close to nature – forest and field landscapes, composed natural views.

Fig. 313
Landscape views

Getting to know the countryside can also be thematically prepared – thematic trails (wine, beer, in the footsteps of Marie Kudeříková), educational trails (monuments and nature), sports marches (e.g. Klaus's Prague - Prčice), etc.

XIII. Cottagers and gardeners

Cottagers – "second home" – self-realization from prefabricated houses, escape from socialist control, arose from the development of tramp settlements with aging population. Settlements are first isolated, hidden even in forests, then on the edges and "residual" areas to the emergence of carpet development – poor architecture and front gardens, problem with transport and networks, again eating up the landscape.

Fig. 314
Cottage complexes often occupy large areas of open countryside

Gardeners – “substitute for the family house” within a day‘s reach, part of suburbanization. Small gardens with small huts – the desire for land and self-fulfilment according to the slogan do-it-yourself. This creates unprofessional, scarce architecture – but it is sometimes charming.

Fig. 315
Gardening colony on the residual area

Neither of the above groups are involved in village life and are mostly a burden (services). The main problem with all of this, besides the exposed buildings, are the ornamental gardens with exotics in the open countryside!

XIV. Preservation and ornamental societies

They are organized in the form of non-profit NGOs and in particular:
- – they **take care of naturally valuable areas** (e.g. grazing by goats);
- – they try to preserve the **species richness of animals and plants** in the Czech Republic (e.g. hand mowing of Carpathian flowery meadows);
- – they **take care for injured** and otherwise handicapped animals (e.g. rescue stations);
- – carry out natural history surveys and **mapping** (e.g. bird census);
- – work with **children and young people**, educate and raise public awareness (young nature scientists’ stations, etc.);
- – participate in **administrative decision-making** (monitor the legality of the activities of administrative authorities);
- – participate in the protection of **cultural monuments** (e.g. archaeological and castle interest groups, etc.);
- – restore and **maintain scattered vegetation** in the landscape (e.g. ornamental societies).

The working forms are remarkably diverse, ranging from the National Programme of Land Associations (owning valuable parts of the landscapes), through the Biodiversity Protection Programme, the National Network of Rescue Stations, the National Programme of the Czech Union for Nature Conservation Ecocentre, the Living Garden Campaign, the Encounters with Nature Campaign and the Young Nature Conservationists. They often replace the management of protected areas in the landscape, cleaning and beautifying the landscape. However, their focus is very broad and civically engaged, entirely voluntary-based.

The societies are gradually developing and building clubhouses, hostels and campsites, rescue stations for natural species, cultivation plants for endangered species. This includes, where appropriate, local pet shelters.

Owned land and protective measures on it (migration routes, etc.) are important.

Fig. 316
Mowing of valuable grassland biotopes

Reflection of Chapter 7 in the system of generels:

7. Generel of spirituality in the landscape
- procession route for the harvest, reminders (recordatia),
- church + parish fair, pilgrimage or feast,
- pilgrimage routes to and from neighbours, accommodation of pilgrims,
- opening of wells and the "rose festival" of girls on the grassy clearings,
- a place on a treeless hill for the witches' pyre and midsummer bonfires,
- the route and site of the vineyard planting for the Nativity of the Virgin Mary, the route of the candlelight procession to the vineyards for St Lawrence,
- new places with great "cosmic energy", water springs, wells, artificial meditation artefacts, magical signs (circles of stones, alleys, grain fields, biological singularities),
- demands for immutability of the surrounding landscape (see subjective territories).

8. Generel of public festivals in the landscape
- feasting in natural stage areas on the edge of the development,
- playground area on the edge of the development,
- walking and access routes from the village,
- natural swimming pool,
- Venetian nights on the pond,
- route and vineyard planting site,
- equestrian areas,
- practice golf courses,
- a place of far-reaching views,
- the rare open-air dancing areas,
- memorials and monuments,
- accessible forest landscape,
- requirements for immutability of the surrounding landscape (see subjective territories).

9. Generel of gamekeeping, fishing and nature conservation
- fenced game preserves and pheasantries,
- feeding racks, watering troughs,
- planting of groves for shelter and sustenance of game,
- shooting high seats,

- hunting trails,
- accessible but quiet banks of streams and reservoirs,
- fishponds and breeding ponds,
- permanent treeless woodland with game fields in game preserves, plantations of fruit-bearing trees,
- collective lands and their protection from external influences,
- protected areas of nature requiring special management,
- nurseries of protected plant species,
- rescue stations for endangered animal species,
- shelters for injured or abandoned animals,
- pheasant, duck or partridge nurseries,
- hunting lodges,
- campsites for voluntary jobs,
- access roads to aforementioned ones,
- clubhouses.

10. The alternative agriculture generel
- organic farming – all for isolation, areas of energy and material isolation from the surroundings, the most diverse agroecosystems,
- separate field access roads,
- accommodation with farm.

11. Tourism and hiking generel
- attractions, services – access to cultural, historical and natural monuments, castles, chateaux, memorials, saletes in parks, artificial ruins,
- nature observatories,
- artificial attractions – concert amphitheatres, hippoareals, country towns, aquaparks and swimming pools of supra-local importance, off-road racetracks, golf courses, euro-view towers,
- excursion restaurants, rentals and services, boating campsites, rare open-air dance areas,
- sports trails,
- marked hiking trails,
- marching camps,
- horseback riding trails,
- bike trails,
- navigable waterways.

12. Generel of temporary stays in nature
- holiday camps,
- tramp settlements,
- cottage settlements,
- gardening settlements,
- campsites,
- access roads,
- identification of possible areas of fenced garden settlements and their clubhouses,
- car parking at entrances to the forest and other target areas,
- permeable woodland.

13. Generel of compositional relationships and landscape values
- character of the matrix and boundaries, their texture and grain,
- character and texture of poles,
- character and orientation of axes and composite views,
- all differentiated into elements derived from other generels and elements designed from purely compositional points of view.

8. TERTIARY LANDSCAPE SYSTEM – PERCEPTION AND DECISION MAKING ON THE LANDSCAPE

8.1 Autonomous tertiary systems

Even the tertiary landscape system can be functionally divided into surfaces and transport systems, whereby not only social entertainments but also ideas, knowledge, feelings, etc. are transported. Only a part of these surfaces and lines is influenced by the functions of the tertiary landscape structure. Actually, most surfaces and lines in the landscape are passive parts of the tertiary system, which are perceived but not influenced by it.

A specific feature of our psychological laws are also places and routes with virtual content that speak to us as unchanging typical features (fertility, richness, naturalness, etc.). Moreover, the **knowledge of the signs once experienced can be experienced in the mind further on**.

8.1.1 Functional areas

Functional areas limited by primary and secondary characteristics

Areas independent of tertiary relationships should be separated from tertiary system areas in the landscape in the first place. In the tertiary relations they only appear as textures of the landscape matrix.

- These are **areas with nature protection** regimes, governed by purely primary rules. Their textures derive from the natural environment, access to them is always restricted – they are reserved areas.
- They are also **agricultural crops** (fields, meadows, pastures, orchards, vineyards, and hop-growing areas), **forests** and **ponds**, whose restricted access regimes and appearance are governed by **primary and secondary rules**. Their texture is therefore necessarily **predetermined by their function**. These areas are the vast majority in the rural landscape!
- Another predominant type of obligatory functional areas of settlements can be added to them – **rural residential areas**, including gardens and amenities. Their **textures are established by long-term common development.** As part of similar matrices, the textures of new ones are also **influenced** by them.
- Separate **industrial areas** with limited textures form agro-industrial centres or industrial zones.
- Locations outside (on the edge of) production areas are more influenced by tertiary interests.

These include mainly **permanent edges of areas**. Non-transport lines, formed by the edges of land (boundaries of crops, anti-erosion bounds and ditches, etc.), whose habitats – accompanying vegetation – can be adapted to tertiary interests. They are therefore part of the preceding textures and play an important ecological role in the life of the landscape (e.g. as interaction elements).

Own tertiary functional areas

These are areas whose layout and appearance are indeed governed by tertiary laws. They are a minority in the landscape, but they give it meaning in a fundamental way. They almost always form singularities.

Obligatory tertiary surfaces – they create psychological and operational goals of movement through the landscape, outside the actual settlement intravillan. This requires specific textures according to location – usually **contextual,** but sometimes entirely **individual**. Their movement connections, using local and purpose-built roads, form the basis of tertiary transports. These are:

- Areas of *cultural functions in the intravillan* (school facilities, cemeteries, libraries, gyms, town halls, churches with parishes, pubs, shops, etc.).
- *Sports areas in the extravillan* for traditional village sports, as well as for tennis or natural gyms with changing rooms and clubhouse, or the usual refreshment stand. They are mostly on the outskirts of settlements and require an operational connection via a local access road to the village infrastructure.
- *Open-air feast sites in the extravillan* are used for cultural and social activities ranging from feasts, folklore festivals, product exhibitions, dance parties and festive gatherings. Most of them are located in the village (in the village square), but often they are located outside of the village, where they also require a connection to the village by a local access road.

Frequent tertiary areas – are common but not necessary areas in the rural landscape. They are:

- *Water activity areas* (recreational reservoirs, natural swimming pools, festivals on the water, etc.). Servicing by local road is required.
- *Folk gamekeeping and fishing facilities* – feeders with high seats, watering troughs, storage ponds, etc.
- *Small scale religious complexes* (churches outside settlements, significant community religious and secular recordatia with surrounding area) their areas are small but significant as destinations of thought and movement. To these are newly added those places of natural accents (biological singularities, springs, wells, special geomorphological formations, magical signs) which may be the object of neopagan cults, etc.
- *Places of prominent vistas* – super-visual views of the landscape, including lookouts and ceremonial fireplaces (for midsummer bonfires, witches, meat roasting, etc.).

Rare Tertiary Areas are associated with otherwise unusual, often one-off activities, mostly tourism-oriented and landscape-only uses. They, as is well known, often "eat up" their landscapes, and therefore need to be tightly regulated, especially in terms of capacity and appearance. Contexts are also particularly necessary here. These are in particular:

- *Purpose-built sports facilities* (crosses, hippoareals, boating areas). These are alien activities in the rural landscape and their textures must therefore be strongly regulated from singularities to matrices. Servicing by local roads and parking is required.
- *Large-scale sports grounds* – golf courses – a new type in this country (mown grassland, natural obstacles, or imitations thereof, small areas of greens, no landscaping). An access road and a reserved parking space are required.
- *Winter sports facilities* – ski slopes with lifts, possibly seasonal refreshment. Require service road and extensive parking.
- *Children's campgrounds* – from permanent camps to seasonal scout camps (with off-season equipment storage). They require a flat area for the camp, usually a temporary meadow or pasture. Proximity to woods and swimming is important.
- *Campsite* – a place without much tramping equipment, off the common track, usually in forest or glade, near a water source.
- *Hut and tramp settlements* – ownership of a hut without land is crucial, this is added to the huts later and often by illegal claim. The aim is to stay in a natural environment. Here too, however, the user "eats up" his landscape and isolated huts become large areas of carpeted cottage development with land. As the tramps grow old, the tramp settlements also become cottage settlements.

- *Gardening settlements* – unlike cottage settlements, the main focus here is individual gardening on a small plot and small cottages de jure used only for tool storage. However, this is changing and most of the garden settlements have also become carpet cottage developments.
- *Tourist service facilities* (hostels, excursion restaurants, rental and service stations, car parks).
- *Special purpose society areas with restricted access* – hunting lodges, game nurseries (pheasant, duck, or partridge), nurseries for protected plant species, rescue stations for endangered species, shelters for injured or abandoned animals, etc. They must be regulated significantly from singularities to matrices. Servicing by local road is necessary.

Exceptional tertiary areas of target activities are associated with very special tertiary requirements but are of great importance to the landscape. These are in particular:
- *Pilgrimage areas* – they have served as centres of popular devotion since time immemorial and allow for both meditative stays (e.g. exercitia) in pilgrimage houses and occasional festivals (pilgrimages) of varying size and focus. The main temple forms a major landscape pole and landmark in the broader context of the visual units. Their textures are therefore often individual and dominant. The area itself must be connected to the local service infrastructure.
- *Specific consumer tourism attractions in the landscape* (spas, aquaparks, etc.) are a very different category of destination areas – the approach to them must be individual.
- *Areas for one-off specific mass events* (concert amphitheatres, techno-parties, festivals in open countryside) are a questionable part of some landscapes, often based on the willingness to lease land to event operators from local landowners. There is a lack of legal regulation of possible uses of field crops.

8.1.2. Transport systems

They connect areas of different tertiary functions through a movement scenario, where the path itself can be a movement destination (pilgrimage – to Santiago, nature trail, sightseeing route…).

Tertiary transport occurs almost exclusively in the network of local roads and agricultural and forest service roads, present in the landscape for economic reasons (servicing the ploughland and connecting with neighbours – national and local roads, special purpose roads). Only in addition are there other routes – pedestrian, water or equestrian only.

Secondary service communications
- *Special-purpose agricultural and forest roads* are a basic and ubiquitous network of roads in the landscape. However, their arrangement is governed by economic laws and is described in the relevant chapter. They ensure both the connection of the seat with individual agricultural lands, and they connect the seat with forests or other production areas (e.g. quarries). The tertiary system uses these routes to its full potential for its tertiary transport purposes. In ploughlands it consists of main, secondary, and additional field roads, in forests of roads I. and II. classes, slopes, technological lines, trails, and footpaths.
- *Access roads for service vehicles to tertiary areas* connect the areas to the headquarters with the shortest possible route.

All other tertiary transport systems use (with few exceptions) their routes and only give them a new, additional content.

Tertiary transport systems

The basic and irreplaceable type of tertiary transport is pedestrian movement. Cycling, as well as the movement of agricultural and forestry machinery and cars, is tolerable for pedestrians only if they use their routes only sporadically. In case of greater intensity, pedestrians must be safely separated from them. Separate routes also require horse riding trails.

Transit, long-distance routes pass through the territory of the village, the destination and often the start is outside it. Local systems can follow it.
- *Walking and cycling connecting roads* are connecting the neighboring villages outside the road

transport, as well as forest access roads, pilgrimage routes and trips to and from the neighbors.
- *Transit cycling roads* passing through the countryside are fundamentally separated from other paths, especially on foot. - Transit hiking trails - marked trips through the countryside, its sights, and other accompanying attractions, in rest stages at maximum hourly intervals.
- *Transit long-distance pilgrimage routes* are meditative walking routes to pilgrimage sites. On foot, often long-distance routes, they are equipped with stage places of partial rituals during modified spiritual reminders. At a certain distance, there are also important places of distant views of the destination pilgrimage area. The interval of stages is gradually shortened from 1 hour until it follows the Stations of the Cross in the pilgrimage area. These are basically hiking trails.
- *Transit paddle routes* – navigable watercourses for water tourism. Size demanding complexes (approx. 10–20 km) with camping, refreshments, preferably by the railway station and boat rental.

Access roads and footpaths to target tertiary areas
- *Pedestrian and bicycle access from the settlement to the targeted tertiary community facilities* and their areas in the extravillan (feast and sports grounds, water activity areas, sacred grounds, purpose-built sports facilities, including golf courses, ceremonial fireplaces). The route is as short as possible but attractive, often of a social nature.
- *Pedestrian access to tourism service facilities* (hostels, restaurants, rental and service facilities, car parks) from the headquarters, sometimes from a public transport station or catchment car park.
- Pedestrian access to facilities with restricted access (hunting and fishing grounds, wildlife rescue stations, feeding racks with high seats) is practically only for staff and club members.
- *Pedestrian and vehicular access to individual recreation areas* (cottage and garden settlements) with access via local roads.
- *Pedestrian and seasonal vehicular access to large one-off event areas* (concert amphitheatres, technoparty venues, outdoor festivals, etc.) and winter sports venues via local roads.

Wandering through the countryside
- *Spiritual circular routes* – a procession for the harvest – a circuit through the whole ploughland with four stops at appropriate spiritual reminders.
- *Spiritual meditative destination routes* – access to destination attractions – pilgrimage sites, services at community reminders, vineyard planting routes.
- *Experiential sightseeing routes* – trails of art and history, natural values, tourism and hiking, compositional values, and landscape, etc.
- *General meditative routes through the landscape* – naturalism, cults of nature, routes of compositional insights and landscape character values.
- *Destination nature wanderings* – landscape trips with places of outstanding views, nature observation sites, movement in the forest, tramp settlements, campsites.
- *Walking routes from the village* – mums with children etc.
- *Horse riding trails* – must be separate from trails used by pedestrians.

All tertiary routes also automatically make use of all the reminders (spiritual and secular) and natural features along the way.

8.1.3 Influencing of visual unit areas

Every action in the landscape can change its values, sometimes minimally, but sometimes fundamentally. Therefore, the newly proposed structure must be examined for its effects on the composition of the supervisual and convisual units.

Schematic solution procedure:
1. In the case of a newly proposed structure – whether a building or landscaping or a change of culture in the landscape, we must first of all find out what new typical landscape features the structure creates (what would be the resulting matrix and its texture).
2. On this basis, we confront the texture of the proposed structure with the textures of the matrices of the current conceptual units or their boundaries. In this way, we can determine whether the structure will “fit” into the current environment or whether it will stand out as a singularity. If it does

fit, all is well and there is no need to investigate the effect further.
3. If the new texture is out of the matrix, we will determine whether its formation is necessary in terms of fulfilling its function and therefore cannot be consistent with the texture matrices (most common functions). If yes, we continue the investigation; if no, we do not implement the design.
4. For a functionally necessary, matrix-avoiding texture, we determine whether it is the same as some other, pre-existing texture of the orientation axis. If its texture is the same, the design is fine and does not need further investigation.
5. In case the new structure is out of alignment with the orientation axes, we check if it is the same as a compositional pole. If it is, we examine whether it will become part of the existing pole (be less than 60 % of their height from it). If so, the composition remains contextual and the design does not need to be investigated further, and it is fine.
6. If the design changes the number of separate poles, we need to determine whether the new pole will be contextual to the composition of the visual whole. If it changes the group of singularities, it must be determined whether the total number of singularities exceeds the critical number of 3 in line or 5 in space. If not, it is still necessary to check the effect from other compositional aspects – whether it will adversely change the scale, proportions, distribution of matrices or the distinctiveness of the whole visual unit beyond the permissible limit given by the degree of protection. If not, the proposal needs no further examination, and it is fine.
7. If the proposal exceeds the critical mass of singularities and changes them on the matrix or axis, it will cause a new composition of the visual whole that must be redescribed and re-evaluated from all relevant compositional relationships. Only in the case of a basic level of landscape protection of the visual unit (see chapter 1.2.3) can this change be allowed. Relevant contextual principles must be established for further implementation.
8. In other cases, the design of a new structure is not permissible.

8.2 Decision hierarchy in visual units

In the landscape, of course, the individual areas of interest of groups and individuals **overlap** to a greater or lesser extent, and everyone has to participate in decision-making to varying degrees. Territories vary most when there are large numbers of people using them – in settlements and especially in cities – the greater the concentration, the less distinctive. *Those who use them have a logical right to beautify and protect them.*

It is therefore necessary to distinguish between the following **levels of convisual units** according to the size of the community using them:

Regionally significant convisual units – central functions of large cities (in our case, the centres of large regional cities), which are completely common to anyone from a given cultural circle (spaces of cultural and sports facilities, theatres, museums, cinemas). They are determined not only by the entire urban community, but also by commuters and sometimes by the entire nation.

Fig. 317
Nationally significant square

Central convisual units – central functions of towns, districts and villages, squares, and village squares (cinemas, libraries, churches, pubs, shops, halls). These are shared by a particular wider local community which decides on them through councillors in town halls, but better by referendum.

Fig. 318
Central Square

Other public visual units – functions of common gathering spaces at the local level (streets, parks, sports grounds, squares, etc.). These are common to the community living in the place (street, quarter etc.), which should be represented by local or borough councillors or a street (now settlement) committee, but again preferably by a local referendum.

Fig. 319
Public space at local level

Semi-private (reserved) convisual units – (courtyards in cities – courtyard balcony yards), but also open countryside = vineyards, gardens, orchards, etc.) – have an owner (it can be a group), but are not fenced (however, the entrance can also be regulated in various ways). The group interests of the residents using the space are decisive – everyone knows and controls each other.

Fig. 320
Semi-private courtyard space

Private convisual units (house, apartment, garden) – the attribute is fencing, boundaries. Decisions are made by the owner, but in accordance with the affected neighbours. By the logic of owning the area for a particular use, the owner has a right to the existing condition!

Fig. 321
Private residential yard

Political decision-making on the appearance of the landscape

For private and semi-private spaces, decisions are made according to the needs of individual life in the territory. However, they cannot be applied to public spaces, as their use and appearance must be shared, preferably by consensus. They are therefore decided according to the principles of society's perception of the landscape.

The political science notion that elected representatives in the relevant council have a mandate from the electorate to make tertiary changes to the landscape is misleading. Contrary to current political practice, the representative form of decision-making is no substitute for the views of the general public, including those of the opposition. Consensual decision-making is the ideal option, with qualified majority decision-making being more palatable. Qualified majority can be derived from the results of local elections. A qualified majority is a majority of all voters (those capable of voting). However, this does not fully correspond to our current electoral system, whereby purposive selection (5% entry threshold) excludes some voters (see the following insert).

For example, in the 2018 municipal elections, up to 28 % of all valid votes were excluded. This means that only 72% of the views of all voters are represented on the council! Therefore, for a true simple majority, representing the views of all voters, to be able to make a decision, it should reach at least 65 % of the votes in a curtailed council! If the councillors were to achieve a qualified majority – 3/5 of all voters (as in parliament), 78% would actually be needed, i.e. 4/5 of the votes in a curtailed council!

If we develop the preceding consideration to its implications, we conclude that if we wanted a supermajority of all voters (voters and non-voters) with a turnout of 47 % of the electorate, the council that represents them cannot make any decision.

Thus, the victory of a view on the fate of the convisual unit by 1 representative vote can be said, with exaggeration, to be an act of violence of a minority over a diverse majority.

It follows that while the standard electoral system is perfectly adequate for the general management of society, it cannot be applied to decisions about the final, permanent character of the landscape and its distinctiveness, and must rely on the unambiguous consent of all, regardless of political opinion.

9. LANDSCAPE DEVELOPMENT IN ECONOMIC AND SOCIAL CONTEXT FROM PREHISTORIC TO MEDIEVAL TIMES

As has already been stated, our era is merely a second on the world's long journey through time. If our short lives are often decided by a few seconds "before" and a few seconds "after", in the natural and man-made landscape it is much longer. The natural evolution of the landscape with humans takes place in dimensions of centuries, even millennia. Yet knowledge of **what and why** has and is happening in the landscape is essential for us to make rational estimates even of the near future. Planning can only be done on the basis of experience, in this case historical experience.

We therefore need to keep track of the changes in the landscape caused by both the natural evolution of natural features and relationships and our interventions in them and their responses. It is a matter of monitoring the interaction of natural, economic, and psychological laws, in the sense of the landscape model described in the previous chapters, i.e. the interactions of primary, secondary, and tertiary systems.

The following overview does not intend to be and is not a broad, comprehensive interpretation of history in all its aspects, but rather a purposefully selected historical phenomena and events that in our opinion were fundamentally involved in the development of our landscape. We are therefore selecting only a few of the wide range of interpretations of historical events, often with a different weight than that given to them by various historians.

It is clear that the weight of the influence of individual systems on the landscape changes over the ages. Therefore, the degree of influence of the secondary and tertiary systems was relatively small in non-ancient times, but in more recent times it has become increasingly important, and the tertiary system is now becoming decisive. In addition, various interventions in the development of the landscape sometimes cause unforeseen changes (e.g. deforestation).

Moreover, interventions in erosion and soil processes are indelibly imprinted on the landscape, particularly by lines of relief (boundaries, streams, roads), and by traces in soil conditions (different soil types and species, change in moisture content in places where facilities no longer exist). With a slight exaggeration, aerial archaeology convinces us that every furrow once ploughed is in the landscape for ever.

Fig. 322
Permanent traces of historical settlement

All elements of the landscape that surround us and in which we create both rural and urban landscapes and individual architectural works, therefore, have a reason and a time of creation in the past that justify a given solution. Otherwise we will behave like blind men in a paraphrase of the well-known fable of the elephant:

"The three blind men recognized the elephant by touch. The first touched the trunk and declared the animal to be a snake, the second touched the leg and declared it to be a tree, and the third touched the tail and identified it as a broom."

9.1 Cyclic time and geological periods

In our evolutionary scheme we can observe a whole series of cyclical changes of the Earth and its ecosystems (the so-called Milunkovich cycles) with different but relatively fixed amplitude.

In the Earth's known past, we can distinguish cycles from the longest to the shortest. The further back we trace evolution, the more gaps and pieces of information we have. The closer to the recent past, the more detailed knowledge. In principle, these are the main cycles of development:

- planetary cycles
- geological cycles
- global climate cycles
- glacial climate cycles
- continental climatic binary cycles
- oscillating climate cycles

Era	Period		Beginning [mil. years]	Duration [mil. years]
Cenozoic	Quaternary	Holocene	0,01	0,01
		Pleistocene	3	2,99
	Neogene		23	20
	Paleogene		66	43
Mesozoic	Cretaceous		145	79
	Jurassic		201	56
	Triassic		252	51
Paleozoic	Permian		299	47
	Carboniferous		359	60
	Devonian		419	60
	Silurian		443	24
	Ordovician		485	42
	Cambrian		541	56
Proterozoic			2 500	1 959
Archean			4 000	1 500
Hadean			4 600	600

Table 6
Simplified overview of geological periods (adapted from Wikipedia, 2020)

- The most distant and longest are **planetary cycles** – amplitude of about 1–2 billion years (collision with a planet, formation of crust, four atmospheres, etc.). The end of the last period was about 0.4 billion years ago. So we are in 1/4–1/8 of a new planetary cycle after the Archean (which should last another 0.5–1.5 billion years) and our landscape is not so affected.
- **Geological cycles** are closer – amplitude of about 40–60 million years. The end of the last cycle was about 65 million years ago, and we are therefore in another transition of the present geological age (Cenozoic) at the beginning of a new but unknown geological age. The biggest break occurred at the beginning of the Pleistocene (1.8 million years ago), since when we observe the onset of ice and interglacial ages, probably as a result of the fluctuation of the Earth's axis.
- After the Neogene to Pleistocene transition, we can observe **global climatic cycles** – with an amplitude of about 10 million years (mountain ranges, continental shifts). We are in the first quarter of a new cycle since the onset of the Pleistocene (2.5 million years).

These three types of cycles are outside the historical context of the current landscape, so we do not pursue them further. But the other three are already essential for us:

- In the Quaternary **Pleistocene** (from -3.0 million years to -11,500 million years), **glacial climatic cycles** of ice ages (glacials) and interglacials of about 100,000 years in length begin at -1.8 million years.
- In the Quaternary **Holocene** (from about 11,500 years BC ago to the present) we can further distinguish **continental climate double cycles** of about 2,000 years (2000–2800) of oceanic-continental fluctuations (regional climate events): the Atlantic/Boreal.
- Inside the double cycles are small but significant oscillating climate cycles of drought/rain on a period of about 200 years.

So today we are somewhere at the beginning of a new geological epoch and in 1/4 of a global climate cycle, what will happen next is unknown. We are in 1/5 of an interglacial (warming), the beginning of a boreal (weather extremes) and the beginning of a dry oscillation in the Eurasian steppes.

What this combination will do in the future is anyone's guess, and the forecasts are not cheery.

9.2 Prehistoric times

9.2.1. Glacial climate change

Pleistocene (second third) – ice age – from 1.8 million years ago onset of ice ages (up to 30 % of the land is under ice, the sea is about 100 m lower). Up to 22 glacials and interglacials are reported. In the interglacial age it is even warmer than today, during the change the landscape freezes slowly, melts quickly. The climate is fluctuating – resiliently stable. This is the period of the formation of today's wide river floodplains and higher terraces, of the splash and incision of rivers in the mountains. Neanderthals and mammoths appear. The first hunter-gatherer cultures emerge.

Fig. 323
Maximum glacier coverage of our area

The last glacial of ice age which marginally affected our territory was the period called Riss in the Alps and Saale in the north, in Poland. It last reached us 130,000 years ago from the Alps into the Vitoraz region, from the north from Scandinavia into the Krkonoše and Hrubý Jeseník mountains, and from the Tatras into the Jablunkov region.

Fig. 324
A diverse forest-tundra as an approximate picture of our landscape in the last ice age

9.2.2. Continental climate double cycles

Holocene – occurs after the Pleistocene, from 11,500 years BC to today. There are small but longer climatic double cycles (it doesn't go back to the ice ages). The population of the area of the Czech lands was of course negligible, about 1 % of the territory.

We can discern continental climatic double cycles of about 2000 years (2000–2800) of oceanic-continental fluctuations (regional climatic events). The end of the last double cycle was sub-atlantic 2 – ca. late 18th century. So today we are at the **beginning of a new boreal**!

Double cycles	duration
pre-boreal (since -7450)	300 years
boreal 1 (since -7750) – formation of steppes by drought	1200 years
boreal 2 (since -6550)	750 years
atlantic 1 (since -5800) – formation of forests by moisture	1400 years
atlantic 2 (since -4400)	1300 years
	total approx. 5000 years
After the double cycles atlantic appears – boreal is followed by cycles with even smaller extremes	
sub-boreal 1 (since -3100) – the sea has dropped by 4 m	1450 years
sub-boreal 2 (since -1650)	1400 years
sub-atlantic 1 (since -250) – classic Antiquity	950 years
sub-atlantic 2 (since 700) – Middle Ages	1100 years
little ice age (1500–1860) – modern history	
recent (since 1800) – present = new boreal	total approx. 4900 years

Table 7
Simplified overview of climatic cycles in the Holocene (modified by J. Löw)

The atlantic is always a period of wet and stable mild temperatures (roughly like the west of England today). The boreal, on the other hand, is a period of extremes – drought and heat alternating very quickly with rain and frosts (roughly today's southern Russia).

The atlantic, with its abundant rainfall and equable temperatures, is the optimum for deciduous forests, the boreal favours coniferous forests more. After a significant warming in the pre-boreal, forest formations developed massively and rapidly occupied our entire area, in steps characterised by a succession of dominant tree species. The present biogeographical province of Central European deciduous forests was formed, covering the whole of our territory apart from south Moravia.

Glacial plant species have remained (some to this day) trapped in the cool mountain areas above the forest boundary, thus forming important refugia of species extinct elsewhere (endemic species).

Today, we are living in an uncertain period of climate change at the beginning of a cycle of typically "boreal" extremes.

Fig. 325
Atlantic – oceanic climate (constant humidity, warmth) – dominated by deciduous forests

Fig. 326
Boreal – continental climate (extremes of dry, wet, cold, and warm) – dominated by coniferous forests

9.2.3. Oscillating climate cycles

Within the double cycles we can trace even more subtle, small **oscillatory** drought-rainfall periodical cycles of about 200 years, with extended periods of fluctuation (about 30 years). These variations are produced by long-term shifts of higher pressure (anticyclones) over the Azores and lower pressure (cyclones) over Iceland, formed by the confluence of the North Atlantic and Arctic oscillations. In the long term, the moist and cooler air then:

- either moves from the Atlantic Ocean across the *Mediterranean and Black Sea* to the steppes, where it rains but it is warm and dry here,
- or it goes from the Atlantic across *central Europe*, over the southern taiga, to *Siberia* – it then rains here and on and around the upper Volga, but the steppes are dry.

This cycle, manifested in particular by significant variations in rainfall in the Eurasian belt of the Great Steppe[26], radically alters its fertility and has disastrous population consequences for the available surroundings. At recurring intervals of around two centuries, nomadic herdsmen from the Great Steppe, seeking new pastures, invade eastern Europe.

Graph 3
Climatic cycles throughout history and nomadic incursions into Europe [Löw, 2017]

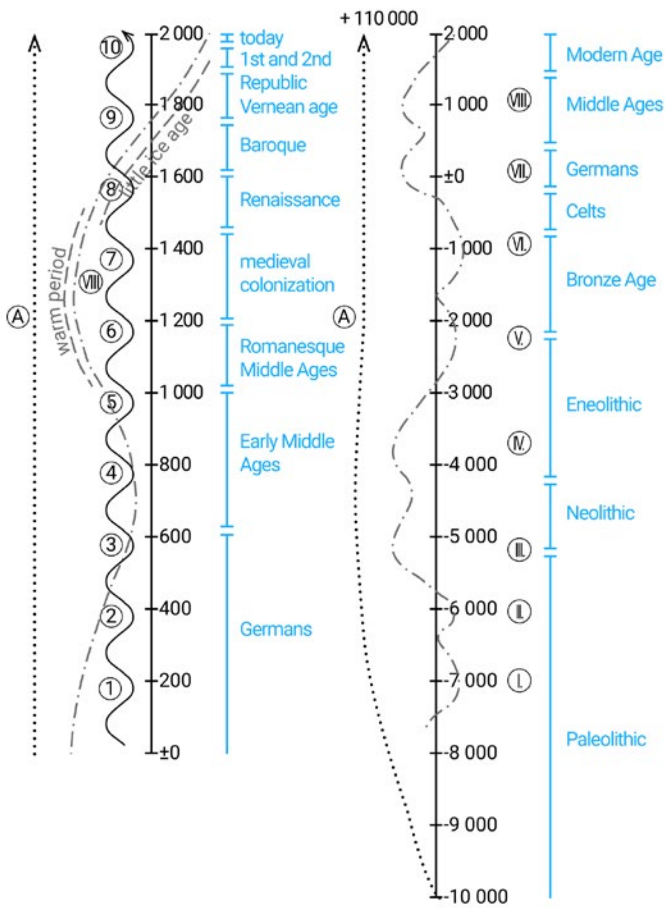
Legend (bicentennial and millennial intervals are plotted on the axes)

<······ glacial climate change:
A = hypothetical present interglacial

·—·— Continental climate binary cycles: I, II = Boreal; III, IV = Atlantic 1 and 2; V, VI = Sub-Boreal 1 and 2; VII, VIII = Sub-Atlantic 1 and 2

——— oscillating climatic cycles – invasions of Europe.
1. Goths, Alans, 2. Huns, 3. Avars, 4. Hungarians, 5. Cumans, 6. Mongols 7. Ottomans, 8. Kalmyks, 9. ???, 10. modern Islamic immigration

historical eras (in Central Europe)



The evolution of climate must therefore be taken into account, but since we do not know it properly, we must react with as much freedom of design as possible so that nature has enough room for evolutionary changes to both boreal and atlantic characteristics.

26 The term "Great Steppe" is understood as a set of Eurasian steppes stretching from southeastern Europe (Eastern European steppes) to Central Asia – Kazakhstan, Mongolia (Central Asian steppes – continental steppes)

9.3 Human evolution in the prehistoric Pleistocene

(1.8 million – 12 thousand years BC)

Hunter-gatherer cultures (Paleolithic in our country)

They reflect the successful engagement of early humans and other hominids (Neanderthals) in biotopes of large ecotones between the major natural ecosystems – forest with detrital food webs and steppe with pastoral-foraging food webs, collectively referred to as **savannas and forest-steppes**.

Our physical predispositions correspond to the **forest-steppe** – upright posture for vision over tall grass, hands free for tools and climbing, eyes shifted forward for better distance perception, etc. Hence our phylogenetic characteristics as a species. Successful engagement was **determined by the tools** that gradually made the gatherers the most successful predators. They gradually multiplied and pushed each other to the edges of their original range, where altered natural conditions forced them to change their subsistence technologies. These margins and the landscapes beyond them were vastly different from those of the original ecumene.

The warm and moist rainforest biomes were the most distinct of these (detrital food webs, rainforest peoples) and their occupation is still preserved in remnants by the original inhabitants of the rainforest. Similarly, temperate forest biomes (then different from today) were also present.

The **tundras** (grazing-foraging networks, Arctic peoples) were also markedly different. Remnants of these settlements still exist today in the Inuit, Chukchi, Patagonian, and others. In the Paleolithic, hunters lived in the tundra with a local abundance of game = Neanderthals (until 40,000 years BC), when they were replaced (first from 35,000 years BC by homo sapiens) by “mammoth hunters”. The location of Palaeolithic settlements was closely related to places where game was abundant and/or fruits could be collected. These were seasonal campsites or outposts, spatially unstable and variable – formations of tents or huts. In Moravia, numerous hunting groups settled by migration routes along rivers. There are two world-famous sites at Dolní Věstonice (Young Palaeolithic, ca. 15,000 BC) and at Předmostí near Přerov, where the earliest settlement of the site dates back to the Middle Palaeolithic (ca. 100,000 BC). Caves were a common variant of human settlements responding to the cold climate of Europe at that time.

The relatively easiest departure was into **grassland biomes** – from savannahs to prairies and steppes (grazing-foraging networks, nomadic peoples). Domestication of animals in the steppes led to the emergence of pastoral cultures (where this failed = prairies, populations remained dependent on uncertain hunting, with stagnation of development). Complementary, but essential for further development, was the collection of grass seeds, and eventually their sowing and cultivation – wild cereals. The residence and movement of herdsmen is governed by the grazing of their herds and therefore does not create fixed, permanent dwellings. Temporary (easily relocatable) dwellings are circular in plan and the tools needed for subsistence are severely limited.

In the last period of the Palaeolithic – Mesolithic (10–6 thousand years BC), the Ice Age turned into a warm interglacial that favoured the forest and the development of hunters – the bow and arrow appeared, and the domestication of the dog occurred.

After the end of the Ice Age, the biomes shifted to their present form and there was also a gradual return of some herdsmen populations with steppe cereals to the forests (replacing the previous tundra in our area). Here they displaced the gathering groups and gained land for cereal farming by deforestation = this is the first Neolithic farmer.

9.4 Human evolution in the prehistoric Holocene

(from the 12th thousand years B.C. to the present day)

Of the four livelihood options on the edges of the woodland, only two proved promising – Neolithic farmers and herders. **Thus, two main human cultures gradually developed in the Holocene, which still exist today:**

A. Pastoralist cultures (analogous to ecological R-strategists) using **pastoral-foraging food webs.**

They are based on the concentration of domesticated large herbivores and their artificial protection from predators. Their breeding and exploitation (milk, blood, meat) were and are crucial human activities. The success of grazing depends on:

- **Characteristics of the climate** – in particular, adequate frequency and abundance of rainfall and length of snow cover. These determined the fertility of the pastures and thus the potential population density and overall potential population size in the area.
- **Total area** of available grazing land in the area and the corresponding human population size.

The combination of both factors determined the potential population size. **When natural factors changed** (see oscillation cycles), **the response had to be a change in population size.**

B. Agricultural crops (analogous to ecological K-strategies) are emerging with the return of some herdsmen to forest landscapes. Significant human influence on natural ecosystems and the emergence of replacement communities (agrocenoses) begins.

They are based on artificial deforestation and the introduction of otherwise steppe plants (cereals), limited in the steppe by moisture, into areas with sufficient moisture – into forest areas. The artificial introduction of **grazing networks** (with moisture-limited yield producers – primary production) **into areas of detrital and therefore moisture-rich networks is the whole charm of the Neolithic Revolution**. The goal of farmers was and is producer preference and the reduction of wild herbivores and predators.

The success of cultivation of crops depended, and in fact still depends, on certain limiting conditions being met – **ecological minima that must be overcome** – in the forest, of course, this is primarily the availability of light. The weight of the other individual minima has also changed throughout history. In particular, the decisive agrotechnical limits are:

- **how large an area we can keep deforested** (i.e. sunny) and sow it with cereals;
- **how far away from home** we are able to cultivate the land to make it still worthwhile to go there every day;
- **how we can ensure the renewal** of the nutrients in the field, which are constantly being removed from the field as the harvest is taken away;
- **how much we are able to harvest** within the agronomic timeframe (at maturity but before the grains fall out);
- **how well we can loosen the soil** for the crop;
- **how we can fight food competitors** (weeds, pests, and diseases).

Our territory lies entirely in this area – **we are K-strategists and farmers, our landscape is deforested by us, so where we leave it, succession = forest immediately sets in.**

Fig. 327
Typical permanently settled farming landscape

9.5 Ancient cultural source areas for Central Europe

The most important for the history of cultural landscapes in Europe **until the end of the 19th century is the state and development of agriculture**, which was the decisive landscape and settlement activity until the end of the 18th century. However, its modification and influence from the environment created different economic and cultural environments.

In our opinion, some initial differences in cultural landscapes in the European context were the most important. The following surrounding landscapes have had a major influence on the Central European landscape throughout its history:
- **floodplain landscapes** of the Anterior East in a *semi-desert biome*,
- **Mediterranean** – the Mediterranean coastal landscape of antiquity with networks of islands in the Aegean region with a potential natural vegetation *biome of hardleaf non-deciduous forests*,
- **steppe** – pastoral landscape – the Great Steppe of Eurasia in a *steppe biome*,
- **deciduous forests** – our Central European landscape with natural vegetation of the mild climate *deciduous forest biome*, at the edge of Roman civilisation.

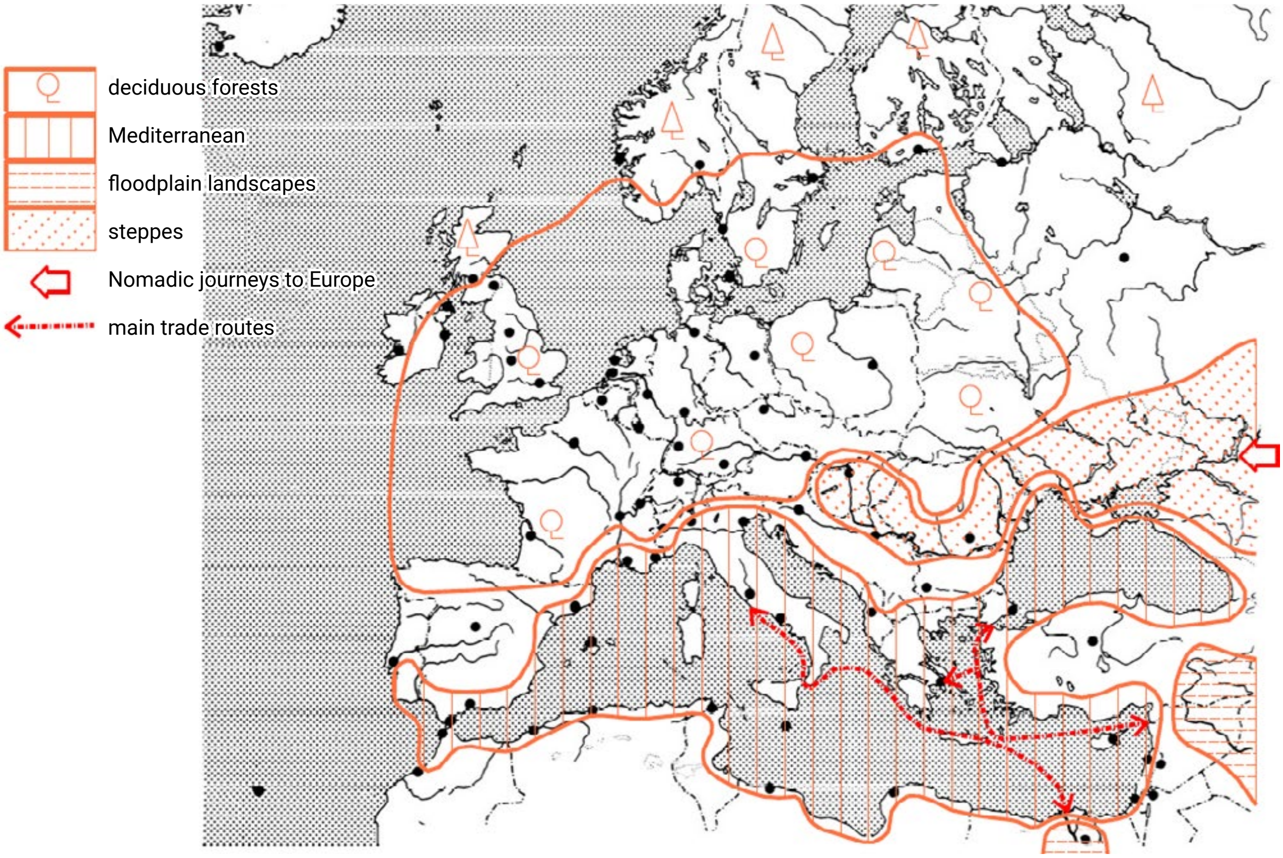


Fig. 328
Schematic map of ancient cultural landscape types [Löw, 2017]

9.5.1. Floodplain Landscapes of the Front East

Annual flooding around large rivers in otherwise steppe to desert type landscapes (Nile, Euphrates, Tigris, Indus, Ganges, Mekong, etc.) created large floodplains with specific soil conditions and significant **energomaterial inputs from outside** (from the upper parts of the basin).

The deforestation of floodplain forests and the planting of grain has enabled agriculture in these wide river floodplains without attachments and fallows with multiple harvests per year. The first cultures were hilly, yet very efficient.

Artificial flooding – irrigation and drainage

Efforts to modify the flood regime to an optimal form initially focused on controlling runoff from flooded areas (essentially draining seasonal excess runoff), and only in the second phase did the construction of irrigation channels and canals in areas that were flooded too briefly take place.

On the one hand, **high yields** and overproduction of food allowed the establishment of permanent (and often large, non-agricultural) settlements, on the other hand, they created a high need for labour, which led to the emergence of **classical slavery**.

Interconnected, jointly organized irrigation systems required a larger cooperating population over an often-large territory and, in our judgment, also led to the emergence of the first states, whose size grew with the size of the interconnected water systems (Sumer, Babylon, Egypt, but also elsewhere – India, China).

Constant food supplies tempted the surrounding **nomadic pastoral tribes** to make constant forays into the floodplains. The disadvantage of nomads, however, were unsecured stocks. This led to the creation of a special type of fortification in permanent agricultural settlements – large, but not perfectly fortified compounds – actually refuge hillforts where farmers and cattle would retreat when nomads raided and where grain was stored. Without supplies, the enemy could not last long besieging the place. That is why the unfortified, earthen walls were so effective. Throughout history, fortifications have been a sign of a period of volatile power and raids.

In these hillforts were permanently settled those craftsmen whose tools of production were difficult to move in a hurry and/or which were difficult to renew. This gave rise to permanently inhabited sanctuary towns, where some craftsmen and professional troops, the organizational staff (the ruler) and, of course, in the first place, the deity protecting against accidents, resided permanently.

The overproduction of these agricultural systems created the conditions for **the first large-scale trade** (in grain) **made possible by shipping along rivers and seashores**. It must be remembered that other modes of transport (porters, caravans, two-wheeled wagons) were only suitable for small volumes of precious commodities.

Fig. 329
Nile Valley

9.5.2. Mediterranean region

The rugged, mountainous lands with a subtropical climate, where mountain ranges alternate on the mainland with small alluvial cones of floodplains (especially at the estuaries of the sea) and, on the Aegean, a dense system of islands, islets, and straits with fresh water almost within sight of each other, allowed for a second specific type of culture.

The rugged and variable geo-relief in these areas caused an **excess of oil and wine production and a scarcity of grain.** This, together with the exploitation of other natural resources (copper, tin, pottery clay, marble), led to the development of trade with the grain-producing areas of the floodplains.

At a time when large-scale, long-distance trade was unimaginable outside of shipping, and at the same time ships were small and structurally weak, the sea with its islands was a unique link between territorially unrelated enclaves, creating **an effect of an open society of trading maritime nations**, first Phoenicians, then Greeks (a network of colonies), unparalleled elsewhere (outside the Arab-Indian monsoon area). Moreover, the development of this civilisation was later perfectly combined with the abnormally fertile volcanic soils of the Greek islands and the mainland of southern Italy.

This created a society of equal, personally free citizens (i.e. self-governing merchants, able to guarantee commercial contracts, dependent on keeping their own word). It was the basis of a state system where the people (kratos) ruled (demos) but only free citizens (the need for labour remained dependent on slavery).

Greek cities were fundamentally different from the previous type – they were small, free trading communities and their trading branches = colonies along the coast and sea "bridges". They are the forerunners of our medieval cities with a free patriciate of merchants.

Fig. 330
Aegean Sea

The Greeks came from forested areas, from where they brought wooden architecture, transformed in Greece into stone. This is the basis for the emergence of the ancient style (wooden house made of stone), which has fundamentally influenced the architecture of the settlements of the whole of European civilisation today. The transmission of this culture to Italy and its spread by Rome is one of the foundations of the development of our territory.

The Roman Empire

Around the 3rd century BC (during the Celtic settlement of Bohemia and Moravia), a revolutionary **fusion of two cultures – Greek and Etruscan** – took place in Italy.

In particular, the Etruscan inland civilisation was based on a sedentary population with a system of agriculture, modified, however, by fertile volcanic soil with low skeletal content. Settlements were fortified and certain areas were militarily unified into small defensive states.

The intermingling of the coastal (Greek) culture of **trading colonies, Mediterranean crops, the "petrified" wooden house and a developed slave society with free citizens** with the Etruscan culture of **pastoralism, grain farming, the brick and stone vaulted house and a patriarchal military society** led to **the emergence of the phenomenon of Rome.**

The military organization of the Romans, enabling the unification of the world of that time, solved mainly the problem of supply (secured market) and transport. The legions with supplies, moving along the **cobbled roads and building camp every day**, were successful and influenced the whole of Europe for ages.

Utilities were perfected, which were a novelty in the transitional, Hellenistic era for cities (otherwise cities would not have existed). This and the **regular transport of grain** (the sea free of pirates and on land roads protected by legions) allowed for population c**oncentrations of up to hundreds of thousands** in the main cities of the empire – Rome, Alexandria, Antioch and others. The whole of western and southern Europe, as well as areas of Mediterranean Asia and Africa, were united in power, trade, and culture. With the legions, there were large movements of gene fund into central Europe (especially of agricultural crops and their weeds).

Decline of ancient civilisation

Causes:

- **The size of the empire,** which was gradually losing its military character through internal social structuring, was becoming a problem for permanent cooperation and management. This led to its voluntary division into two (or even four) parts and to uncertainties in the vital grain trade from Egypt (and elsewhere) – leading to the development of subsistence farming.
- **The population deficit** – the reduction in the birth rate of the Roman population and the reduction in the economically active population (military, authorities, Roman people) led to the search for new human resources – "gastarbaiters" and, as a result, to the *settlement of barbarians in the empire* and the transition to a system of colonies. This led to progressive *autonomisation and cultural changes*. The Germans were thus invited into the empire and settled there.
- **Ecological problems** – the enormous *consumption of wood* for heating and metallurgy, and especially for construction of houses and ships throughout antiquity, led to the gradual clearing of even mountain and foothill forests in southern Europe. The emergence of replacement forest communities was *disrupted by intensive grazing*, especially by goats, degrading the ground cover and selecting tree species – a blocked succession in the scrubby macchia stage became established. This large-scale phenomenon led to a *radical acceleration of water runoff* and an increase in water erosion. In large parts of the Mediterranean, the hills were stripped down to the bedrock substrate, and washed soil accumulated over a relatively small area of floodplain and silted up the estuaries. This has created barren areas of stony fallow land in most of the Mediterranean, now covered with Mediterranean macchia (where the changed conditions no longer allow for reforestation), often even more degraded to rock steppe formations and allowing only extensive grazing. Many *important port towns, on the other hand, are tens of kilometres from the sea and fertile floodplains have been turned into marshes with frequent flooding.*

Fig. 331
Mediterranean macchia and rock steppes

The Mediterranean region with Rome was and is manifested here as a path of innovation – from new types of crops in antiquity, to new technologies in the Middle Ages, to stylistic architectural and sculptural forms in modern times!

From there came the cultural unification of Europe by Christianity (even in Muslim Syria Christians were predominant until the 11th century!). Those who wanted to be cultured had to accept Christianity (from the 3rd to the 10th century).

The Roman Empire was restored by Charlemagne (800) and only ended de jure by Francis II of Lorraine, during the Napoleonic Wars (1806).

9.5.3. The great steppe and the migration of peoples

The steppe biome of the Great Steppe pastoralists is fundamentally dependent on the rainfall regime for its productivity. The already mentioned **cyclical changes in precipitation** (for every 200 years) cause changes in fertility in the northern and southern parts of Eurasia.

In the dry period in the north (in the taiga region), the Great Steppe receives heavy rainfall and its fertility and population density increase.

Fig. 332
Area of the Great Steppe and adjacent deserts

In the rainy period in the north (in the taiga area), on the other hand, there is a moisture deficit in the south, near the pastures of the Great Steppe. Its fertility is radically reduced, and nomadic populations are forced to increase their territories. In the struggle for grazing land, i.e. for life, the stronger tribes displace the weaker ones, and a **billiard effect occurs**, which brings the forest landscape of Europe into contact with the forest landscape at the edge of the steppe (Russia, Ukraine, and the Pannonian Basin). Here it then manifests itself as unexpected, devastating raids on settled populations. The nomads are not fighting to subdue the agricultural population as part of the cultivation of the land (as has been the custom in Europe throughout its history, for land without the farmer is worthless!), but to **exterminate it in order to gain grazing land**.

Nomadic peoples in recurring waves (around 400 – Huns, 600 – Avars, 800 – Hungarians, 1000 – Cumans, 1200 – Mongols (Tartars in Russian), 1400 – Turks, 1600 – Kalmyks, Dzungars, etc.) plundered Europe in a way that was unimaginable and incomprehensible to Europeans. The whole continent was periodically destabilized and was in constant power reconstruction.

Fig. 333
Mongolian nomads today

The incursions of nomads from the Great Steppe were devastating, especially in Moravia, which was not spared by any of the waves, and they are still manifested by increased xenophobia, but also by the genetic roots of part of the population.

9.6 Prehistory and antiquity in Central Europe

9.6.1. Neolithic

(5300 to 4300 BC)

The atlantic 1 and 2 period (5800–3100 BC) was the ecological optimum for forests in our country – the forestation was probably quite massive, only small enclaves of extreme (and therefore mostly agriculturally unsuitable) habitats were forestless. The first farmers came to a completely forested landscape. Among the important tree species of the time, beech and yew are particularly noteworthy.

The first agricultural system in our country was the **heat system**:

- **The size of the cultivated area** was a slight problem, since the soil was basically not cultivated – it was only (and only in the first, virgin cycle) the removal of forest, and later even only shrubs. The stumps did not matter, as no ploughing was done and pits with wooden sticks or hoes could be made everywhere.
- **Nutrients were not a problem neither.** For other reasons (see below) the area was used for a maximum of 3–4 years and then left fallow for a minimum of 5–7 years (there was no shortage of soil).
- **Timely harvesting at the agronomic deadline was a problem** – primitive stone sickles were not enough to harvest a larger area at the agronomic deadline (when the grain is already ripe but not yet falling off the ears).
- **The main problem, however, was the elimination of food competitors, especially weeds.** This is where the main motive for the heat system must be sought. Ecologically, a **strategy of environmental change** was used against them. Pioneer herbs – annual weeds – entered the acidified and sun-opened area with a short delay after the sowing of the crop. For about **3–4 years,** the then **primitive technique could be used to maintain an economically significant predominance of cereals,** after which further sowing was not worthwhile due to weed infestation, the area was left for **5–7 years for succession as an "appendix"**. Through successional development, the annual pioneer weeds were displaced by a replacement grass-herb community, which subsequently reduced the incidence of grain disease causes (especially fungal) and allowed a return to a nutrient-balanced soil environment. The grassland "appendix" community was again abolished by tillage, and it took another 3–4 years for the pioneer weeds and fungal diseases to return – the soil became tired. After this time, however, simply converting over the appendix was no longer enough, as weedy plants were ubiquitous in the surrounding fields. It was therefore necessary to convert the whole area and its surroundings to a higher – forest successional stage, where the long-term shading of the habitat reduced or eliminated all light-loving plants. This was not a mature forest, but an involved stand of shrubs and rod trees. **A period of approximately 10–12 years is required to reach this stage, including the survival time of light-loving species.** After that, the cycle could be repeated.
- The struggle with foraging competitors was radically escalating the problem of the usability of settlement areas within walking distance of settlements. Indeed, the areas that were effectively weed-free by alternating successional stages were small, and their surroundings, continuously illuminated by grazing, created refugia for light-loving weeds even when the land itself was fully shaded. If we add in the action radius of the settlement all the areas sown and the areas necessarily fallow, we find that **within 40 years at the latest the entire reachable area was exhausted and the whole village had to move elsewhere!** Thus, the Neolithic heat economy still did not create the conditions for a stable, permanent settlement. A common urban feature of the temporary settlements was in many cases their concentric arrangement, which appeared in the Trypillian settlements in Ukraine in the 3rd and 2nd millennia BC [Voženílek, 1979]. At first open settlements of wooden huts later became enclosed settlements. A typical example outside the Czech territory is the Neolithic village in Lidenthal, Germany, or the so-called Biskupin near Poznan, Poland.

This farming system was **relatively very profitable** – yields of *10–12 q of grain*[27] per ha were achieved (which is not much less than on today‘s American prairies), and in Belarus the heat system was used in places until recently.

In our country, the landscape matrix of the settlement areas at that time was deciduous forest with a mosaic of areas in different age stages, with irregular areas of fields and fields of organic shapes. However, the settlement areas **did not exceed vegetation stages 1 and 2, i.e. an altitude of 350 m above sea level.**

The Neolithic marks the beginning of a "two-track" development of our Central European landscape – in the uninhabited areas it is still determined only by natural forces (primeval forest, natural forests, and their communities), in the inhabited areas nature is strongly directed by deforestation (secondary forests and cultural steppe) with settlements. This duality is still valid in principle today.

Fig. 334
Creating a forest field

9.6.2. Eneolithic – Late Stone Age

(in the Czech territory about 4300–2200 BC)

Around 3100 BC, the atlantic ended and the sub-boreal began (the sea dropped 4 m and the Little Ice Age began). With it comes the spread of the white fir tree.

The Neolithic way of life continued, but the first drawn plough (the first pointed stick tied to a rope at the bottom, which was pulled) appeared, and with it came the **straight line** (the drawn plough could not be zigzagged) and the **right angle** (ploughing was not very efficient, it had to be ploughed twice – crosswise). The first metal (copper) tools appear, but only of a fancy nature (moreover, copper is soft).

9.6.3. Bronze Age

(in the Czech territory about 2200–750 BC)

From about 1650 BC, sub-boreal 2 came into being, in its milder and warmer form, favouring deforestation and the development of agriculture. This is the period of the mound cultures (1600–1250 BC) and urn fields (1250–750 BC).

Heat farming continues but supplemented by bronze tools. The bronze sickle abolished the harvest

27 q = metric cent = 100 kg

time limit. Towards the end of the period, draft animals (with which roots and stones could no longer be avoided) were harnessed to the plough (wooden hook) and the land had to be permanently deforested. Once deforested and cleared, the land gained in value, marking the end of nomadic heat farming.

Fig. 335
The plough beam must be straight

A small but essential amount of tin is needed to produce bronze, and this is rare in Europe (in our country around Cínovec), otherwise only in Spain, Cornwall, and adjacent islands (hence the Phoenician Sea routes around the Atlantic coast!).

Prehistoric colonisation peaked – still in the 1st and 2nd vegetation stages, but due to local conditions it extended higher up (southern Bohemia, Pilsen). This created a homogeneous agricultural **old settlement area**, in many ways exceeding later limits, and divided by the Highlands into two separate ecumens – the Polabská between the border mountains and the Pomoravská with the Moravian Gate.

Settlement in lowland agricultural villages with a massed layout became established, and new villages were also built on terrain elevations characterised by fortification with wooden palisades or stone walls. The first refuge hillforts served to protect peasants from raiding predators and evolved into permanent settlements. The fortified settlements also had a cult and market function.

A new significant wave of settlement (from about 1000 BC) was associated with the so-called *Lusatian culture*. The period already belongs to the earlier Iron Age. Agricultural settlement from the Neolithic onwards significantly affected the primary landscape system and formed the basis of the secondary system.

9.6.4. Iron Age

(in the Czech territory from about 750 BC to the beginning of the first millennium)

The sub-boreal 2 and the Celtic period in our country lasted until about 250 BC (the Latin and Hallstatt culture from 750–200 BC, the Boii).

From 200 B.C. to about A.D. 600, the sub-Atlantic 1 and Germanic period (Roman period, Marcomanni, Langobards and Quadi) lasts.

The arrival of the Celts in the 5th and 4th centuries BC, whose relatively large oppida were located mainly in Central Bohemia, the Polabí region and Moravia, marked a significant intervention in the emerging settlement structure in our territory.

Due to its relative availability, iron multiplied the possibilities of using it for everyday tools, while its hardness also reduced their devastation. The first plough hardware, which had been made of wood only, increased the efficiency of ploughing and made possible a completely new economic system. However, tree stumps were already a major nuisance during cultivation and the **transfer of land through the temporary forest was no longer possible**. Therefore, only the field and fallow stages were alternated – the attachment system.

The attachment system

Field-attachment stage rotation essentially uses a **strategy of alternating grassy-herbal successional stages**. This creates a fundamental distinction between agricultural land – field and the rest of the landscape. It meant alternating cycles of **ploughing after 3–4 years** and an **attachment after 5–7 years** (the ratio of areas in ploughing and fallow in the ploughland was about 1 : 2 to 1 : 3).

The weed control system narrowed from using a strategy of alternating light and shade to one of alternating successional stages of grassland communities. **The pioneer weeds** that first flew into the ploughed field and multiplied (as did the crop pathogens) were **gradually displaced by higher diversity communities** in the fallow field When the diversity reached dominance in the attachment, it was **eliminated** by an abrupt change in habitat conditions **by ploughing**.

- The replacement of stone and bronze tools with iron led to the permanent abolition of several limits, in particular the size of the deforested area and the duration of the harvest.
- The use of the iron plough with deep ploughing encountered the **skeletonisation of arable soils**. The ploughed boulders had to be removed to the edge of the fields, creating stone walls and stone cairns. At the same time, **this fixed the shape and extent of the land in the landscape**, or even blocks of land (including their boundaries as erosion barriers) = **sections** (the very foundation of the section ploughland).
- The regeneration of nutrients in the field was still not a major problem due to the extended period of fallowing.
- So, as human population increased and the old settlement area became increasingly populated, the **problem of how far from home we are able to cultivate the land** in such a way that it is still worthwhile to walk on it every day gradually came to the fore. The attachment system definitely made permanent settlement of farmers possible and directly required it. This led to the creation of **fixed agricultural districts of arable** land – the ploughlands. Their size was always governed by the **walking distance from the settlement to the field**, i.e. the amount of time a peasant could spare from the working day to travel (even with beasts of burden). This distance was fixed at about 1.2 km. If the carrying capacity of the ploughland was filled with a certain number of inhabitants, it was necessary to react to further increases by **moving the surplus population elsewhere**. This laid the foundation for the resources to colonise new places.
- The fight against food competitors was fundamentally improved by **more efficient ploughing**.

Yields of the appendix system fell below 100 kg per hectare. The advantage of the system, however, was the increase in the area currently involved in production (the forest stage was dropped), so that the total yield of the ploughland increased by 50 to 70% compared to the heat farming!

The appendix farming system formed the basis of the structure of our old-fashioned agricultural landscape. The fixed location of the fields and their fixed boundaries led both to a fixed road network (access roads from the village to the fields) and to the permanent location of the settlements.

The principle of refuge hillforts was developed technically and functionally, and large hillforts (Lat. oppida) served not only as refuge but also as protection for mining and metallurgical activities of settled artisans near ore deposits. Crafts, trade, and government were gradually concentrated here too. However, all of these have disappeared over the ages, leaving only artificial landforms.

Fig. 336
Celtic oppida in today's landscape resemble ramparts that encircle hills (even several times)

The Germanic period (in our case 800 years! from 200 BC to 600 AD), associated with the sub-atlantic, meant a wetter but milder climate and with it the further emergence of forests. It brought to us a relatively **advanced cattle farming**, but at the same time the semi-nomadic **heat agriculture**, already obsolete at that time. This did not return to the attachment farming until about 100 years later. Contact with the advanced Roman Empire brought some new plant species (e.g. vines in southern Moravia), inventions, organisational forms of society and, again, the aforementioned iron plough into Germanic society and our landscape.

It is also the time of the first known migration of peoples – the **Huns** ("Scourge of God" Atilla) from the Great Steppe – invaded the Germans and moved Europe.

9.7 The Middle Ages in Central Europe

9.7.1 The fortified settlement period – early Middle Ages

(approximately 600–1000 AD)

The sub-atlantic period 2 meant a wetter and warmer climate, a reduction in the settlement area and a new emergence of oak forests. Around 850, a warm period – stable and slightly humid – begins.
- Around 600 another cycle of drought in the Great Steppe – expansion – occurs – the **Avars** conquered the Slavs along the way and together with them occupied central Europe with the Hungarian lowlands (Avar kaganate).
- Around 800, the second breathing out of the Great Steppe brought the **Hungarians**, who terrorized all of Central Europe, including our Great Moravia, and only after their defeat on the Lech River did they settle in Hungary.

This is the period of the massive spread of Christianity across Europe and later the conquest of the southern Mediterranean by the Muslims. However, Christians continued to prevail in numbers under their rule for several centuries.

This is the time of the probable arrival of the first Gypsies fleeing to the Balkans from the Islamic conquerors.

It was only **around 600 that Slavic tribes finally settled in our territory**, probably as a result of the transition to an annex economy. The central settlement areas of the fertile lowlands become the basis for the process of the formation of the first "supertribal" state formations of Great Moravia. Here, too, f**ortified settlements** were established, not on the hills, but in a **non-flooded part of the floodplain**. This was made possible by the balanced drainage conditions from the still completely forested upper parts of the large river basins. Well-tilled soils and, compared to other locations, the **abundance of nutrients in these floodplains** allowed the first large-scale settlements to emerge, which also showed signs of a spatial division of labour.

Fig. 337
Area of the former Great Moravian fortified settlement on the aerial photograph

The forest landscape was sparsely but firmly interconnected with long-distance trade routes, on which the first marketplaces were established, especially at fords requiring the transhipment of cargo. Traders penetrated the landscape essentially as caravans with well-armed protective troops (which is why the Frankish merchant Sámo became an important war partner of the Slavic tribes).

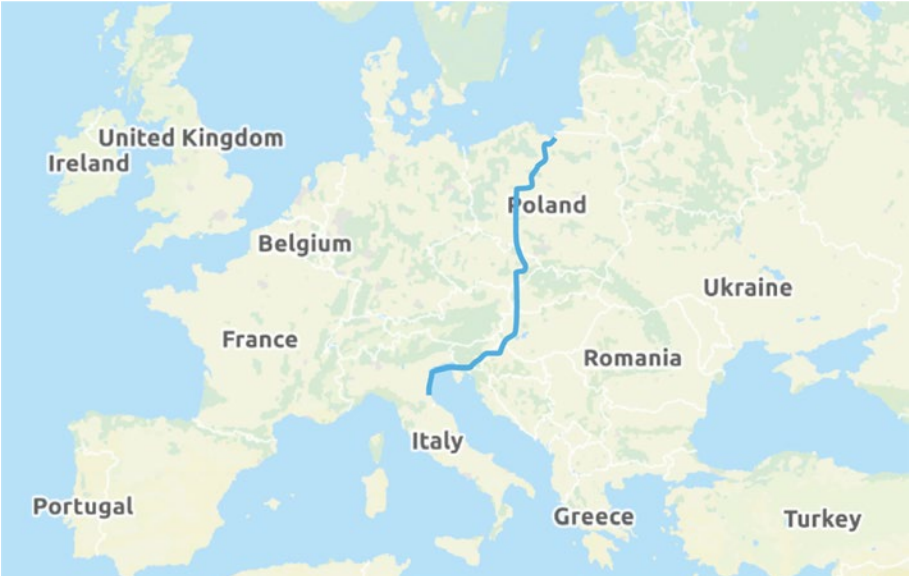


Fig. 338
The most important long-distance route in our country was the Amber Trail

The development of Great Moravia was halted by the invasion of the Hungarians (the aforementioned breathing out of the Great Steppe) and the centre of power moved to the more protected Bohemian basin. After the end of the invasions there was a partial restoration of settlements, not in the river floodplains, but on their outskirts – on the edges of the sub-recreational terraces. This signals a worsening of the flood situation in the floodplain itself. The end of Great Moravia, however, like the interregnum before the reign of the first Premyslids, is shrouded in the unknown.

9.7.2. Romanesque Middle Ages

(approximately 1000–1200)

It is still the sub-atlantic period 2. Around 1200 another cycle of expansion from the steppe takes place – first the Turkic Kumans around 1000 fleeing from the Mongols to southeastern Europe and in the 13th century to us (Uherský Brod region – Lucké Pole) who were eventually settled in Hungary (Kunszág). After them came (after 1200) the invasion of the Mongols (then commonly called Tatars), who destroyed the Eastern Slavic states (Kievan Rus) and plundered Central Europe. By the end of the period, wild horses were eliminated in our country (today's tale on their wildness is an advertising lie).

The supporting ideology of Europe became Christianity and feudal organization. Throughout the 11th, 12th, and much of the 13th centuries, Christianity was embraced with varying degrees of intensity in various parts of Europe (in the south, of course, in the 3rd century and earlier) as a revolutionary ideological foundation for further civilization.

The basis of the organization of the population was a community headed by a chieftain – a militarily trained feudal lord; the others were "his people" and their duty was to feed him. His duty in return is to care for and protect them.

In addition, the Church took care of the spiritual life. However, the majority of the population of all classes still lived in the worldview of natural paganism, with its fear of natural forces, the need for unconditional cooperation of the community, the suppression of individual life and the consequent reduction of its value (collective guilt, sale into slavery, etc.). In contrast, the ideal of Christianity stressed the importance of individual human destiny for salvation (acceptance into the kingdom of God) and the responsibility of the individual for his or her life. In the Middle Ages, the **pre-Christian norm** of common behaviour, so long in effect, **did not ensure salvation**. It was necessary to do much more for salvation – it was necessary to be "abnormal". This found its expression especially in the ideal of **monasticism** on the one hand and **penitence** on the other.

The emergence of contemplative monastic orders living in seclusion (Benedictines, Cistercians, Carthusians, Premonstratensians, etc.) founded the whole early medieval culture. Penitence (repentance for one's sins) led primarily to pledges and offerings (the classic pre-Christian atonement), so that the Church paradoxically grew rich from the sins of its members. More extreme penance was pilgrimage (including flagellants) to the Holy Land. However, this was made difficult to impossible by the Turkish seizure of the pilgrimage routes. The response to Turkish attacks and conquest of Byzantine Asia Minor was the Crusades (the first ca. 1097) and the military protection of Christians by chivalric orders (Knights Templar, Johannists, Teutonic Knights, and others).

Agricultural landscapes were further shaped by new inventions. Key to the development of agriculture was the **invention of the improved heavy plough**, suitable for deep ploughing of heavy soils (instead of the earlier wooden hook or ploughshare). However, the long plough is difficult to turn, so the field is made up of as long, albeit narrow, strips as possible, with gradually ploughed interstices along the slope. The plough was known earlier, but its general spread, linked to the use of the horse's pulling power (the discovery of the horse collar allowing the horse to pull up to 15 times more), lasted for the next three centuries until around 1250, when it was supplemented by the three-field farming system.

Fig. 339
Belt fields

Villages standing in isolation, far from cultural centres, were in many ways dependent on mutual aid. Each village was an **energy and material closed unit**. The basic type of settlements were **mass villages with a stretch ploughland**.

With the development of local barter trade, a new **network of exchange points** gradually developed in our countryside, in addition to the old marketplaces at fords on long-distance routes, which logically became centres of more demanding crafts. This natural process led to the creation of a hierarchy of marketplaces with their associated permanent settlements, as settlements in the future endowed with urban rights (growing towns).

To the west and south of us, urban communities – the **model of medieval cities** – developed **in the 10th and 11th centuries** on ancient Greek principles (trading colonies – factories) as **commercial and artisanal self-governing entities** with personally free burghers. It should be stressed that the medieval city is thus not to be regarded primarily as a special type of settlement, but as a **settlement endowed with special privileges**. As privileged communities (especially the merchant – patriciate) were settled in the settlements of Western and Central Europe during the 10th to 12th centuries, they enforced the granting of privileges similar to those enjoyed in their home communities. This is the basis of our future founded cities.

The old market settlements, mostly on the frontier fords, were replaced by growing towns and country castles.

This whole period is characterised in our art by the stone **Romanesque style**. The **construction technique of worked stone** itself **was new** and specialised in our country, so that a new craft was created – **stonemasonry**, which in the following centuries led to the creation of specialised building works. This marks the first time a fundamental **break between the "big", official architecture** requiring specialists, and **the "small", rural,** relying on self-help, non-professional technologies for many centuries to come.

The primary differentiation of this self-help, vernacular construction was determined by the **building materials available locally**, and in the long early periods of cultural production was not related to any racial, much less ethnic, boundary. In the Hercynian, Western Carpathian and Polonian biogeographical sub-provinces, where **long and straight timber** from "black" forests with a proportion of fir and pine (and later, during colonisation, spruce) was the regionally available and predominant **building material, log houses dominated**. In the North Pannonian biogeographical sub-province with exclusively deciduous forests, which provide mainly **short and crooked logs**, the leading building material was clay, and the dominant **house** was **made of adobe bricks**, with a thatched roof. The stone parts of the buildings were only made of collected stone [Löw a Míchal, 2003][28].

The disadvantage of buildings made of clay and wood is the low stability in pressure (the buildings collapse) and therefore the houses are usually ground floor only. For taller buildings (especially in cities), the technique of half-timbered masonry is used, mainly in western Bohemia.

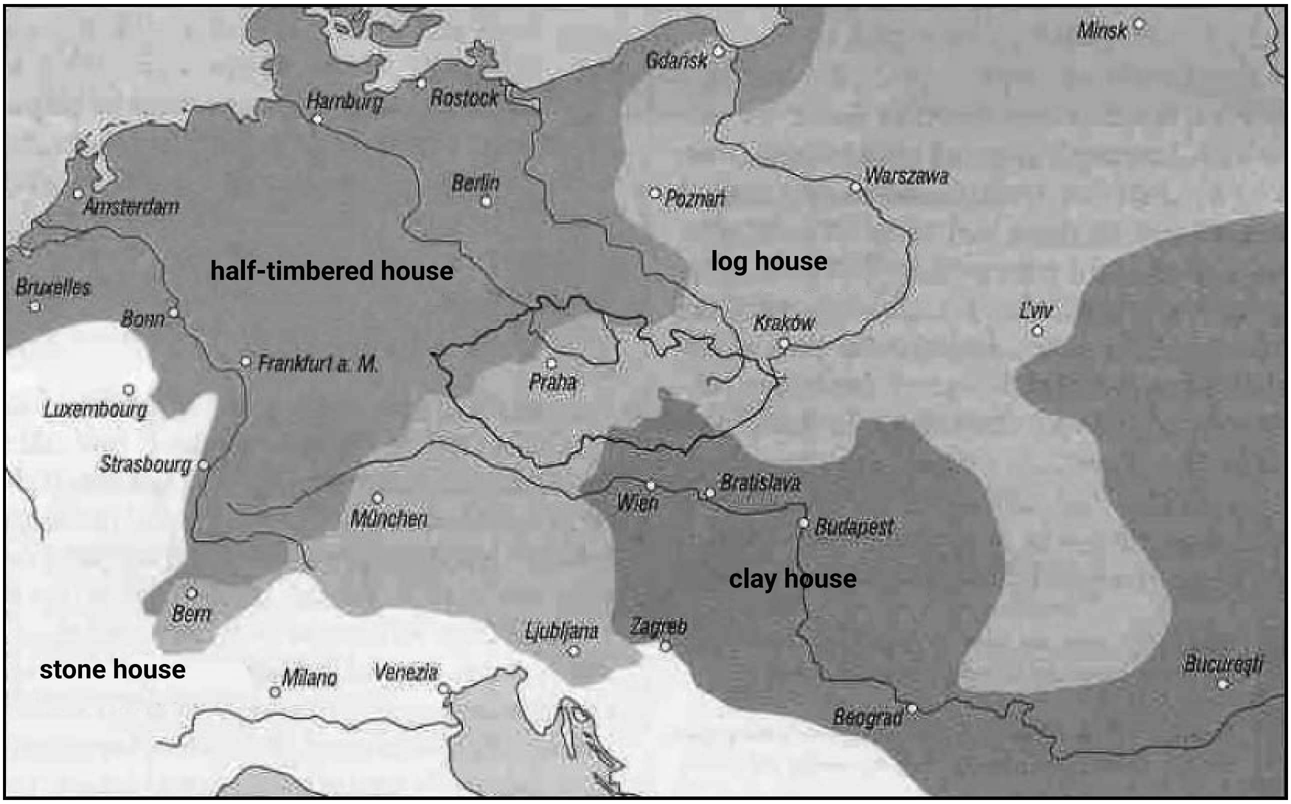


Fig. 340 Map showing the approximate distribution of basic house types within Evropy [Mencl, 1980], English translation

However, all this was developed only in the course of the following centuries, and at that time they were mainly half-dugout houses with above-ground walls made of **wicker covered with clay**. Fences were also woven (other joining techniques were difficult without tools). Only prominent buildings were log.

The cultural (settled) landscape still occupied only the landscapes of the 1st and 2nd and, marginally, the 3rd vegetation level of the Hercynian (13 % of the territory of the Czech Republic) and Pannonian (9 % of the territory of the Czech Republic) provinces. These **old-settled areas** (22 % of the territory in total) **are practically completely settled**, albeit in a chaotic manner (by the accretion and replenishment of the first enclaves of the ploughlands). The remnants of forest cover between the enclaves have been **destroyed by grazing and firewood extraction**. The forests thus became **stump areas** (young trees felled for fuel were driven out of the stumps by groups of offshoots). The development of hornbeams and lime trees, which are well rejuvenated, took place.

28 The publication *Krajinný ráz (Landscape Character)* was prepared for publication within the project *VaV 640/1/99: Péče o krajinu II*

Fig. 341
Stump area

Relatively more natural in character were the river floodplains, which were still part of the ploughland, although we observe a **shift of the actual settlements** to more sheltered margins.

However, **natural landscapes** were still overwhelmingly predominant over cultural landscapes (78 % of the area) and occupied vegetation levels 3 and above. Natural forests with a predominance of oak, beech and fir were still the basis here.

Gradually, however, the forest landscape is being reclaimed by deforested enclaves. These were settlements on the long-distance trade routes through the forests, servicing trading caravans, and defensive castles. Both had at least a minimum of ploughland.

Most significant, however, was the establishment of the first monasteries of contemplative orders, fundamentally detached from settlement. The monks' way of monastic life (*ora et labora* = pray and work) in seclusion, combined with the inflow of the latest knowledge from southern and western Europe through the annual congresses of the order, was crucial for the establishment of the first enclaves. Monasteries were also founded in the old settlement landscape, but always in isolation (in floodplains or hidden valleys). Their education (they could read and write) and technological innovations made them first-rate cultural centres. New varieties of vegetables, fruits, and spice herbs (paradise yards) substantially supplemented domestic agriculture. But the importance of these **enclaves lay mainly in** demonstrating the possibility of livelihoods even in extremely infertile areas. This set the stage for the great medieval colonisation.

Fig. 342
Monastery hidden in the valley

9.7.3. The great medieval colonisation

(in Czech lands about 13th and 14th century)

The period of the ongoing sub-atlantic 2, when the greatest warming (hot period) occurs between about 1050 and 1400 but is followed by a rapid cooling – the Little Ice Age.

As early as the end of the 12th century, the aurochs (wild bovine), a documented extinct animal species (what is now romantically called aurochs is an imitation artificially selected from modern farm cattle), disappears in our country.

At the end of the 14th century, Romanies also appear in our country, welcomed and protected by the rulers' gilds as supposed Christians from Syria fleeing Islam. This attitude gradually changed, however, and in the 15th century a sustained and cruel persecution of them began.

Ideas and politics

The Church is all-powerful. Every successful organization attracts opportunists for whom the idea is only a means – a profitable enterprise. Therefore, reform movements (Jerome, Augustine, Thomas, Abellard, etc.) have arisen in the Church from time immemorial to combat these evils. New – begging (better humanitarian) – religious orders (Franciscans, Dominicans, etc.) are also a reaction. These no longer defend society, but on the contrary have as their main goal to help their fellowmen. That is why **monasteries are built in towns** where the fellowmen live.

Fig. 343
Town monastery

Fig. 344
Town monastery

Ordinary life is already becoming Christian. The supranational world of Europe, fragmented but with a unifying idea (the Roman Empire and the universal Church), is maintained until the modern age.

A relatively peaceful and prosperous period led to rapid population growth. However, the ploughland could not increase in size and could only support a certain number of inhabitants. This was addressed:

- thanks to the openness of Europe, through its constant **colonisation**,
- technological progress through the **three-field system**.

The whole of Europe was set in motion, and the population surpluses from the fertile areas massively colonised the previously uninhabited, less fertile areas.

In our country, **internal colonisation** had already begun in the previous period, by the beginning of the 13th century, when the **old settlement area was settled**, where the density of settlements soon approached the present distance of 2.5 km. This reorganisation of the old settlement area partly exhausted the domestic population surplus, and the colonisation of the new areas therefore took place only with the arrival of the foreign population

The colonization of new, uninhabited areas was prepared in a power fashion by the ruler, who gave them as fiefs to large noble families. This created vast, uninhabited forest domains. In the second phase of colonisation, these "useless" domains were involved in the settlement of settlers (new subjects) from the overpopulated areas, together with the domains of the rulers.

In this second phase, the massive, **large-scale medieval colonisation permanently changed our landscape and life in it.** Settlement even in our country finally exceeded 3rd vegetation stage and filled our entire territory outside the highlands (up to the 6th vegetation stage – from about 600 m above sea level), thus adding a decisive 46 % of the territory to the settled landscapes. In contrast to the property fragmented estates in the old settlement area, the estates here were relatively property fragmented into larger domains.

The colonization in the 13th century was mainly carried out by colonists from German (but also Flemish or Polish) backgrounds, but most of them were later Czechized.

With the great external colonisation came the new **three-field agricultural economic system.** The three-field system is a **modified attachment** system, consisting in the division of the ploughland into three approximately equal parts, on which the cycle *"spring crop – winter crop – fallow"* alternates, with cattle from the whole village grazing together on the fallow. The motive was again to involve the larger part of the ploughland in the actual cultivation. While in the attachment system 1/3 to 1/4 of the ploughland is in actual cultivation, **in the three-field it is 2/3**. However, nutrient recovery in the field becomes a significant problem in the three-field – first fertilization (gardens at the estate) and fallow with grazing. Yields have dropped significantly *below 9 q/ha,* but this decline has been amply compensated by the increase in area currently involved in production.

In total, 68 % of our country was already settled at the beginning of the 14th century.

With the last, third phase of settlement – the **late medieval colonisation** – new legal relations (emphyteutic law – land belonged permanently to one family) came to us. The peaks of the highlands and the foothills of the border mountains were also settled (in the second half of the 14th and 15th centuries), and the more favourable enclaves of otherwise unfavourable forest areas were also settled. The Bohemian and Moravian ecumene, until then separated by the forest, were connected. Typologically quite different villages with **longitudinal or croft ploughland** were created there, signalling the impossibility of deforestation of the entire area within the usual 1.2 km radius of attendance.

Thus, another 20% of the territory was added to the settled landscapes, leaving only 12 % of the state's area for natural areas!

Landscape

The three-field agricultural system has changed the basis of the structure of our landscape to this day.

- The need for a common approach to classifying land into one stage of the system with its neighbours (it was necessary to exclude as many weed refugia as possible) led to the division of the ploughland into three equally sized land blocks – **tracks**. The result was a **track ploughland**.
- However, as the three-field system was secondarily displacing the older annex system with a section ploughland in the old settlement landscape, the desire to merge the stabilised sections into tracks was also evident here. Thus, a **pseudo-track ploughland** was created.
- During the late medieval colonisation, the three-field was also applied to strips of land behind farmsteads, in the **craft ploughland**, where the three-field was applied in the agreement of neighbours in adjacent sections of crafts.

The **fixed location of the field blocks** (sections, tracks, and crafts) and their fixed boundaries, as well as the definitive location of the settlements, led to the emergence of a fixed road network and a network of spontaneous relief edges – erosion barriers (ploughed and sedimented baulks reducing the slope of the land, gullies, and ditches). Erosion processes have significantly altered the **meso and micro-relief of our rugged landscape**. Furthermore, the belt-like internal structure of the field blocks was typical of heavy ploughs.

Four **regionally differentiated types of villages** emerged during the medieval colonization: the **village square/street type** of the large medieval colonization, the **street (road) type** of the old settlement Pannonia, the **village square/street type** and the f**orest/vast field villages** (row or circular villages) from the late Middle Ages. Today we have to look for them in the historic cores of the villages, made up of a single front of farmhouses with gardens and a croft wall (similar to towns).

The **feudal residences** were located in accordance with the organization of society within the domains which the feudal lord was obliged to protect and which paid him a rent in return. The form of his fortified residence depended on his income – the lower (and poorer) nobility (yeomans, squires, knights) resided **in villages, in fortresses**, which also served as manorial land = dominical estates. The higher and incomparably richer nobility (lords), with sufficient rents from their subjects, built isolated **castles**, with a preference for defensive functions. Especially after the Mongol invasion in the 13th century, construction accelerated and castles on deforested (for defence) hills became dominant features of our landscape. The actual dominical villages were then cultivated in the form of manor-houses, so called "poplužní dvory" (Meierhofs)[29].

The towns represented communities of merchants and special craftsmen (miners), mostly from abroad (Germans), endowed with special privileges. They were originally founded with sufficient spatial comfort (each house had a garden behind the courtyard). The development of whole plots and the emergence of typical medieval dark, cramped quarters with narrow streets is only a consequence of the subsequent population growth in the area bounded by the walls. The ruderalised environment of the city, accompanied by the emergence of **synanthropic communities**, changed the ecological conditions for biota and humans. As the sanitary situation of towns deteriorated, epidemiologically important species became more common.

29 "Poplužší" was an area field measure (20–60 ha) derived from the area that one plough with one harness was able to cultivate.

Settlement landscapes

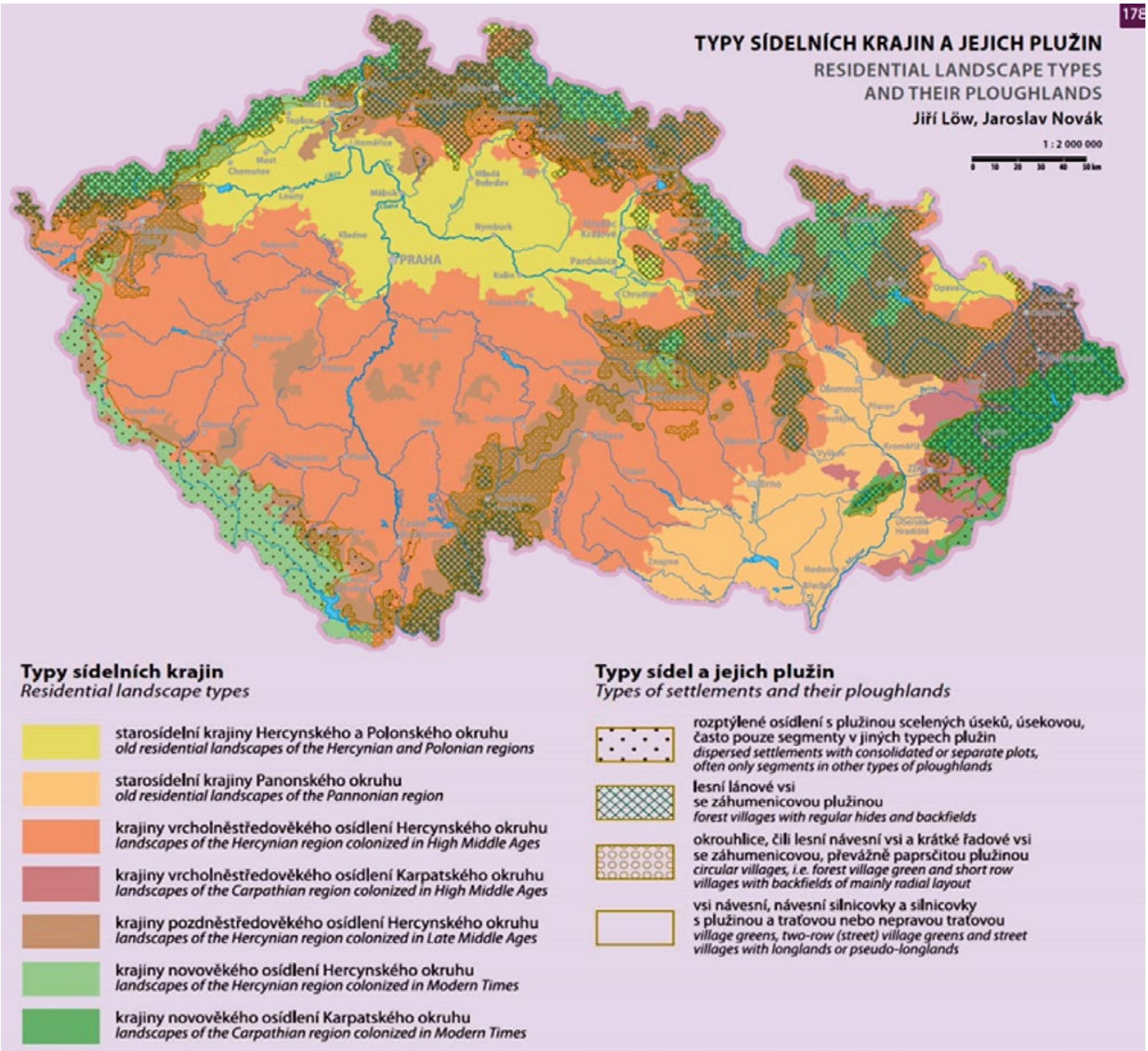


Fig. 345
The old settlement area of yellow and orange expanded during the centuries of medieval colonisation to include red and purple and towards the end also brown (the mountain areas remained uninhabited after the modern period – green), the types of settlements and ploughlands clearly show the connection with the period of settlement [Löw and Novák in Atlas krajiny ČR, 2009]

In the **old settlement landscape** (22 % of the state) = chernozem = consisting mainly of lowlands with the floodplains of large rivers, the **ancient settlement was reorganised** into the commuting pattern of the ploughlands. Already at the beginning of external colonisation, however, the **active parts of the floodplains** of the large rivers were abandoned. Due to deforestation of their basins, the rivers changed their hydrological regime (from forest to steppe type) and frequent floods and inundations, with unnaturally fluctuating runoff, displaced the settlements. The floodplains were then used (depending on the moisture conditions) either as **high-yield meadows or as waterlogged pastures and forest hunting grounds.**

Fig. 346
Close to nature (historical) river floodplain

The typical sequence of land-use structures of the old settlement area then became established, so that the active floodplains were a mosaic of floodplain forests, meadows, and pastures, while the plateaus (old river terraces) around, often supplemented by wind-blown loess, were the most fertile arable land, with only sporadic woods and meadows, signalling local waterlogging.

The relatively steeper slopes, especially the edges of the floodplains and dry hills, were used for orchards and vineyards. Settlements formed an almost continuous band of villages on the floodplain edge (signalling both their secondary creation as replacements for abandoned floodplain settlements and the economic importance of the floodplains for foraging and cattle grazing). Development has scrupulously avoided the floodplains. During the Moravian floods of 1997, with few exceptions, no historic core settlements were flooded!

Further away from the floodplain edges, settlements were again classically located along smaller side tributaries and in shallow depressions. This type of landscape was, of course, the most deforested and the flora and fauna here were also steppe-like.

Fig. 347
Typical old settlement landscape

Fig. 348
Old vineyard tracks

The Hercynian area of high medieval colonisation (from the 13th century onwards) occupied the largest part of the country (42 %), with extensive unforested plains of ancient mountains cut by sunken river valleys.

Here, a typical land-use pattern was established, with the narrow river valley being meadow and the slopes of the incised valley being wooded, with occasional pasture. The plateaus themselves were arable land, with pastures and bosks on the rocky outcrops.

The settlements, as centres of the ploughlands, were often located in shallow side valleys without a developed floodplain. The incised valleys were often too narrow for the existence of a ploughland, and settlements were therefore absent.

The peak of medieval colonisation is the period of greatest deforestation in the Hercynian landscapes and forests were soon converted to stump areas (fuel) and further degraded by grazing.

Fig. 349
Field unforested plains of Hercynian

Fig. 350
Cut valley with defensive use of spurs and mills at the bottom

In the eastern, **Carpathian areas of the great medieval colonisation** (4 % of the territory) with orogenetically young mountain ranges eroded into a rugged form, a typical reverse sequence has become established.

The narrow floodplain was again grassland, but with a greater proportion of wild sections and riparian vegetation. The mostly flat, long foothill slopes were used for arable land (also orchards and meadows at the upper slopes), while the hillsides and summits were wooded. Abundant hillside areas interfere significantly with their structure, allowing grazing but limiting arable land.

Fig. 351
Carpathian Valley

Fig. 352
Field landscape of the Carpathians

Fig. 353
Field landscape of the Carpathians

In the landscape of the late medieval colonisation of the cold and rugged foothills and peaks of the Highlands (20% of the area), with a higher proportion of forest, there are forested gaps between the neighbouring ploughlands.

The individual large fields of the croft ploughland are cut into the woodland at different distances. Fields, gardens, and later orchards are arranged in a large field according to the slope and are interspersed. There are no croft tracks and the ploughland is directly connected to the farmhouse behind the croft.

Fig. 354
Forest-field village with a croft ploughland

Settlements occupied landscapes where it was still possible to make a full livelihood from agriculture. Settlements were founded by trial and error, in addition to the practice of location, in an attempt to exploit each area, and many of them disappeared forever during the first difficult period.

They are mostly forest-fields or chain-ordered, along the valley axis. In the south of the Highlands and Bohemia in general, where there are no distinct longitudinal valley axes but frequent basins, the ploughland is organised in a rayed plan with a circular village in the middle.

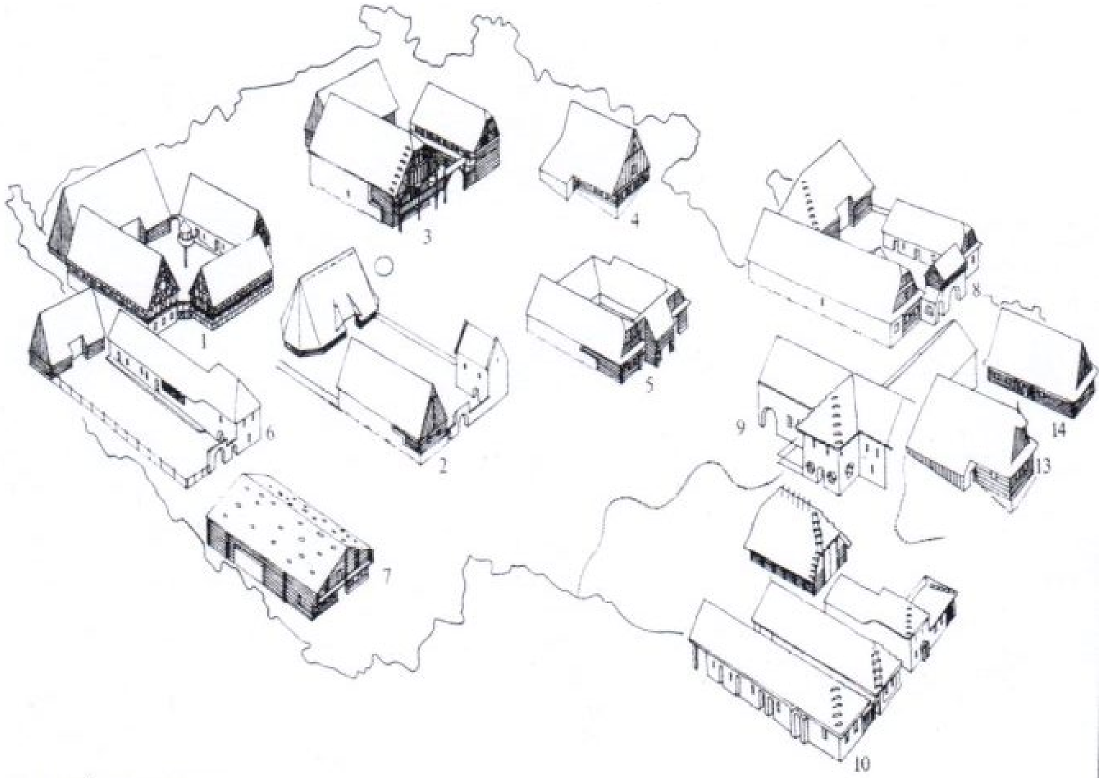
Fig. 355
Circular village with a typical ray-shaped ploughland

The initiation of this settlement was often mining, which brought mining professionals from the west, settled in mining settlements with subsistence ploughlands (thus the German language islands that existed until recently).

An important fact must be pointed out here, which explains the remarkable success of colonisation even in the now unfavourable and desolate locations and the massive emergence of the three-field system. In the first half of the 12th century, one of the **most important warming period**s in Central Europe occurred (documented, for example, by the vineyards in Žďár nad Sázavou). This climatic optimum lasted until the end of the 14th century and seems to have ended before the Hussite Wars. In general, our landscape was the most deforested during this period and the number of settlements was also the highest.

In the high Middle Ages, a further and predominant zone of **deforested, agricultural landscape** emerges. However, while the soils in the ancient settlement landscape have been continuously cultivated for 7,000 years (**chernozem and brown earth**), the soils in the medieval colonisation area have been cultivated for only 7 hundred years and are brown forest soils, which are incomparably less fertile. This is why the soils below 350 m above sea level still need to be protected today.

Because the common building types in the village have always been self-sufficient, their typology was and is conservative [Mencl, 1980, Láznička, 1956, Škabrada, 1999]. The difference between the area of the clay house with soft and organic shapes and the area of the timbered house with straight and sharp shapes is still noticeable today.



Walled house of German provenance:
1. Timbered “Frankish” courtyard in Cheb with a two-storey house

A log house of distinctly Slavic provenance:
2. “Frankish” courtyard in Rakovnik region with a timbered ground-floor house, a granary, and a polygonal barn
3. “Frankish” manor in northern Bohemia with a two-storey log house
4. One-storey free-standing house in the Silesian border region
5. Enclosed “Frankish” courtyard in the Bohemian-Moravian Highlands with a log house with both ground floor and first floor (sometimes with a granary above the exit)
6. Brick granary house in the Chodsko and Pošumaví region
8. Log house in the Silesian borderlands of the Jeseníky Mountains with a „Frankish“ courtyard

Log house of southern provenance:
7. Alpine log house in Šumava with a “lying” roof of Italian origin

Clay house of Danubian provenance:
9. Clay house with a granary in the Haná region, longitudinally oriented to the street
10. Danubian clay house, oriented to the street on the narrower side

Carpathian log house:
13. Walachia house in Moravia
14. Flat-faced log house of Silesian Těšín region

Fig. 356
Schematic overview of basic types of folk houses in the Czech Republic [Mencl, 1980], English translation

The development of our landscape in the Middle Ages is a crucial and, in many ways, defining stage of its further development to this day. Not only the structure of our settlements was established, but also the division of landscapes into forest and field, including their internal structures.

10. LANDSCAPE DEVELOPMENT FROM THE RENAISSANCE TO THE 19TH CENTURY

10.1 Transition to the Modern Age

(cca 1400–1500)

The Little Climate Optimum is coming to a close, and the Little Ice Age (with fluctuations from roughly the 14th to the 18th century) is slowly coming to an end. The front east and the Balkans are marked by Turkish expansion (Battle of Kosovo).

The period is marked by the Hussite wars and the Reformation. **Hussitism**, as a Czech attempt to reform religion and reconcile the medieval contradiction of the real world with the world of ideals, was, despite its ideas, the second greatest disaster in history for the settlement of our lands. Combined with the plague pandemic of the 14th century, it is estimated that the total population of Bohemia declined by almost a full third during this period. Most settlements, including their ploughlands, remained, but their economic base was **undermined**. In later periods, settlements were much more dependent on natural conditions (which, as already noted, were deteriorating). Often there were reverts to an attachment and sometimes even a heat economic system.

Poverty and wars also meant the fall of the lower "landlord" nobility – everything was absorbed by the higher nobility. Thus began the gradual consolidation of feudal enclaves into large units and the growth of the vast wealth and power of the nobility. A significant change was the change from armies of vassals to armies of mercenaries (e.g. the Brothers in Slovakia). This gradually led to the creation of mercenary multinational military units, hired by states as needed. In the following period, the nobility ceased to serve in the field and the freed time led to the search for leisure activities – both cognitive and pastimes.

The **shortage of labour** (including new settlers) began at this time to force even the great feudal lords **to convert land to their own management** (dominical) and to seek ways of using the land with little need for human labour, as was typical in the following period.

While the original reformation church of the Hussites, Utraquism, gradually lost its appeal after the wars, Protestant churches of the Lutheran type (of the Augsburg Confession) took its place. Since the Hussites, only the Unity of the Brethren has survived, but it was persecuted by George of Poděbrady.

The ruling ambitions of the Estates were at odds with the landed order, and throughout Europe there was a protracted struggle between the Estates and the rulers for control.

10.2 The Renaissance and Humanism

(1500-1620 in our territory)

The climate is still sub-Atlantic, but **it is cooling further**. Another exhalation of the Great Steppe (Kalmyks, Dzungars) has already been assimilated by the growing Ottoman Empire and Russia. The continuing Turkish invasion of central Europe (after the capture of the entire Balkans in the 15th century, and more recently most of Hungary) threatened our territory as well (marauding raids in southern Moravia).

The Renaissance period is coming. The basis of the humanistic ideals of the Renaissance was the belief in man's ability to control the fate of the world ("man the measure of all things"). The precursor and proof of the feasibility of these ideals was sought in ancient philosophical literature, from which the predilection for antiquity in general, including architecture, was derived.

Fig. 357
School of Athens (Raffael Santi, 1510)

Major **geopolitical changes** are taking place. There is a subtle, but later increasingly obvious, shift of economic and commercial centres **from the Mediterranean to the Atlantic**. The economy of the leading Italian cities (Venice, Genoa, Amalfi, Pisa, Ragusa, etc.) was still based on monopoly trade with Asia via the Levant. Trade with India via the Near East, which was ideal in the early Middle Ages (the main routes were controlled by the pro-trade Byzantine Empire), later became difficult and costly (Muslims dominated the main routes with their forays and Arab rulers demanded a significant share of the trade). Eventually, in the 15th century, it became almost impossible (the conquest of all routes by the Turks and the arbitrarily uncertain and prohibitively expensive transit). This enormous difficulty and expense of trade with the East led to the search for alternative routes. The opening of South African routes outside the Arab-Turkish barrier, which were much cheaper despite their length, but especially the opening of the New World broke Italy's economic prosperity. In effect, however, it also undermined the prosperity of the Arab world – thus establishing, among other things, the drastic decline of Arab civilisation, until then often much more advanced than European civilisation.

Fig. 358
Change of trade routes to India from Arab to African

The gateway to Europe was the cities on the Atlantic coast – first Portuguese and Spanish, later Dutch, French and English. Wealth, based on American and South Asian booty, substantially increased the economic base of the Atlantic area. The influx of gold and silver from the Americas, on the other hand, led to a sharp devaluation of money. This undermined the economic power of the cities (based on monetary exchange) and their political influence in the states.

The colonisation of Latin America by Spain and Portugal was extremely fast. However, a crucial factor in the easy and rapid defeat of the Inca and Aztec empires was probably domestic. The drastic oppression by the Incas and Aztecs of recently conquered territories led to revolts, and large groups of Indians supported the conquistadors.

The meeting of the two, until then isolated, populations led to a rapid exchange of both crops and diseases (smallpox in the Americas, syphilis in Europe).

Thanks to the excavations, the former city-states of Italy became the centres of a new culture, in the eyes of their contemporaries a continuation of antiquity. The spirit of humanism and the Renaissance spread very unevenly, so that the Renaissance period in our territory is mainly the 16th century, while in Florence it is the 14th and 15th centuries. It is probably also the period of the deepest moral decline of the Catholic Church organization (the popes of the Rovere, Borgia, Medici, Farnese, and other families).

The invention and application of the printing press contributed significantly to the spread of Renaissance culture, and architectural designs were also disseminated on graphic sheets.

The power struggle for domination in our country

The positional struggle for control of the kingdom between the king and the Estates was gradually won by the Estates. In 1502, Vladislav Jagiellon confirmed the right of the lords to accept new foreigners (incolate) into the lordship, which was widely used.

Already during the 16th century, our richest domestic families died out of syphilis and various forms of degeneration. Almost half (20 out of 47) of our manorial families died out during this period and were replaced by foreign, mostly German Protestants. If, in general, of all the noble families in our history, about 20 % were of foreign origin, then half of them came to us at this time (not after the Battle on White Mountain). The new Protestant estates (over 80 %) not only dominated domestic politics and marginalized the Catholic minority, but also inserted themselves into the election of the king and international politics.

Four seemingly unrelated factories have contributed significantly to the development of our landscapes

1. The first was the shortage of labour after the Hussite wars. This led to an increase in the share of the overhead economy of the nobility (Meierhofs – manor-houses on the dominical) and to a large development of those industries that do not require the constant work of a large number of people. These included fish farming, sheep farming, and, in extreme cases, spontaneous afforestation and the first large estates. A major innovation in the fields was the invention of the scythe with a rake, which accelerated the harvest. The demand for labour was also rarely addressed by the recruitment of new serfs to work the land:

- *The Swiss Anabaptists (New Baptists)*, a sect expelled by the Protestants, settled in southern Moravia and Slovakia between 1525 and 1585. They brought with them various production innovations (Habanese pottery, cellars), but in 1622 they were permanently expelled further afield – to Hungary.
- *The Croats (Krobots)* – fleeing from the Turks in the 16th century, were permanently settled in South Moravia (about 20 000 people). They brought old economic practices and signs (wine hybrids – "chorvat", "bago", red costumes and sequins of the Podluží region, etc.). Although they declared themselves Czechs during the Second World War, as homogeneous Catholics they were dispersed by the communists across the Sudetenland in 1946 (mostly in the Jeseníky Mountains, e.g. Huzová).

The construction of ponds (as well as the conversion of castles into chateaux or the new construction of chateaux and other facilities) required the deployment of large amounts of labour at a time. However, the operation of the ponds themselves did not require much labour and was relatively very profitable. Where there is a fragmented estate with multiple serfs, entire pond systems and landscapes are created. There was a radical increase in anthropically conditioned communities in the landscape – shallow ponds and their associated wetlands and wet meadows, and conversely the spread of steppe grasslands.

Fig. 359
Established pond

2. The second factor was the **use of firearms**, especially heavy artillery, breaking down the walls. Overhead walls, which offered protection only against random smaller troops not armed with cannons (a protected ground floor or wall was enough), lost their wartime significance. On the one

hand, this allowed the **extension of noble buildings into the landscape**, especially through gardens, on the other hand it led to the construction of new, expensive and large fortifications at strategically selected towns. The new fortresses had walls dug into the ground, and thus protected from heavy artillery (without the possible distance of the attacking guns from the targets of fire).

Fig. 360
Walls below ground level

Fig. 361
Fortification system

3. The third factor of change was the **unbearable sanitary situation in towns**, which were still without utilities and heavily overcrowded. In towns, there was an increase in synanthropic communities (rats, mice, fleas, lice, bedbugs, etc.), and conversely, the sporadic return of gardens at urban palaces.

This led the well-to-do **to build suburban villas with gardens** (villa rustica) and distractions (suburban farmhouses and villas), from the beginning characterized by playful lookalikes (sally terraces, pavilions, water games, etc.) surrounded by vineyards or orchards, later gardens.

Fig. 362
Kratochvíle Chateau

4. The fourth factor was the **discovery of America,** coupled with the aforementioned **devaluation of precious metals**. Mining towns in particular were therefore rapidly declining. At the same time, however, the discovery of America brought **new crops**, of which corn and potatoes proved to be the most important in our country in the future. New deadly diseases and pests also arrived, and foreign plants were introduced into gardens, often as ornamentals – the first neophytes.

On the whole, however, the Renaissance period was one of relative prosperity for all classes, although work on the dominical and especially the great manorial buildings was hard (the glorified pond builder Jakub Krčín was sent to hell in folk tales).

Types of settlements and settlement landscapes

As already mentioned, the first opening of the intravillan area took place at this time. Outside the settlements, there have always been **solitary purpose-built structures**, the location of which **depended on the location of the natural resource being exploited**. There were mainly water mills and mining structures. These are now joined by a **number of other types**:

- the aforementioned water (and rarely wind) mills were crucial for agriculture;
- typical for cattle breeding were grazing areas with sheepfolds, washboards on streams, and hayfields in the more remote meadows (hay was transported by sleigh in winter);
- important for hunting and early forestry were hunting lodges, sawmills on the streams and canals for floating timber from forests, where, in addition, there were still nomadic charcoal burners´ settlements producing charcoal for heating technologies;
- fisher bastions and pond control facilities typical of the pond industry;
- for crafts and industry on the streams, hammers were established, elsewhere glassworks, limeworks, brickworks, quarries;
- for the diversion of the nobility seeking even short-lived ways of using leisure time (cognitive use was still common – music and theatre, fashionable painting, teaching of the main European languages, collecting art and natural history, the ceremonial development of hunting, etc.), pavilions, hunting lodges, various sallets of imitations, mainly inspired by antiquity, were built for entertainment.
- in connection with pastimes, the first alleys appear, so far only as parts of park compositions.

With all these buildings, masonry, and professional styles, previously rare in the landscape, commonly enter the landscape.

Fig. 363
Front facade of the Baroque mill

The manor houses are partly **made up** of old castles rebuilt in the Renaissance style (however, a large part of them was demolished as part of the fight against the disturbers of the peace), and partly completely new chateaux were built, surrounded by Renaissance-Italian gardens.

Fig. 364
Courtyard of the Renaissance chateau

Fig. 365
Chateau with Renaissance garden

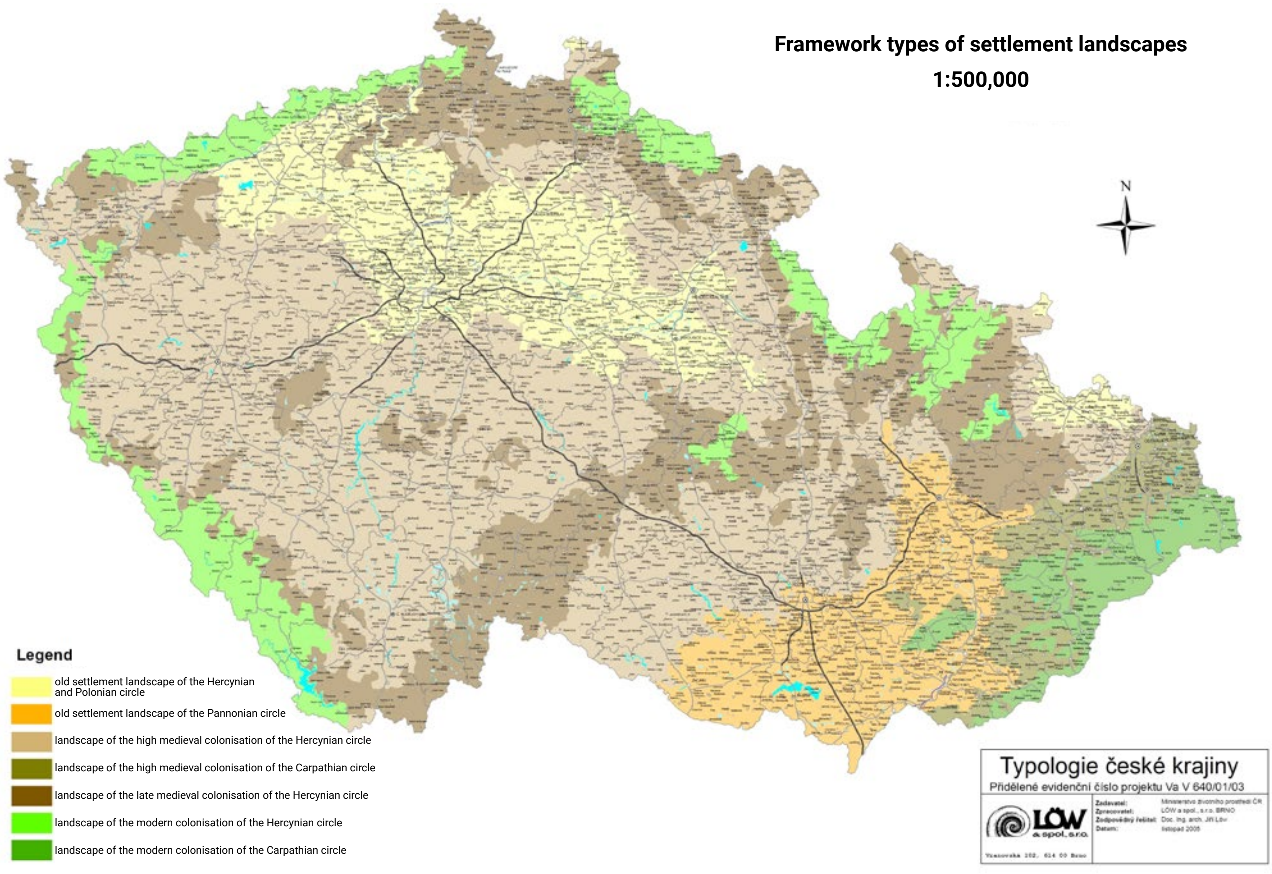


Fig. 366
Framework types of settlement landscapes: old settlement landscapes (yellow and orange), landscapes of high medieval colonisation (light brown and khaki), landscapes of late medieval colonisation (dark brown), landscapes of modern Hercynian (light green) and modern Wallachian colonisation (dark green) [Typologie české krajiny, VaV 640/01/03]

Older Settlement and Medieval landscapes

The population decline was gradually replaced, but some settlements were not rebuilt. The forests outside the manorial preserves were **only coppice forests of pole timber** and there was a shortage of building and metallurgical timber. There was a significant proportion of communal grazing land. Due to the decline of settlement, there was also less forest cover initially.

New Age colonisation of the Hercynian foothills

With the recent increase in population, a **New Age colonisation** began, which reached its peak in the Baroque period. However, its motives are not primarily agricultural. In particular, the heat technologies of the iron and glass industries require large volumes of **firewood and charcoal**, as close to production site as possible. These still untapped reserves of firewood were in previously uninhabited areas of the highlands. The landscape thus settled has a forest character, but strongly reduced by settlement perimeters with ploughland areas used for selective self-supply by artisans. The settlements are mostly situated on valley bottoms, where they benefit from the power of watercourses (hammers, sawmills) and the slope is well used for transporting wood to them. Typically, the villages are **valley field and chain villages**. Fields, meadows, and pastures are distributed in the lower parts of the slopes and are fragmented according to the slope character of the individual areas, with grassland predominating. The ploughland is linear and longitudinal. The slopes and mountain tops are otherwise further wooded. Small charcoal burners´ settlements, producing coal for glassworks and metallurgical plants and for export, are located in forests.

Fig. 367
Foothill settlement

The New Age Wallachian colonisation of the Carpathians

Other motives initiated the **Wallachian colonisation,** associated with extensive grazing in the Carpathians. Its specific feature was the exploitation of the hilltops and the settlement of the hitherto uninhabited highest locations of the Carpathian mountains. Since the Middle Ages, there has been a gradual **movement of high mountain pastoralists** from Romania (*the Principality of Wallachia*) along the Carpathian Arch. A unique **unified culture** spread **across nations and states**.

Fig. 368
Typically deforested ridges of the Carpathians due to grazing during Wallachian colonisation

In the Renaissance period, the area did not yet achieve its typical attributes and did not fully develop until the 18th century. The exploitation of the uplands essentially led to the **upper limit of the forest being pushed down**. The typical sequence of areas here was not strict but rather **mosaic**. Nevertheless, it can be said that downwards from the summits there were pastures, accompanied by woods in completely unsuitable habitats, while the upper parts of the foothills, including the mountain saddles, were a mosaic of single-season meadows with enclaves of scattered settlement with orchards and sporadic fields. The extremely infertile locations do not lend themselves to a three-field system and the economy is therefore essentially attachment, with the attachment often being very long.

Fig. 369
Remnant of the deforestation of the Carpathian ridges in our country

The lower parts of the slopes were mostly forested and ended in narrow valleys without a floodplain. **Settlement was therefore dispersed, with stretches of ploughlands**.

Towards the end of the period, the "Little Ice Age" began (about 1 °C less than today), prefiguring further developments.

10.3 The Thirty Years' War

(1620–1650)

Struggle of the nobility with rulers for power

The greatest human catastrophe in our countries throughout their history was the Thirty Years' War. Out of the 1.4 million inhabitants in the Czech lands, only 800,000 remained after the war, which means that during 28 years about **45 % of our entire population** disappeared. The country was completely and repeatedly plundered, and this happened (which is particularly significant for understanding the further development) without any distinction as to whether the plundering armies were Catholic or Protestant, domestic or foreign. The war divided Europe into two irreconcilable camps, fighting over the redistribution of new wealth – both from overseas and (in central Europe especially) from confiscated ecclesiastical property.

After the defeated revolt of our nobles against the king, Protestants refusing to convert to Catholicism (but only those who were personally free, serfs had to convert to Catholicism) were ordered to leave the country. As part of the punishment, the property of the guilty was confiscated – in Bohemia and Moravia, **three quarters of their estates were confiscated** by the monarch. In the second phase, there was a **great wave of "privatisation"** with all the accompanying phenomena known even today. The result was a completely changed structure of the nobility and the **creation of huge estates** of the "most successful" nobles. In contrast to today's ideas, however, far fewer "foreign" nobles entered the country than in the previous period of "the estates".

The Thirty Years' War made the **last selection of villages according to their natural potentials**. Some villages disappeared forever after the first plundering, others persisted despite constant raids (e.g. the village of Petrov in Strážnice region was totally plundered at least every 5 years until the beginning of the 18th century but was always repopulated). Thus, settlements mostly in poorer natural conditions were abandoned and their economic districts were annexed to neighbouring settlements. This gave rise to today's so-called long cadastres.

10.4 Baroque period

(cca 1650–1780)

Around the end of this period, the **sub-Atlantic 2 climate period numerically ends and a new one, the recent period, probably analogous to another sub-Boreal period** with a gradual increase in temperature and precipitation extremes, begins. By the mid-18th century, however, there is still a distinct "Little Ice Age".

The Baroque Era is primarily a reaction to the failure of human management of the world on humanistic principles. People who had lived through the horrors of the Thirty Years' War had lost all illusions of human enlightenment and wisdom. The natural reaction was to return to the search for a transcendent meaning of life. From these foundations, Baroque mysticism grew as a return to the ideas of Christianity. The Catholic community also succeeded in defeating the Turkish troops at Vienna (1683), and the gradual liberation of central Europe began. A new empire was established in the East – Russia.

Politically, the period can be characterized as a period of a **firm power division of Europe** into Catholic and Protestant states (according to the agreed principle of countries' sovereignty in the matter of choosing the religion). It is interesting to note that the **dynamic Baroque**, often presented in this country as the style of Catholic victors, did not copy countries according to ritual, but according to the degree of misfortune that befell them during the war. Where there were no murderous battles, the classicizing baroque reigned (including, for example, Catholic France), where there were battles, the dynamic baroque reigned (including Protestant Saxony).

We can distinguish two periods in its development – a period of convalescence (ca.1650–1690), a painful economic and population recovery, and a subsequent period of further development (ca.1770), both economic and cultural. The Baroque period is one of the greatest cultural upsurges in our country (musicians, writers, painters, sculptors, architects, and gardeners).

Economy

In the first phase, the huge loss of people after the war was replaced only gradually, and the lack of labour led to the fact that **land was only meaningful with peasants** (the growth of serfdom). The basis of the property boom of the nobility and part of the patrician classes was (on both sides of the war) the purchase of confiscated ecclesiastical and exiled estates at dumping prices.

The post-war lands were divided into more than 350 estates, largely autonomous. These estates, in addition to managing the rustic part of the estate, cultivated between a quarter and a third of the total arable land area (dominical), tied to the manor-houses – Meierhofs (praedium).

The Meierhofs were common from the early Middle Ages, when the higher nobility with residences in non-agricultural castles cultivated their joined dominical from these large courts (the lower nobility cultivated their land directly from the fortresses). Paradoxically, however, directed farming was at a disadvantage compared to the peasants, partly because of bureaucratic management and the lower labour intensity of the "employees" (still serfs), but mainly because of the **high concentration of production without a sufficiently large market for the products**. To improve the directed results of farming, therefore, other possibilities of preferential or protective interventions were sought, imposed on the serfs.

The security of the countryside during the development period allowed the opening up of the intravillan areas of towns and villages and their gradual development. This was concentrated around the centres of the estate. At that time, chateaux no longer served only as the residence of the lord and his servants, but above all as the **administrative and economic office of the entire estate**, including the officials' apartments (which is why Baroque chateaux are so difficult to use today, when offices and apartments have their own buildings). The seat of the manor with its sub-chateau gradually created a higher category in the hierarchy of villages, in which administration, economy and markets were concentrated.

Fig. 370
Baroque chateau

Fig. 371
The grounds of the Baroque chateau – the administrative centre of the estate

The location of administrative settlements was usually not the result of lordly will, but of centuries-old, natural spatial-functional relationships, which were selected by traffic connectivity. This completed the **static, centre-based settlement system**. This structure was firmly stabilised and remained in place until the Industrial Revolution.

Apart from urban and industrial urbanisation, it is still in force today and was even enacted under communism (centres of local settlement, centres of district settlement, nowadays “municipalities with extended governmental competence”, the so-called ORP).

For a long time, the boundaries of the estate and its centre constituted the only adopted space of the subjects. Stepppping out of this world was practically possible only during religious pilgrimages.

Due to the political weakening of Bohemia and Moravia, the **Baroque towns** did not grow much, and the fortification circuits, supplemented by ramparts, further defined them. The impoverishment of the patriciate, replaced by the enrichment of the nobility, led to the construction of city palaces in the main provincial towns, where they often generously occupied entire city blocks and rehabilitated town centres with gardens. Many of our smaller towns were the **last to develop** at this time, and their Baroque appearance has been preserved to this day.

The need to move armies quickly around the empire and long-distance trade led to the construction of the so-called **imperial roads** (the first since 1727). On the basis of an imperial decree, these were planted with alleys of fruit trees (for the marching troops), which have become a permanent and ubiquitous part of our landscape.

Until the mid-18th century, the **three-field system** prevailed in our agriculture, but later new crops, especially potatoes, maize, and clover, **became increasingly popular**.

The low efficiency of overhead farming led to further reforms. In 1777, Maria Theresa approved the division of the land of her manorial courts among the peasants (**raabisation**) and the conversion of corvée into cash rations.

Fig. 372
Raabisation village

From the 18th century onwards, the influence of the Theresian “fire patent” (which forbade the use of wood in buildings by the fire – for fire protection reasons) was also evident in the gradual transition to brick buildings. There was a massive switch to brickwork, initially from adobes.

Landscape

As has already been pointed out, the vivid experience of the most terrible disaster in the history of the Czech lands – the Thirty Years‘ War – led to a growth in **spirituality** among all sections of the population. Particularly in the countryside, and especially at a time when the relatively satisfactory resolution of technological agricultural problems gave way to the effects of uncertain weather (even a single storm in the harvest could condemn a family to starvation), spirituality became an everyday, commonplace and supremely important part of everyone‘s life. The search for dialogue with God was, of course, in addition to the common gathering places – churches – also carried over into the most vital, agricultural areas – the places of supplication, marked by **small buildings** (recordatio = reminder).

In the context of folk piety, statues of St. Florian as a protector against fire and St. John of Nepomuk as a protector against floods were ubiquitous, alongside the gods‘ torments and chapels. St. Urban, the patron saint of winegrowers, was frequent in the vineyards.

Fig. 373
Recordatio

Pilgrimage sites were also part of the communication with God, i.e. places where people felt that they were closer to God for some reason. It was customary to organize pilgrimages to these places even earlier, but in the Baroque period these places were substantially multiplied and structurally strengthened by chapels, later temples, sometimes even large complexes with monasteries, hospices, pilgrimage houses and other facilities. Pilgrimage sites were visited from nearer or further environs. This led to the emergence of star-shaped networks of **paths** that followed dirt roads and had natural resting places, usually with a well and distant views of the destinations.

Today‘s **Bohemian landscape, still essentially Baroque**, is directly shaped by the large number of churches and smaller sacred buildings. These have been its compositional and spiritual landmarks for centuries.

Fig. 374
The pilgrimage church of St. John of Nepomuk on Zelená hora in the town of Žďár and Sázavou as a message to God: a church with the plan of a star with an inscribed outline of the tongue as the attributes of John of Nepomuk and the ambit as the crown of thorns of the martyrs – a complex plan known only to Santini, the abbot and God

Even the **chateau parks in the landscape have adopted spiritual concepts of compositional hierarchy.** This is also the period when bears (although the last one was not shot until 1856) and wolf packs were exterminated in the vast majority of the territory. The parks were thus opened up to a safe landscape of straightforward alleys and composed vistas. Strict symmetry reigned, though again sometimes only discernible from a bird's eye view. In general, the low vantage point and horizon was a major compositional problem. The main views were therefore composed on the raised first floor of the chateaux with a terrace or salon. The parks themselves are composed of strictly shaped bosques. The penetration of the parks into the landscape brought with it the use of the first **exotic woody plants,** especially the typical *Aesculus hippocastanum* tree, the "horse chestnut".

Fig. 375
Alley of *Aesculus hippocastanum*

In landscapes of vegetation stages 1 to 4 (old settlement and medieval colonization), the secondary **differentiation** of the dominical in all landscape types into **three basic production zones** – intensive (always used as fertilized arable), extensive (always used as meadow or pasture) and reserve (intensively or extensively used according to the current needs) – was significantly manifested. This division already reflected production and location potential (according to fertility, cultivability, and availability). The landscape was differentiated by origin and development, with fully developed ploughlands of all the types described earlier. It is the decisive economic base of the states.

The increasing poor (and in fact not so much needed for the cultivation of dominical land) part of the rural population led to a significant increase in small farming and goat breeding. All the **baulks were used for supplementary grazing** and were particularly important for the smaller farmers. The shrub floor in the open countryside was therefore virtually non-existent. Scattered vegetation in the tree floor was sporadic in the field landscape, sometimes purposefully planted to obtain fast-growing straight wood. Poplars with artificially shaped straight trunks and a pannon-like crown, which did not shade the surrounding habitat with ground branches, were therefore mainly planted. Old **solitary trees** were rare in the field landscape and were usually surrounded by some kind of tale or event (which is why they often accompanied small religious buildings).

Fig. 376
Field landscape with sporadic scattered greenery

Trees are relatively more abundant in hillside meadows, where their relatively regular staple acts as a windbreak, especially in areas with gusty winds.

Fig. 377
Meadow with trees

The most varied parts of the cadastre are **pastures**, which usually occupy somehow **abnormal habitats** (complex relief, rock outcrops, ravines, steep slopes, etc.) – typically rocky steppes. They were therefore not parcelled out and remained communal and served as common grazing land for the community (so called common). Commons were also found in the waterlogged parts of wide river floodplains, where they were so extensive and economically important that their use also influenced the orientation of the settlement villages perpendicular to the floodplain edge (the whole herd was well grazed in the floodplain).

Grazing, especially by sheep and cattle, naturally favours the existence of solitary trees. The pastures thus have the scale and layout of small park landscapes, and the chateau parks follow them later, in a romantic form (Lednice, Poděbrady, etc.). They are therefore also some of the most popular sceneries for painters.

Fig. 378
Common grazing in the commons

The forest cover was only firmly defined at this time, but the transition between the forest and open countryside was gradual, the forest edge and parts of the inner vegetation were **illuminated by grazing** and often had the character of groves. However, major building development led to an increase in demand for carpentry and joinery timber, which from the 16th century onwards led in the most developed areas to a shift towards managed artificial regeneration and the conversion of low forest (stumps suitable for fuel) to high forest (suitable for beams and planks).

Fig. 379
Lighted deciduous forest

At this time, there was a maximum expansion of water mills on all our middle streams. The rise of water above the weirs meant that the streams slowed down and silted up. Thus the **phenomenon of natural streams**, except for swift creeks in forests or large and slow streams, practically disappeared in our country.

Typical of the Hercynian region are the **valley catenae** – incised wooded valleys (often rocky) with stretches of flat meadows on the valley floor, which mirror the calm surface of the river with sparse bank vegetation, alternating with a mill surrounded by tall trees and gardens.

Fig. 380
Water mill

In the broad floodplains, flow variability is further increasing, accompanied by more frequent floods. In order to maintain their usability, the **first land improvement elements** (gullies with sluices, ditches, etc.) are therefore appearing in them, with the possibility of seasonal regulation of the runoff from the land. The flooded, locally regulated meadows gave huge (though not always certain) **yields of hay**, which was stored in haylofts directly on the meadows.

Gradually, hay from the floodplains became one of the important regional trade items, especially for supplying of armies.

Fig. 381
Floodplain meadow

In the higher altitudes of the foothills and mountain **areas above vegetation level 4** (landscapes of modern colonisation), the picture of the landscape was different in some respects. The fundamental difference is in the representation of forest cover and tree species in the landscape in general. The landscape of the foothills and mountain areas was still predominantly forested. Until the end of the 17th century, forests were indigenous, although increasingly affected by selective logging. Later **colonised foothills became a common (but poor) agricultural landscape** where agriculture no longer played a minor role. Iron, glass, logging, and charcoal production were slowly losing their importance. Weaving, practised by peddlers, became a substitute non-agricultural occupation. The settlements are mostly located on the valley bottoms, but secondary to this, independent farms spread up the slopes, allowing the extension of the ploughland to higher ground in the valley. Blacksmith‘s workshops, sawmills, and mills are increasingly built outside settlements, on suitable stretches of streams. Fields, meadows, and pastures are distributed on the slopes and are fragmented according to the slope and accessibility of each area, with grassland predominating. The grassland is not subject to erosion and sedimentation processes and therefore **does not form baulks**. Baulks are only present in fields and are low, but more often the edges of fields are formed by stone boundaries, formed by the removal of stones from skeletal, cultivated young soils. Baulks and stone boundaries have become overgrown with shrub and tree natural seeding, so that involved, linear stands of trees are common here compared to lower elevations.

In the secondary **dispersed settlement** (glade settlement), resulting from forest clearance and glade cultivation, the attachment system reappears, as in the mountain environment, in spatially separated sections.

Fig. 382
Dispersed settlement

Mountain farming in the Carpathian region is linked to the **Wallachian colonisation**. It was not until the 18th century that it crystallized into classical forms. Wallachian colonisation was late, but its cultural nature was so **archaic** that it brought the social forms of early medieval life.

The lower parts of the slopes were mostly forested and ended in narrow valleys without a floodplain. Settlement was dispersed in the upper halves of the slopes, essentially on the sites of former, strategically located shepherds‘ huts. In the highest places (the broader tops of the slopes and the saddles) there were pastures with a typical accompaniment of coniferous trees, but in the saddles, there were sometimes fields. The stone boundaries in the middle parts of the slopes, signalling fields, are now covered with secondary succession trees. Farmsteads with buildings around a common yard were linked by cart tracks along the tops. The diagonal layout of the edges of the plots and the access roads is typical of the Carpathian flysch area, which is prone to landslides (for surface water drainage).

10.5 Classicism and the Enlightenment

(1780–1815)

The end of the sub-Atlantic with temperatures reduced by the "Little Ice Age" is gradually fading and a new sub-Boreal is probably coming.

As the end of the Baroque era became too bound by spiritual rules, the conviction grew that the **social order of the time was not the will of God**, but an inhuman, progress-preventing, autocratic system of oppression of all. Unlike humanism, however, there was not only a **questioning of "God-given power" but also a questioning of "God's right to earthly rule". A new stage of man's belief in the sufficiency of his own powers to order the world in a meaningful way – the Enlightenment** – w s dawning. This philosophical foundation has laid the rules for the whole subsequent ordering of society to this day. The replacement for the feudal order was in an elitist spirit, with the typical associations of the "wise", from the background of the rulers. Government effectively fell entirely into the hands of the **rulers** and the more or less **anonymous elites**. This is the basis of the so-called enlightened, absolutist monarchies. These newly emerged to the north (Prussia) and east (Russia). The Russian Empire was already coping with the incursions from the Great Steppe and had already absorbed the new nomads into its territory.

There was an apparent period of rainfall extremes (if throughout the Middle Ages major floods came about once every 100 years, now they occurred until the 21st century about once every 10 years!)

Historical context

The revolutionary armies of the Great French Revolution **introduced universal conscription en masse**, and the mercenary army was replaced by a citizen army. The training and maintenance of huge armies (as well as armies of civil servants) required a regular supply of large amounts of money. In the first phase the confiscated properties of the Church (the largest confiscation in history) and of the opponents of the revolution were used, in the second phase the spoils of war and taxes.

Catholic **Austria** solved problems in a similar way – Emperor Joseph II abolished all religious orders not performing useful service for the state. Their properties were sold off or used for the military. The cultural loss was great and irreversible. In the same way, the emperor abolished all festivals of popular piety (feasts, pilgrimages, etc.) and replaced them with official ones – "imperial feasts" on St. Havel, outside the agricultural season. This, however, as well as a number of other decrees, was from the beginning rejected by the people, and feasts new and old were celebrated, as well as pilgrimages.

The main way to raise the missing revenue was (and is) to raise taxes, and therefore **tax reform** was necessary. In 1748–1757, the **"first Theresian cadastre"** replaced the tax rule and the land registers of the serfs (1653–1658), which for tax purposes recorded the serfs' holdings and land, divided by crops (these are still practically valid today), with an indication of the area and the creditworthiness of the land and other earning possibilities (so called "rustical"). The **"second Theresian cadastre"** (1759) also recorded for taxation purposes the land and income of the nobility, the remaining clergy, and the towns (the "dominical"), thus laying the basis for the **definitive end of the power of the estates** and the economic privileges of the nobility. These surviving cartographic works are the oldest comprehensive documents on the landscape in our country.

The taxation of the nobility and churches continued with the gradual deprivation of the rights of the nobility, i.e. the removal of the exercise of state administration. The professionalisation of the state administration and its removal from the supervision of the upper class led to its improvement and centralisation. However, the more important **function of the civil service** was (and still is) redeemed by a number of disadvantages. The centralization of the administration and the army led to the state unification of language. With this, however, came the deliberate and unintentional Germanization of the empire.

In agriculture, a new system of farming gradually prevailed – the **rotational, so-called four-field system**, whereby forage crops (primarily clover) were introduced into the rotation instead of fallow land, replacing the fallow function with a much higher yield. The scheme is then: forage + legumes, spring sowing, root crops, winter crop. This system already required an increased nutrient supply through fertilisation. This has led to an increase in the number of cattle and their permanent housing. Grazing was significantly reduced and replaced by forage.

The mass introduction of potato cultivation significantly increased the fertility of the previously low-fertility ploughlands and mountain grasslands and increased pig farming. However, this also meant a significant increase in erosion and flooding in the floodplains. The first attempts at local river regulation were therefore made (Svratka river 1747, Morava river 1818).

The high demand for straight construction timber meant controlled, artificial forest regeneration and led to the conversion of low stumpy forest to high-trunk, coniferous one. Until then, forest regeneration had been carried out only by natural rejuvenation, with stands under constant pressure from grazing and humus extraction. The appearance and character of the forest at that time was therefore very different from the current understanding of "deep" forest. The application of forest orders gradually led to a radical transformation of the species composition, regardless of the vegetation levels of the natural forests. Forest stands were converted from fir to unstable spruce monocultures as we know them today (with all the negative consequences).

Rural area

The settlements did not actually develop spatially. Except for the raabisation villages and housing on the estates, no new ones were created. Village construction, however, massively switched to brickwork, especially adobe brickwork (burnt brickwork had long been a luxury).

Nevertheless, the new brick buildings still retained the "wooden" or "earthen" morphology, enriched sometimes with designs from manorial (Baroque) estates – **the peasant Baroque thus dates back to the Classicism and beyond!**

Fig. 383
South Bohemian peasant Baroque

As a result of the fire patent, the barns go to the end of the gardens – into the backyards.

Fig. 384
Backyard barns

As a result of the expanding four-field system, fallows are gradually disappearing from the landscape, replaced by forage crops.

The Baroque structure of the landscape and settlement still remains. **At this time, the forces of man and nature were at a given energy level in a maximally profitable but still sustainable state, without additional energy.** It is also the last period when this state of affairs occurred.

The most accurate information about the appearance of this landscape is provided by the paintings of Czech and foreign landscape painters of the 19th century (in fact, in their time they actually painted Baroque landscapes).

Fig. 385
Landscape from the Chrudimka riverside [Antonín Chittussi, 1887]

11. FROM THE 19TH CENTURY TO THE PRESENT

11.1 Period of industrial revolution

(in our country 1815–1914)

Recent (current) climate period, with significant climate fluctuations – end of cooling and temperature increase (0.2 °C).

The period and its ideas

The change in the conception of state-building principles, founded by the Enlightenment, also abolished the basic feudal principles of the sense of community with a group of people close or near to a person.

A new conception of nations emerged and new **"identifying signs"** were sought for them, the most important of which were the theses of shared destinies (of course, great, and heroic ones) or linguistic affinity (national language) and, in some cases where both of the previous ones failed (Yugoslavia, Ireland), religious affiliation (Catholic, Orthodox, Protestant). This gives rise to the idea of a nation-state that seems to have always been there. Subtly, a secular idea of society emerges, including extreme anti-theism.

The surviving aristocratic elites (0.12 % of the population here, but 0.28 % in Austria and 5.8 % in Hungary) tried to join the industrial revolution but were overtaken by the industrialists – the new wealth. The bearer of the revolution was the middle and new upper class – the bourgeoisie, who quickly became rich and sought new ideals and order. In 1867, full civil rights were granted to the Jews, who, with capital, had joined the industrial revolution and became the clear winners.

The bourgeoisie's new conception of power was matched by a search for a new way of life. It first copied the aristocracy (a play on antiquity – Romanticism and the period of historical styles), then gradually moved beyond the formal ornateness of Art Nouveau to modern styles.

Fig. 386
Romantic summer residence of a factory owner from the beginning of the 20th century

There was a transition from a **sustainable life**, based on continuously renewable resources, to a **consumptive life**, based to this day on the use (consumption) of non-renewable energy resources, mainly coal, later oil, natural gas, and uranium.

In addition to the irreversible depletion of these resources, there is also the **problem of combustion** (oxidation) – for millions of years, carbon has been chemically bound in fossil fuels, which is released as CO_2 by combustion and has been dangerously subsidising the natural carbon footprint of the biosphere ever since.

The steam engine itself is a mechanical machine with the technological level of antiquity (Heron of Alexandria), but its mobility and its combination with the use of concentrated energy in coal have changed the world. The **industrial revolution** was born.

The development of technology, based on the supplementary energy of fossil fuels, led to the belief that all the problems of the world were solvable by technology and that *"if we do not know the answer to a question today, surely our great engineers will soon (in time) invent and answer it"* (J. Verne's vision).

Others believe that everything is a question of money – **everything can be quantified and bought.** The reliance on technical progress as a means to solve all problems, including social ones, is typical of this (and other) periods. This includes the famous phrase of the Czech imaginary polymath Jára Cimrman: *"The future belongs to aluminium!".*

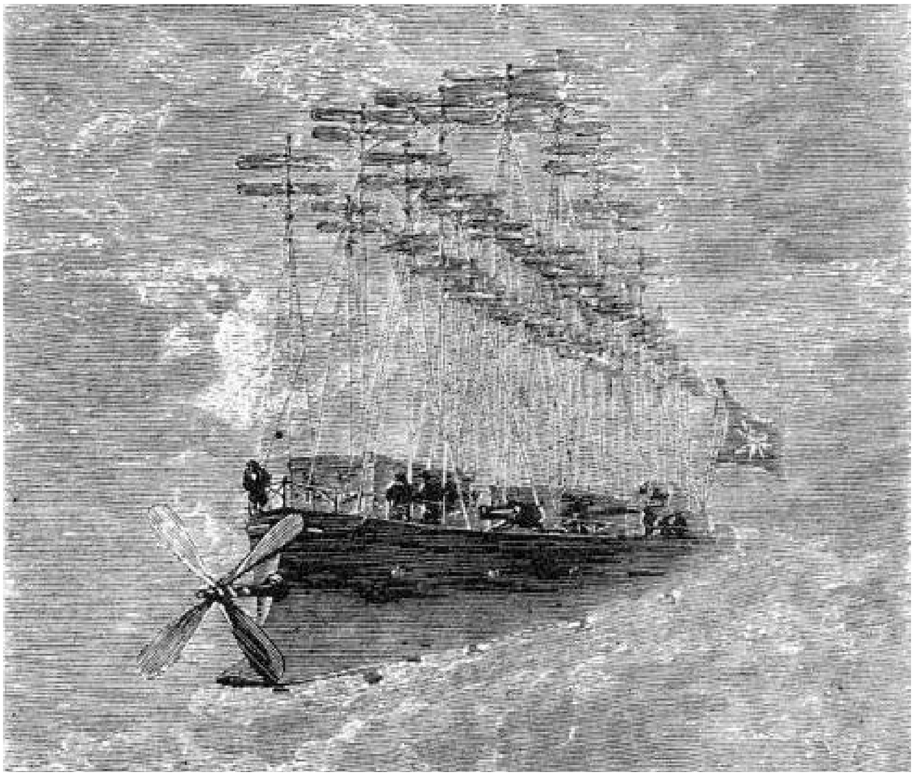


Fig. 387
Verne's Albatross aircraft – book illustration [L. Benett, 1886]

The transport revolution (steamships, railways) **is the key – large-scale**, fast, and reliable **long-distance transport** using the steam engine **expands the market for products and only now does large-scale production make sense.**

The **railways**, limited mainly by longitudinal gradients and large radii of curves, showed very clearly the potential of relief. In our country, the side slopes of incised river valleys were used to overcome the differences in altitude between the highlands and the lowlands (about 400 m), which included stops. Secondary factories were built at the stops and metal farming settlements were established in the vicinity.

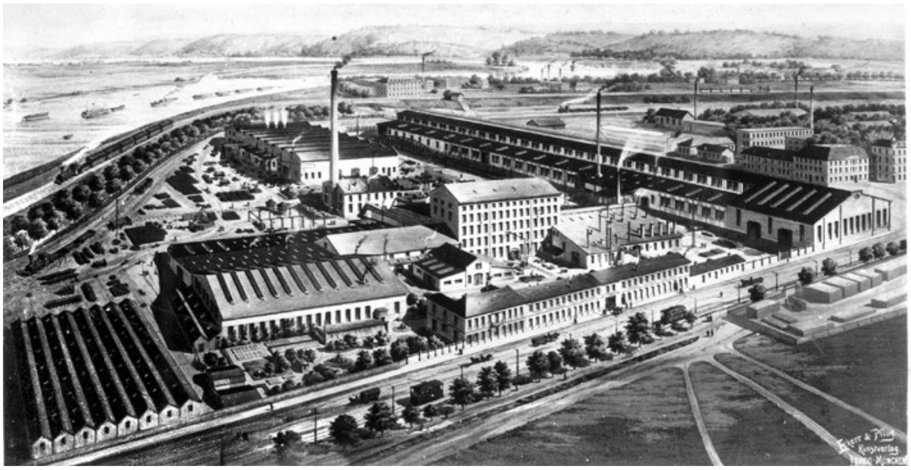
Fig. 388
Railway viaduct

Steamship navigation, connecting the oceans, enabled the further expansion of Europe into new colonies. These were involved in the industrial revolution, but only as **sources of raw materials, processed in the metropolises, and then as markets for products**. The flat landscapes of Europe also allowed navigation on waterways, soon linked into systems by navigable canals. However, even these were replaced by railways by the end of the century.

Large-scale steam navigation encouraged the creation of new colonies as a source of raw materials and outlets for products. The new colonies were fundamentally different from the old colonies of the 16th–18th centuries, which were built as self-sufficient settlements resisting the monopolies of the metropolises (Spanish Latin America, the United States, the Boer settlements, etc.). During the 19th century, therefore, these historically older colonial territories rapidly became independent.

Technologies based on large (and therefore **stationary**) steam engines – sources of locomotive energy – led to the creation of **factory complexes** – halls, linked as closely as possible by transmissions to the motion source. Factory chimneys became a symbol of progress, prosperity, and wealth (the factory owners themselves lived in factory premises).

Fig. 389
Factory area with chimneys



Huge development is taking place and towns are increasing rapidly in population. It is only at this time that the area of towns begins to grow, and they later increased in size by orders of magnitude (and are still expanding).

The large, newly opened Austro-Hungarian market allowed a large concentration of production in the Czech and Moravian industrial centres. In addition **to coal and iron mining and processing, the engineering and textile industries** were decisive. The first railways, which radiated from Vienna to the whole of the empire, therefore also touched the Bohemian lands (oriented mainly in the south-east-north-west direction).

For the first time in history, **suburban rail transport** enabled commuting, **agglomeration growth and suburbanisation**. Even small settlements in the vicinity of large centres are becoming involved in industrial production.

The static settlement structure of centres of population (estate settlements) is often destroyed by the railways, and **typical urbanisation corridors develop**, consisting of a chain of similarly sized settlements with a railway station. In some cases (especially in wide valleys and plains) these chains of settlements coalesce to form a continuous belt of settlements (e.g. the urbanisation corridor along the Morava river). Typical forms of metal farming are developing here, where industrial employment is not fully sufficient to support a working-class family and must therefore be supplemented by small-scale farming on a croft, including the first development of amateur gardening.

The industrial development associated with the railway gradually spread from the large centres to smaller towns (the principle of **town = industry, village = agriculture**, still in use today, was established at that time). However, the uneven development of settlements at that time (dependent on the railway routes) also preserved whole towns with preserved building stock of past periods (today‘s conservation areas and zones) in marginal places. In a simplistic way, it can be said that in each settlement the predominant **style layers on the buildings are from the period when the settlement was last developed.**

Fig. 390
Factory in a valley

Rural landscape

The open countryside is characterised by continued **agricultural specialisation**, particularly in industrial crops such as **cereals, flax, and potatoes**.

During the continental blockade of the Napoleonic Wars, **sugar beet** cultivation began, and beet farming developed, conditioned by industrial sugar technology. In suitable areas, this meant economic development linked to the **land improvemen**t of heavy soils. Ponds are being destroyed and floods are being technocratically reduced by regulating rivers, ignoring the poorly understood ecological consequences. The most notable case was the sugar industry in the warmer areas of the Elbe river lowland, Haná region and southern Moravia.

Fig. 391
Sugar beet field

The massive expansion of **potato cultivation**, which radically increases the fertility of otherwise climatically unfavourable areas, led to a radical increase in runoff variability (10-year floods), to massive water erosion and to the risk of unilateral dependence of countries on crops (see the “potato blight” in Ireland in the mid-19th century and emigration to America).

Fig. 392
Potato field

The introduction of other, not time-tested plant species, often accompanied by their pests (acacia for honey, American vines with introduced vine phylloxera, potatoes with leaf beetle, etc.) has meant and still means invasive neophyte disasters, devastating native, long-evolving ecosystems.

Table 8
Non-native species in the Czech Republic

Geographical origin of the species	Share of total
Europe	43,1 %
Asia	30,0 %
Africa	8,3 %
North America	10,9 %
Central America	2,7 %
South America	4,1 %
Australia	0,9 %

On the other hand, there is the development of crop breeding, which significantly improves yields and quality genetically.

The industrial revolution has enriched agriculture with a range of new machines since around the mid-19th century:
- the reversible plough (by turning of ploughshare, it allows ploughing forth and back),
- harrows and roller dragging (breaking up clods and levelling the surface against drying out),
- seed drill (approx. 3 m swath – sowing in regular rows and evenly),
- mowing machine (tipping bar approx. 2 m for mowing both grain and grass = light, even in wetlands),
- raker (approx. 2 m free bars and the possibility of tipping them – hay),
- self-binder (complex raker that automatically binds straw sheaves and bales),
- potato plough.

Rather than new, fundamental inventions, however, it is about improving, speeding up and automating traditional farming practices, still tied to horse-drawn carriages, without additional energy.

The **steam engine** is more of an attraction and a rarity in agriculture (on large estates, the plough, the thresher), and it is only with the internal combustion engine that cultivation will develop further. Rarely do the first tractors appear. The more efficient use of agricultural machinery requires in some places the modification (consolidation) of land. This first phase of land consolidation for the purpose of machinery lasts from 1883 to 1939.

Nutrient recovery in the field becomes a major problem. In the last quarter of the 19th century, in addition to the intensification of rotational farming, new agrotechnical advances in plant nutrition were applied and the use of **organic and inorganic** (Chile nitre, guano) fertilisers increased. At the end of the period, these were supplemented by mechanised fertilisers (superphosphate, Thomas meal, ammonium sulphate, etc.). However, it was not until the turn of the century that the era of steadily increasing doses of artificial fertilisers began to take on a qualitatively different form: between 1890 and 1913, fertiliser consumption increased **fivefold.**

In addition to the seven different old areas of the surviving Baroque landscape, a new **area of urbanised landscape** was added at this time. Outside the mining area, this is still in its commencement, but it can already be defined in Ostrava, Prague, Brno, Liberec, and other areas.

Fig. 393
Industrial urbanisation

Fig. 394
Residential urbanisation

The population is temporarily not existentially dependent on nature and begins to despise it, the first **ruderal communities** appear (created by unthinking human activity on unused areas of garbage dumps). Even the forests are becoming a mere surface for the production of straight, fast-growing timber (spruce 100 %!), the lynx and a number of smaller species are being killed off.

Towards the end of this Vernean era, the improved piston – combustion engine and new machinery, including the common use of tractors on large estates, are subtly but increasingly prominent. They take over the function of horsepower and increase radically the energy dependence on non-renewable resources.

A new phase of life for all classes – leisure – is emerging and Sunday trips out of town are becoming increasingly common. The destinations are in keeping with the romantic era – monuments and natural formations. Marked hiking trails lead to them for the first time (1874).

The first brick dam is built (1896) and the regulation of rivers continues (e.g. the Orlice river – 1912).

11.2 The world wars

(1914–1945)

Recent climate with temperature increase (0.2 °C).

The era and its ideas

The World War as the culmination of war tactics of **huge “civil” armies without adequate fighting equipment and tactics** led to unprecedented massacres in the trenches (less than 2/3 of the soldiers of the total, approximately 16 million victims). These huge casualties, however, did not affect the Czech lands significantly (150–200 thousand victims, 2 % of the population), yet almost every village had its fallen (memorials).

It should be mentioned that the Austro-Hungarian Empire, although a monarchy, was a relatively moderate liberal society, unprecedented in the area at that time, and its fall created a power vacuum in Central Europe, occupied from all sides.

The big change after the war was the merger of the Czech state, the most industrially developed part of the Austro-Hungarian monarchy, with the incomparably more backward Slovakia and Subcarpathian Ukraine. In addition, the schizophrenic contradiction in the founding ideas of the new state – the Czech state on the principle of civil-historical (long-term land borders), Slovakia (historically non-existent) on the principle of nationality (right to self-determination), laid the foundations for further secessionist fates.

The First Republic

New historical legends were created to support the foundations of the newly established state:

- the glorification of the legionaries (and their acts of war against dissenting minorities – Znojmo, Žitný island on Danube),
- the ongoing struggle for a false “old Slavism” (false manuscripts, Russian Tsar as Czech King, etc.),
- creating enemies of the state from Austria (away from Vienna),
- disparagement of our entire history after the Battle of White Mountain (glorification of Hussitism, “the meaning of history is the eternal struggle with Germany”),
- etc.

Within the framework of this self-definition, new national churches broke away from Catholicism (the Czechoslovak Hussite Church, the Evangelical Church of Czech Brethren) and atheism developed.

In the nationally defining Czechoslovakia, about 1/3 of the population was of foreign nationalities (Germans, Hungarians, Russniaks, Poles) and an artificially unified Czechoslovakia was tacitly applied to defend the Czech and Slovak majority.

In the Czechoslovakia, all the major roads **taken over so far ran in a north-south direction**. East-west routes were sporadic and did not respect historical or new state borders. Moreover, their construction was hampered by the landform, which, especially in the Carpathian part, almost blocked this connection. One of the first acts of the new state was therefore to fight with its neighbours over short but strategic sections of the east-west railways (in Těšín, Valtice, southern Slovakia and Vitoraz regions). The Czechoslovakia thus found itself from the beginning in a hostile environment of neighbouring states.

However, with the **development of the automobile**, when the railways slowly lost their fundamental importance, roads were built above all, the most important of course again in the east-west direction.

The **expansive development of industry** was linked to the Austro-Hungarian markets. External military danger from all sides led to the need to locate strategic industry in the inland (eastern Moravia, western Slovakia). Not only strategic reasons, supported also by the desire to industrialise non-industrial areas, but also the rising cost of labour created the conditions for the development of new industrial centres. Manufacturers are investing in hitherto marginal areas of eastern Moravia and central Slovakia with cheap labour (Bata‘s Zlín).

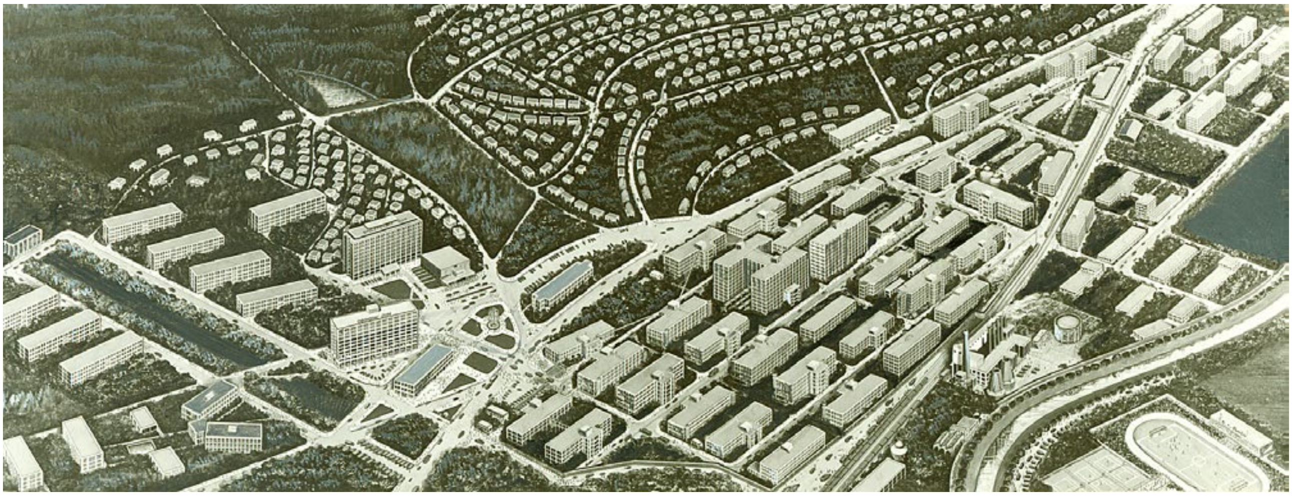


Fig. 395
New industrial centre

An important impulse of civil society was the development of the Sokol (Falcon) movement (founded in 1864), which was becoming increasingly rural, and the dense network of Sokol halls with gyms, halls and pubs became a permanent part of life. The second important civic impulse was the foundation of the youth scout movement Junák (1914). From it, an unorganised tramp movement of working-class teenagers (the first settlement in 1918) branched off, using the natural parts of the forest landscapes near watercourses. All this was made possible by an increase in leisure time to 10 % of the total.

Rural landscape

Agriculture continued in its previous intentions, with the use of horse power still predominant and the combustion engine used sporadically. However, it was mainly applied to new machines, especially threshing machines, which were a huge time-saver compared to the previous practice and therefore spread very quickly. The first tractors and, towards the end, combine harvesters also appeared. The wider use of machinery technology required an increase in the minimum size of the land (about 5 ha).

The basis of fertilisation was still manure, although the use of artificial fertilisers began to develop.

The distribution of land, as a consequence of dominical farming, was very uneven. The new state addressed this with land reforms.

The first land reform began in April 1919 with the Land Law and was aimed at the largest estates (which were mainly noble and ecclesiastical). It led to the annexation of all land over 150 ha of agricultural land or 250 ha of all land. The annexations were paid for, but at about 1/3 of the actual price.

40 202 km^2 of land was taken. 27,400 km^2 was non-agricultural land, of which, in addition to meadows, the vast majority was forest, and 12,800 km^2 was agricultural land. However, only 18,000 km^2 were allocated (including the state). A total of 632,131 families of the rural poor were allocated a total of 862,000 ha of agricultural land. Excluded from the distribution were the so-called residual estates – an average of 104.7 ha of land – used for the exploitation of large agricultural centres that would otherwise have been destroyed. These 2,019 estates were mainly acquired by friends and members of all political parties, and big landlords have also become famous and praised prime ministers and ministers!

The overall development was reflected in the electrification of the state, which subtly but universally introduced overhead power lines into our landscape. The wires on the poles became an automatic feature of all our landscapes, and this, though very prominent, strangely enough became an imperceptible feature as time went on!

The development was also reflected in the capacity building of dams (the first concrete one in 1935) and the regulation of rivers (Ostravice in 1931). Large dams prevent the fish from moving in and out of our rivers, for example salmon are disappearing.

The chemical industry of artificial fertilisers (potash-magnesium, ammonia) is also developing. The use of chemical protectants is also beginning.

The synanthropic communities of urbanised landscapes are becoming a major phenomenon and increasing (often unhappily) biodiversity.

The new rich are finally finding their architectural style – the functionalism.

Results of World War II

The strategy of **large civil armies, this time with adequate technology**, led in WWII to a combination of troop and civilian slaughter (more than 60 million casualties, 2/3 of them civilians). Because of contemporary technical possibilities, German Nazism brought to an imaginary peak "national ideas" that not only make the chosen people better than all others, but even make them superior to other, inferior ones, whom they have the right to exterminate if necessary (6 million Jewish victims of the Holocaust).

The war meant **major population changes in Europe**, both by the murder of the respective age groups of males in all the struggling states, and by the murder of large parts of the Polish, Russian, German, Jewish, Roma and other indigenous populations in the occupied countries. The total loss of Czech and Slovak lives amounted to nearly 370,000 victims (about 3.5 % of the population), almost 280,000 of whom were murdered Jews!

The end of the war meant further **large population movements** in Central and Eastern Europe. The German population was expelled en masse (the whole of Poland moved westwards, in some places by several hundred kilometres) and property was confiscated, in our country by the **2nd land reform** (1945–1954), the main aim of which was to ration the new settlers. Czech and Slovak populations moved to the vacated territories in our country **in several waves**. The first wave occupied the most favourable agricultural areas of the old settlement landscape of southern Moravia and was mostly made up of people from similar areas of Bohemia ("flash" similar to the medieval internal colonisation). **The less suitable and poorer the areas, the later, more heterogeneous** (settlers from Slovakia, repatriates from Volhynia, but also Bulgaria and Australia) **and thinner was the resettlement** in subsequent waves. Especially in the western borderlands, **many settlements disappeared**, and the upper boundary of the forest shifted. The knowledge of local ecosystems and the possibilities of their use (Šumava mountains, the northern borderlands, but also Pálava highlands) went with the inhabitants. The second phase of land consolidation, mainly involving the consolidation of abandoned allotments, was introduced.

In addition, another part of the settlements was also subsequently abolished **to increase the impenetrability of the "peace border"** The formation of an impenetrable border zone against its own citizens, however, on the other hand, contributed to its natural development (that is why we have the national parks of Šumava or Podyjí).

Fig. 396
Impenetrable barriers of the border zone

11.3 The age of socialism and communism
(1945–1989)

Recent temperature increase (up to 0.3 °C), which exceeds even the temperatures of the warm medieval period.

Power hegemony of the war winner – the USSR (Russian imperialism temporarily disguised by communism).

The environment of the communist dictatorship and the principles of its rule had acted as a **catalyst for decline** in modern, otherwise global problems, compounding the errors and problems rather than causing them. The first major problem was centralization ("democratic centralism").

Hence the elaborate system of imposed social engineering in all spheres of life which had an impact on virtually all the territories of the Russian-Soviet empire. **Social engineering** of the Russian type, based on uniform and therefore necessarily simplified planning of everything, led to the overlooking of regional and local potentials and the loss of **the ability to differentiate local differences, including ecological ones:**
- nationalisation of all industry, and then services, and their central management;
- forced abandonment of traditional manufacturing industries in favour of heavy industry, especially war industry;
- construction of ironworks **where there is neither coal nor iron** (Košice);
- self-sufficiency in everything is proclaimed;
- forced introduction of a centred settlement system – also introducing "write-off" settlements;
- the slogan "the countryside will catch up with the city" led to the construction of prefabricated houses in villages;
- unified prefabricated houses with materially deficient amenities in cities became ghettos; rural estates were replaced by terraced standard family houses (with compulsory flat roofs);
- etc.

A "class struggle" was established – to promote these goals, a system of persecution and intimidation was introduced, which affected both organisations and individuals (murder trials of ideological opponents and Catholic clergy, placing churches under the curatorship of the Communist Party of

Czechoslovakia's church secretaries, banning and persecution of political parties and associations – Orel (Eagle), Sokol (Falcon), etc. The exemplary system of intimidation of the "kulaks" (who were relatively the richest peasants in each village – in some places a big landowners, in others a peasants with one horse!) and people destroyed for no reason at all – as a warning to everyone else. A period of unjust executions and long prison terms for hundreds of thousands of people, locked inside a fenced state. Even drunken talk in a pub could get you 10 years in prison! Denunciations and harsh anti-theism were introduced into schools. Everything outside Marx-Leninism is declared capitalist pseudo-science and banned.

In line with Europe-wide trends, the share of leisure time increased again, and significantly (up to 15 %, and by the end of the period up to 20 %!) and with it the search for new leisure activities, the most important of which was the desire for gardens, chalets and cottages, and tourism (mass recreation on holidays).

Rural landscape

The problems with the landscape are also similar to those in the West, but in our country they were particularly badly solved or not solved by the communists, and therefore huge, and a large part of the mistakes are still manifest today.

Nationalization of primary production – the new land reform law **nationalized land** (without compensation, of course) for agricultural production over 50 ha. However, it also made it possible to nationalise almost all land (with the possibility of keeping only 1 ha) for an owner who does not work on it ("speculative land") and for an owner who is a legal person (with exceptions such as an agricultural cooperative).

The nationalisation of agricultural land was subsequently followed by the imposition of **cooperatives**.

Two distinct phases can be distinguished in the landscape, indicated by the basic means of production, the tractor, which can be described as the *small tractor era* (until about 1960) and the *large tractor era* (until today).

The small tractor era

This is the time of the forced creation of **unified agricultural cooperatives (JZDs)** – the communists took the model of the Soviet kolkhozes and began to apply it, including repression of "kulaks" and deterrence of others. Many peasants were forced to give up their property under various kinds of pressure. The formation of the JZDs took place in three stages:

- the first stage was voluntary, when the members of the cooperative jointly managed the arable land;
- the second stage was associated with a change in the structure of the cooperatives to the third and fourth types, which resulted in a mass withdrawal from the cooperatives – the Communist Party leadership responded by forcibly buying up machinery to make it impossible for private farmers to operate;
- the last phase was already associated with outright forced collectivisation of the land.

The grouping of peasants in villages into joint cooperatives also happened elsewhere, outside the Eastern Bloc (e.g. in Denmark), but everything was voluntary.

In the borderlands, where there was a fundamental shortage of peasants, highly subsidized **state farms** were created, where everyone was employed.

Private farmers were thus virtually eliminated, as were small tradesmen and craftsmen.

Horsepower was gradually replaced by internal combustion-engined light tractors, which used virtually the same (improved) implements as in the previous era. A significant change was the crawler tractors for ploughing (more ploughshares and coupled harrows). However, even a small tractor is heavier than a horse, and wet meadows require local drainage or remain uncultivated. Agricultural machinery is expensive and idle for part of the year – hence the creation of "machinery hire" – the Machinery and Tractor Stations (STSs).

Massive use of artificial fertilizers made from petroleum (ammonia, phosphate, potash), and the first pesticides (DDT – tried in the Korean War) appear. The industrialisation of agriculture was promoted under the slogan "the countryside will catch up with the city".

Common stables are built (especially cowsheds for 96 heads of cattle), haylage and silage (fermented haulms) appear as fodder.

With these events, fundamentally altering long-standing farming practices, and with the continued pressure to form agricultural cooperatives, a number of negative processes have occurred:

– the ploughing of baulks – triggered the most intensive **erosion processes** since the end of the Ice Age and meant a sharp increase in the unbalanced drainage patterns (exposing rock outcrops in the highlands and new floods in the lowlands);
- not only the ownership but also the **emotional relations** of the rural population to their landscape was broken – the **landscape had been abandoned by the people** and had become a mere space for large-scale production technologies or a backdrop for recreation and tourism;
- new buildings for housing are also appearing in the countryside – but typically as multi-storey dwellings (without outbuildings);
- local roads are repaired in simple bituminous compositions (asphalted);
- new sports complexes are being built behind the village as replacements for the "Sokol" gyms; recreation areas for the trade union recreation of the ROH (Revolutionary Trade Union Movement) are also being developed;
- the destroyed religious consciousness has been replaced in the curriculum of popular piety by a system of festivals derived (to this day) from apparent pre-Christian customs, and folklore is promoted as much as possible as "the art of the people";
- a wave of cottage industries, occupying land in the countryside and in the woods, follows the earlier tramp huts.

Fig. 397
Rural collectivisation

Fig. 398
Reminder of a ploughed dirt road

In the context of large-scale production, a new revolution is emerging – the agrochemical revolution. It is introducing the **cultivation of the soil with all kinds of chemical means:** herbicides (against weeds), fungicides (against fungi), insecticides (against insects), rodenticides (against rodents), desiccants (against crop wilting), etc. Progressive chemicalization is gradually replacing mechanical tillage to achieve yields.

Of the ancient six limits of Neolithic agriculture, one has already been solved:
- **"how far from home are we able to cultivate the land"** = tractors fundamentally reduced the time to travel to the field.

And partly the second one:
- **"how large an area are we able to keep deforested and sown"** = constant movement in the fields limited tree growth (but there was an unnoticed self-seeding of trees on the edges of the forest and a shift of its boundaries into the fields).

For the other four, the revolution and disengagement from natural processes has only now occurred:
- "**how do we ensure nutrient replenishment** in the field" = precisely mixed **artificial fertilisers** replenish the nutrient supply arbitrarily every year,
- "**how much we can harvest** in the agronomic timeframe" = using desiccants to ensure the harvesters have the exact common timing of crop maturity,
- "**how we can combat food competitors** (weeds, pests and crop diseases)" = using pesticides we can eliminate food competitors and crop diseases,
- **"how we can loosen the soil for the plants"** = loosening the land on its own makes no sense in relation to the previous production and often only a stubble-tillage is carried out.

Capacity livestock farming is directly dependent on chemicalization. Chemical preparations (hormones and preventive antibiotic screens in large-scale livestock farms) are included in the special feed mixtures of each category of livestock.

Advanced pharmaceuticals make it possible to rear animals even in unsuitable conditions.

Thus, in practice, agrochemistry replaces the vast majority of natural agronomic (and zootechnical) practices and basically anything can be grown and bred anywhere.

The fundamental danger is the lack of knowledge of the involvement of these alien substances in ecosystems. The precautionary principle is being violated, and so DDT has almost deprived us of birds and mammals, CFCs have almost destroyed the ozone layer of the atmosphere, chlorinated biphenyls have contaminated milk and meat from cattle, Travex has contaminated water and soil, etc. (but it continues today – Roundup).

Because of nonsensical communist evaluation criteria, soil is being over-fertilised and a large, unused portion of fertiliser is also polluting water sources.

As in other cases, the impact of chemicalization in our country had been particularly devastating due to poor quality raw materials and products. The biggest problem was with phosphate fertilisers made from Russian raw material from the Kola Peninsula (Kola phosphate), which contained a strong admixture of dangerous cadmium. Cadmium and a many other foreign substances from fertilizers and pesticides polluted soils and became involved in food chains.

Added to this are immissions from other industries. The sulphur contained in lignite combusted in the atmosphere in heating plants and power stations, combining into sulphuric acid and creating acid rain, which acidified soils. Efforts to remedy this led to large-scale liming of both fields and forests.

Agricultural fields thus gradually became a chemical desert, lethally poisonous to all life except the target crops. Only islands with relatively natural conditions were preserved (much later, the desire to connect them in a minimalist way led to the creation of a protective system of TSES). In general, however, the biodiversity of the cultural landscape has declined sharply and substantially (buzzards, bee houses, etc.).

The big tractor era

In the 1960s, huge and powerful tractors manufactured in the USSR, with parameters for large steppe areas (e.g. celinas), began to be imported from the Soviet Union. For those huge fields, machines were designed to hitch wide-ranging implements. The working position of these machines was wide, and they had to be folded into a narrow travel position for travel to the field. The same had to be done for crossing among fields. However, this did not happen and meant the destruction of all the trees around the field roads.

The weight of these machines led to intensive soil suffocation, their low manoeuvrability led to an attempt to change our landscape structure to a large-scale one. This is a time when the demarcation of land less than 100 hectares in land development must have been demonstrably necessary for technical reasons! The enormous size of the land also led to large-scale land amelioration interventions, and even so, it substantially increased water and wind erosion.

The wide sweep and poor turning of the mechanisms led to the formation of residual uncultivated areas (sharp corners, pylon islands). The same problems exist with the self-seeding of trees at the edges of forests, which has gradually expanded so that today's field boundaries are even tens of metres out of line with the original field.

In principle, the same old types of implements are still attached to heavy tractors, but with a multiplied load. The arrival of combine harvesters is merging all harvesting operations, and threshers are disappearing. The problem arises, however, with the enormous overweeding of the fields (weed seeds used to be taken from the fields in sheaves with the grain and disposed of in the manure, but now they are returned to the fields with the chaff).

Agricultural planes, used mainly for chemical plant protection, are appearing, but problems have arisen with the accuracy of application (even village gardens etc. have been affected).

This period of large-scale farming with large and heavy machinery has continued to the present day.

Consequences of large-scale farming and its main problems:
- Adaptation to the size **and shape of the plot**, and the whole landscape, dimensionally inadequate for farming techniques (technological nonsense) – large plots = wind and water erosion.
- Smothering of **subsoil layer** by heavy machinery = reduced rainfall absorption – drying out and further acceleration of runoff.

Fig. 399
Large-scale fields aggregated regardless of erosion

Fig. 400
Efficient but heavy farming machinery regardless of soil smothering

- The pursuit of yield (not profit) at any price (under the slogan of self-sufficiency) led to the same intensity of production in the mountains and in the lowlands, e.g. growing maize for silage and on **sloping land**, massive and usually **unnecessarily high fertilisation** with mineral fertilisers, **ploughing of meadows**. All of this led to major water erosion of the soil.
- **Large-scale farming** and new, larger barn buildings (2,000 cows, 5,000 pigs, 10,000 and even 100,000 chickens!) required litter-free housing with aggressive manure production.
- The risks of infection and disease led to the creation of **antibiotic screens**, these created and continue to create residues in the meat and milk of the animals.
- Huge, but necessary, odour **control sanitary zones** pushed all livestock production out of the villages and into agro-industrial centres.
- Litter-free operations (grain without straw) led to **liquid manure** problems and, in turn, livestock dung as the basis for the supply of **organic matter** with nutrients to the soil became rare.

- **Large-scale** irrigation and drainage where some land was meliorated unnecessarily and detrimentally.
- The merging of holdings **into large units** comprising several cadastres (and ploughlands). The organisation of production, based on concentration in agricultural centres outside the villages, then led to the need for a radical change in the **field-farm road network**. The radial network to the villages of the past was artificially (and often poorly) replaced by a tangential network connecting the centre to the land across the ploughlands. The main farm roads have taken on the width of third-class roads and are surfaced with bitumen.
- "Economical" terraced houses with 2 storeys and flat roofs began to be built in threshing floors on the occupied plots of the "oversized" gardens of the old development.
- The prefabricated housing estates being built – the depersonalization of the world with the uniformity of equality – initiated the development of **second homes** in the countryside.
- Nature and landscape protection – generous but often only in appearance – in practice, real nature protection became the domain of the first conservation organisations (nature protection association, Brontosaurus movement, etc.).

A specific feature of the previous regime was also the high employment in primary production, influenced by the different way of managing agricultural and other enterprises. Non-agricultural activities, which had several functions, two of which were the most important, became increasingly prominent in the unified agricultural cooperatives (JZD) and state farms. First of all, they enabled the employment of seasonally under-utilised workers in the "socialist sector", or in the countryside in general. Secondly, they brought interesting resources from non-agricultural activities into the risky agricultural economy (which the JZD did not have to pay to the state, like other productions) and improved the results of its own agricultural economy. This resulted in exceptional cases in such a situation that some of the largest agricultural enterprises realized up to 90 % of their gross production in non-agricultural activities (construction crews, repair shops, assembly of industrial products, small-scale garment industries, etc.). JZD Slušovice, led by Mr Čuba, even produced computers. This was also one of the reasons why at the beginning of the 1990s, about 7 % of the economically active population, i.e. almost 600,000 people, were employed in the primary sector [Bičík a Jančák, 2005].

In 1979 the highest dam (Dalešice) was built, and since 1982 the Morava River has been de jure navigable and regulated up to Hodonín.

Forest management

Heavy mechanisation is also used in forests. **Large-scale clear-harvesting** exposes huge areas without forest edge, which releases the effects of crosswinds and logging. In order to remove roots, soil is bulldozed in flat terrain (especially in lowland forests). Planting of monocultures (preferably *monopoly species* – 100 % spruce, Canadian poplars in the wet) continues.

Fig. 401
Forest clear-harvesting

Pesticides (including the inglorious DDT until the end of the 1960s) are also used on a massive scale against forest pests that multiply in monocultures.

Deteriorating air quality due to the exhalations from thermal power stations and steelworks led to acid rain, which has destroyed spruce forests, particularly in the Ore Mountains and Jizerské Mountains. Costly replacement planting had been carried out with resistant but often non-native species ("silver" spruce). Only today are these replacement plantations growing into more involved but poor quality stands (often replanted), and the power plants are being desulphurised.

During communism, **hunting** (which in the Middle Ages was a training exercise for chivalry for battle and remained a privilege of the nobility) **was also fully developed** in two forms (still in force today):
- **reserved hunting grounds** for "prominent" persons and, for money, also for foreigners (over-gamed preserves where deer eat even the branches of trees within reach – "transparent forests"), artificially bred pheasants in pheasantry (refusing to fly!);
- **folk hunting** – "armed brigadier"", the aim was and is to protect "good" = game from fellow citizens (poachers, motorists) and to fight with "bad" game = predators (what has claws and a hooked beak is to shoot) and beasts (they have rabies anyway).

Efforts to remedy

In general, since about 1980, there has been a period of elaboration of **environmental design and protection concepts**, which, although still on paper, have increased general awareness.

Improvement efforts have been made in new generations of land development projects:
- while the Economic-technical Land Improvements (since 1955) were carried out to consolidate land into large blocks (over 100 ha) when the JZDs were merged;
- with the Aggregated Land Improvement Projects (from 1974 onwards) there is already an attempt to address all aspects of the field landscape – from erosion to the water network to greenery;
- in the case of the Comprehensive Land Improvement Projects (1980–1991), although consolidation is still continuing, the protection of natural values is also increasing, although mostly on paper again.

Protection of fields against erosion is also being introduced.

Communism tries to counteract the enormous encroachment of agricultural land with the institution of **replacement reclamation**. Whoever occupied agricultural land had to acquire the same area elsewhere by reclaiming the abandoned land with their own forces (there was no spare building capacity), regardless of the price! Thus, from the 1970s onwards, an era of building artificial earth terraces (first narrow, then wide) on slopes and steppe fallows in general was ushered in, destroying many natural refugia. After many centuries, completely new landforms have appeared in our landscape, which are now a lasting memory.

Fig. 402
Wide terraces of vineyards

11.4 The recent present

(1990–2020)

The recent increase in temperatures continues, and precipitation is typically highly variable:
- flash floods have hit us in 1997, 2002, 2006, 2009, 2010, 2013 and they recur 5 times more often than in previous periods (about once every 2 years!);
- on the other hand, extreme droughts were in 2003, 2007, 2008, 2015, 2016, 2017, 2018, with hurricanes Kyrill 2007 and Herward 2017 interfering;
- this leaves 1998–2001 , 2004–2005, 2011–2012 and 2014 as "normal" years, which is only 9 normal years in 23 years!

Despite the stubborn denial of climate change by politicians who don't understand it, global climate change is a fact to be reckoned with and seems to be going the way of past boreals.

These times, full of the changes and upheavals that accompany the transformation of society and our landscape[30], are hard to describe in their dynamism. However, it is possible to divide it into six successive periods, not entirely accurately and purposefully, where individual historical changes are given their political contexts and can be named according to these contexts (the *Velvet Bankruptcy of Communism* – 1989, the *Age of Honourable Men* – 1990–1992, the *Age of Revolutionaries of the Second Order* – 1992–1998, the *Age of "Improved" Communists* – 1998–2006, the *Age of Godfathers* – 2006–2013 and the *Age of Communist Oligarchs* – 2013–2020).

The Velvet Bankruptcy of Communism (1989)

(Prime Ministers Jiří Adamec and Marián Čalfa)

By the end of the 1980s, the economic situation of the Soviet bloc was becoming critical. The extremely obvious economic superiority of the West over the East – 4.5:1 (NATO's GDP was about

30 The issue of changes in the landscape has been addressed, for example, in the project of the Czech Science Foundation *GA205/94/1222 Transformace příhraniční krajiny jižní Moravy* (Transformation of the border landscape of South Moravia).

30,000 billion dollars, the Warsaw Pact had a GDP of 6,700 billion dollars) meant that the equivalent armaments, with huge costs on both sides, had a far greater impact on the Communist side – 4.5 times greater (if a Frenchman gave 100 francs for armaments, a Russian had to give over 400)! So Reagan essentially over-armed Gorbachev.

Communism in all countries was facing state bankruptcies, and these were gradually coming. Our communists tried to engineer the bankruptcy to ensure impunity for the past 40 years and to pass on power in a way that would leave them with as much private control over the rest of the state assets as possible.

Power was first taken over by a virtually small group of revolutionaries – "honorable people" (in Brno the entire new parliament of Citizen Forum – Občanské fórum – had 70 people!) who, although honest and decent, were completely economically inexperienced. Which everyone, in the general euphoria, failed to realise.

Fig. 403
Velvet Revolution

The Age of Honourable Men (1990–1992)
(Prime Minister Petr Pithart)

The **basic ideas of the new state** were established:
- a liberal, democratic, and secular society,
- free elections,
- a developed system of civil society,
- a common European future – the EU and NATO structures,
- redressing some of the wrongs committed by the communists in the past,
- free enterprise, social market economy,
- privatisation of state monopolies (perhaps the only successful privatisation was the one of a car factory – Mladá Boleslav by Volkswagen).

The majority of the previously persecuted minority of Chartists and their friends who proved their bravery and moral fortitude in bad times participated in their formation, including the legal foundations.

Towards the end of the period there was a development logical in any revolution. At the moment when it was clear that no reversal was imminent, the "revolutionaries of the second order" stepped in. Gradually, over the next decade, they pushed the "honourable" out of positions of power, and "realist" politics, increasingly hostile to the dissidents, began (the revolution eats its children). The iconic central slogan of the Velvet Revolution, „truth and love must triumph over lies and hatred,“ soon became a pejorative.

Landscape

Already in 1991, the **Restitution Act** on the Redress of Certain Wrongs was adopted. A special rule is that if land cannot be handed over, the restitution holder has the right to choose state land anywhere (substitute restitution).

Restitution meant the demise of the cooperative and state farms. The system of subsidies was fundamentally changed (1991) from supporting production at any cost to supporting the non-productive functions of agriculture. A new document on the organisation of the agricultural landscape – simple and comprehensive land regulations – was prepared, corresponding to the principles of ownership:

- Simple land management is only used to settle a group of affected lands when intervening in the landscape, for investment or restitution reasons.
- Comprehensive land management is already a complex document which (with the consent of the decisive landowners) can propose common facilities (erosion protection, road network, TSES, etc.) at the expense of all owners and protect the values of the landscape and its character.

The financial constraints on farms at that time led to the necessary reduction in the use of artificial fertilisers and pesticides – the **landscape was relieved** (natural species that had not been seen for a long time, such as partridges, appeared in the fields).

The age of the revolutionaries of the second order (1992–1998)
(Prime Minister Václav Klaus)

A huge part of society, which was silent or cooperative under communism, took part in free elections and won the elections in a pragmatic, albeit disrespectful way, under the slogan that the revolution and belt-tightening were over and paradise would be here. These revolutionaries of the second order (after the battle), under the banners of the honourable, picked up a group of salon economists (from the Vladimír Komárek´s Prognostic Institute) to government posts and set in motion major economic reforms:

- small-scale privatisation (auctioning of small establishments),
- large = voucher privatisation (1992 – 1st wave, 1994 – 2nd wave).

In total, assets worth CZK 367 billion were privatised, i.e. an average of 35 thousand CZK per capita. 77 % of citizens participated, but 72 % of them put their coupons into privatisation funds, which were insufficiently regulated and often were embezzled (Viktor Kožený et al.).

The era can be characterized by:

- the **invisible hand of the market** is ruling – the economic sharks are the best ones to orientate – especially the economically trained profit-communists, and they are secretly but immensely rich (Bakala, Babiš, Kellner, Kožený and others);
- ideas are profaned and relativized by the consumerists, and the **meaning is consumption**;
- **media advertising of stereotypes** reigns (in shopping, holidays, and life) – they dictate the value system;
- media also shapes opinion on politics (who is not on TV is not in parliament); anyone can be destroyed by campaigning; the power of central authorities is growing;
- maximum preference for road transport for mass production (condition of **globalisation**);
- first party funding scams (1998 – Klaus‘s “Sarajevo assassination”, collapse of his government and new elections).

EU pre-accession subsidies directed to us are beginning to shape the ways in which they are used and new non-governmental non-profit organisations (NGOs) are emerging. Of these, the so-called land cooperatives, which collect key land of particular natural importance, are particularly important for further development in terms of nature and landscape protection. Local association initiatives for nature and landscape management are also proving important.

In the landscape

Land restitution is in full swing, but it is not meeting the expectations of the "honourable" – the restitutionists overwhelmingly do not want to farm themselves and are renting their land to former JZDs at ridiculous prices. The latter are turning into joint stock and limited companies. Replacement restitution offers great opportunities for speculators – even MPs are buying up people's restitution claims on irreversible land (e.g. taken by opencast mines) and exchanging them for large, comprehensive dominions elsewhere. Some of the land is not worth cultivating, and large fallow fields are appearing in the foothill landscape.

Only 2.3 % of the economically active population is employed in agriculture.

The Forestry Act prohibits bare-harvesting on areas larger than 1 ha.

In 1997, Moravia was hit by a catastrophic flood; all the long-standing and laboriously built flood protection measures failed and the water precisely flooded a wide swathe of the old floodplains. Our investigations during this flood found that all settlements and facilities lying in the floodplain were washed away, whereas no core of villages older than 200 years was flooded [Kolektiv, 1998][31]. Hopes were raised that the approach to stream regulation and floodplain urbanisation would finally change [e.g. LÖW a spol., 2000b], but the result was further demands for dams and higher fencing of streams in the floodplain.

A national initiative for the construction of cycling routes is beginning to emerge.

The Age of "Improved" Communists (1998–2006)

(Social Democratic Prime Ministers Miloš Zeman, Vladimír Špidla, Stanislav Gross and Jiří Paroubek)

After the electoral stalemate, the winner (M. Zeman) and the opposition (V. Klaus) entered into the so-called opposition agreement, whereby they shared power and wealth regardless of ideals – the onset of political distasteful decline in our country. With Zeman came a group of people, with a majority of recent communists, and they occupied government positions. Departmental policies followed those of the pre-revolution era and the building of a social-market economy began. However, the integration process continued and we joined NATO in 1999 and the EU in 2004.

An important attribute of EU integration is interstate solidarity – both political and financial. The system of European solidarity (cohesion) funds is intended, among other things, to support weaker states with stronger ones. Even we, as a backward economy, are still significant recipients of this "extra" money.

The Rural Development Support Fund, after initial scrambles with the EU, secured large sums of money available for development projects. However, the method of drawing down these funds and controlling implementation was extremely complicated and towards the end of the period we found ourselves unable to spend the available money at all due to bureaucratic obstruction! The hunt was on for simple and easily negotiated projects (e.g. the epidemic of building lookout towers anywhere, anytime).

Another problem has been with agricultural capitation payments (per head – in this case per hectare of farmland) to farmers. These are naturally linked to landowners in the EU. However, our landowners mostly only had rented land and so should not have received anything! The EU has relaxed the rules and so our large tenant farmers would also get subsidies.

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31 See also J. Löw's paper Urban Reflection on Floods at the conference Floods and Landscape 97.
This is also confirmed by the study *Město a povodeň: strategie rozvoje měst po povodních* (City and Flood / Urban Development Strategy after the Flood) [Konvička a kol., 2002], which analyses the impact of the extreme flood of July 1997 on Moravian cities and the possibilities of their further development. It notes that a significant part of the flood damage occurred in locations – river floodplains urbanised mainly in the 19th and 20th centuries. The publication is the result of the research task *Strategie rozvoje měst po povodni* (Urban Development Strategy after the Flood) *GA103/99/0780*, carried out at the Faculty of Architecture of Brno University of Technology in 1999-2001 (financed by the Czech Science Foundation).

The globalization of the world has come in full force, above all:

- *Globalization of production and trade* – preference for **cheap capacity transport – motorway transit**, airports, water transport, **fuel** is the problem (not an energy crisis, but a fuel crisis) determining the world (seabed, gas, etc.).
- *Globalization of assets* – **depersonalisation of capital** in joint stock companies and loss of ownership – everyone is a manager and owns each other, losing accountability (PM calls it "tunnelling" but he is watching).
- *Globalisation of labour* – labour is where the production is and it is where it is profitable for it – anywhere, anything. There is a replenishment of populations by immigration (in our case Vietnam, Ukraine, Russia, etc.), but it often does not take over our hierarchy of values (in which, moreover, we ourselves are not clear).
- *Globalization of information* – information is readily available via the internet, but any information = degradation of information sources (disinformation attacks etc.), similar to so-called political correctness (self-censorship of unpleasant news).

The evolution of the landscape

Agricultural cooperatives are often "tunnelled" by their management (assets are transferred to their limited companies) and a way is sought to get rid of the landlords' ownership claims. To do this, a form of joint stock company is chosen, which allows land to be acquired by subscribing for shares.

Table 9
Development of the number of agricultural entities: the number of private owners (= farmers – new landlords) and commercial companies (a.s.) is increasing at the expense of JZD [processed according to Bičík a Jančák, 2005]

legal form of business	**1990**	**1995**	**2000**
agricultural cooperatives	66,5	46,9	29,1
commercial companies	-	28,1	43,2
private peasants and farmers	1,3	21,7	26,4

However, less than half of the farms control only 5 % of the agricultural land and keep 4 % of the animals.

Replacement restitution continues on a large scale and it is as if history is repeating itself with the residual estates of the First Republic – the creation of new land dominions (see table below) that dominate agriculture (the largest estates today are comparable to the domains of the richest Moravian family before the war – the Liechtensteins – 135,706 ha).

Table 10
The largest owners of agricultural land in the Czech Republic [processed according to Bičík a Jančák, 2005]

A. Babiš	Agrofert	103,000 ha
R. Vítek	Spojené farmy	20,000 ha
G. Večeřa	Agro Měřín	21,000 ha
J. Mílek	Úsovsko	19,000 ha
	Eurofarms	23,000 ha
R. Kružík, L. Krejčí	Agro 2000	15,000 ha
J. Kolář	Rhea holding	17,000 ha
Z. Červenka	Lukrom	15,000 ha
Z. Jandejsek	Rabbit	17,000 ha
O. Gojiš	Interlacto Group	10,000 ha
and about 280 other enterprises of the characters of large estates		

The government creates financial subsidies for the purchase of leased land and large landowners gradually buy it.

The European agricultural subsidy policy (originally designed for the French agricultural voters) leads to significant profitability, with agriculture once again becoming a profitable form of business and struggling to maximise profits. **Chemical pressure** on the landscape **is increasing** (e.g. phosphate fertilisers, together with poor quality household detergents, have increased phosphate run-off into watercourses, leading to calamitous cyanobacteria outbreaks). Again, *monocrops* reign supreme, due to the skewed economy they are non-food crops (e.g. rapeseed for fuel).

Farming on less favourable land is again starting to pay off, but new uses are being sought, especially livestock production. Comprehensive grazing areas for cattle, riding horses, goats for milk and sheep for meat are being established, and in some places exotic breeding of ostriches, llamas, deer, and fallow deer.

Subsidies for meadow maintenance (mowing and hay collection) allow cheap maintenance with guaranteed profit – meadows and pastures become a good investment (Prague lawyers "farming" in Šumava mountains).

In times of difficult food surpluses, the EU has managed to divert production subsidies partly to payments for cultivating (maintaining) land without food production. There is a definite victory of demand over supply, subsidies dictate what is grown. Recently recovered species of organisms are disappearing from the fields again and the landscape is emptier than before.

The first signs of COx greenhouse effects and climate change are appearing.

Non-food production, mainly in the floodplains, was focused on lignoculture on agricultural land or biogas production.

Genetic modification of crops and animals as **bio-machines** (they can't walk or fly – only lay eggs) – no one knows what it will do in a few generations.

The way out is to grow organic food. But this is expensive and have low yields – not suitable for large-scale production. Nevertheless, demand for them has been rising for a long time in this country, which is mainly due to a greater interest in food quality (rather than sustainable farming or animal conditions).

Compared to neo-romanticism, there is also an increased interest in semi-natural areas and species conservation in the wider population. There is a pan-European Natura 2000 network of sites, the EECONET network and our own nature park type tools. The European Landscape Convention (2000) is also new, although neo-romanticism (bucolic landscapes) and especially the tourism business are still winning out. The first attempts at environmentally sustainable production of agricultural products are emerging – organic farms.

The first constructions for nature (ponds built under the guise of biocentres with EU money for ecology) are also being built. The accelerating fragmentation of the landscape by traffic is responded to by the construction of the first "biobridges" – ecoducts, bridging motorways with vegetation belts (or the motorway is embedded in tunnels underground).

In 2002 and 2006, there were further devastating floods, this time in the Bohemia, and again without a professional or political response.

Increasingly, suburbanisation pressures are encroaching on the agricultural landscape with new, carpet-like construction of houses. New industrial installations such as wind farms and photovoltaic complexes are appearing.

The last of the "improved" – PM Jiří Paroubek – became famous for declaring that he would rule with anyone, even Martians.

The Age of Godfathers (2006–2013)

(Prime Ministers: Mirek Topolánek, Jan Fisher – appointed by the President, Petr Nečas)

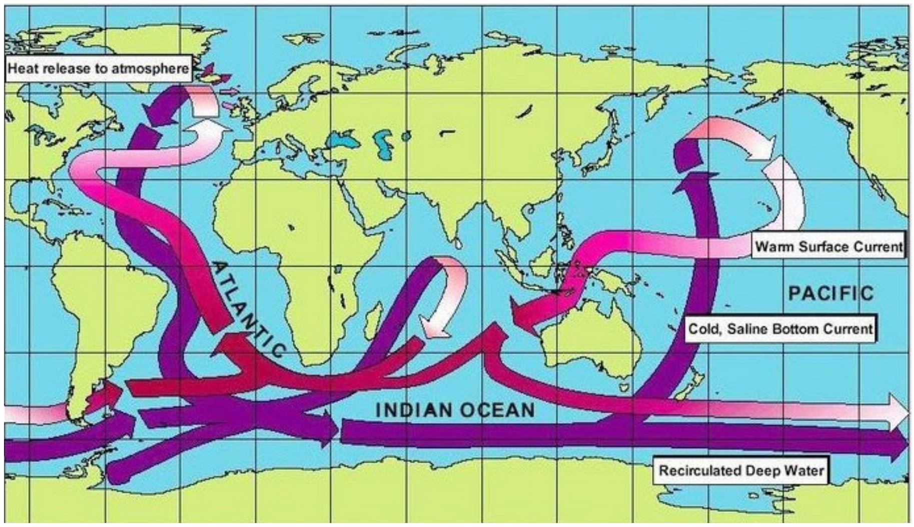
The habit of sharing positions between the government and the opposition led to the emergence of clientelistic relationships, often linked to corruption. This led to multiple government breakdowns and resulted in the prosecution of MPs, the Prime Minister, and his associates (including his future wife).

Global climate change (warming) – there is no doubt that changes are occurring, and public opinion is beginning to reflect this (whether we are to blame or not, but we certainly have an impact). Although some laymen refuse to accept this fact (Klaus et al), numerical calculations of climate cycles show a reversal in the 18th century and we can see climate change too.

Global temperature changes themselves are not the worst consequence, but their effect on **probabilistic transport systems** – the planet's major heat exchangers – airflow (South Pacific, North Atlantic and Arctic oscillations) and ocean water flow (Pacific: Equatorial countercurrent = El Niño, Kuroshio = "Black River", Atlantic: Gulf Stream + North Equatorial Current, Brazil Current, Indian Ocean: North Equatorial, Somali Current and Agulhas Current, etc.). The change can be fatal – just a few degrees of temperature and everything will behave differently!

The changes are manifested little in the increase in the average, but mainly in the widening of the amplitude of the fluctuations, and this will be decisive.

Fig. 404
Thermohaline heat exchanger
[according to CLIVAR, 2020]



The globalised world is responding by shifting the fight against greenhouse gases to a new global market for subsidised technologies (e.g. photovoltaics) and emission allowances. A planet-wide agreement on joint action at the highest political level remains a mere vision.

In our country, the struggle for subsidies continues, the construction of lookout towers directed by municipalities is booming – hundreds of them are being built. Other facilities for tourism are being added (expensive canals for recreational boating, so-called spas outside natural resources, "western" towns, ski resorts when the snow amount is falling, etc.). No entrepreneur would build them with his own money, but with subsidies he could.

Thus, a hitherto inconspicuous new trend in the use of the landscape (which was hitherto an image of mainly secondary – productive uses) is confirmed – adaptation to tertiary (leisure) tourism interests, with imitations of historical, cultural and, finally, fake natural (a play on aurochs). The economic use of the growing leisure time (short working hours, free weekends, long holidays) is the newest and very profitable form of business. The conception of our landscape as a **space FOR ENTERTAINMENT (to kill some free time)** is expanding. It is no longer a home and a livelihood, but a grand imitation of our subjective imaginations. This development is prefigured by the castle parks of the nobility – a social class, long since freed from existential worries, with plenty of leisure time.

The virtual world is also creating a new "patriotism", especially food, as part of the advertising campaign of the landlords. Even if peasants are renamed farmers and have farmers' markets instead of peasants' markets, this does not hinder the fake Czech patriotism in food.

Landscape

Changing climatic conditions have begun to have a greater impact on our landscape. The first unmistakable warning was the devastating Bohemian floods in 2009, which were preceded by droughts in 2007–2008.

Hurricane Kyrill also hit the Bohemian Forest and sparked an overpopulation of spruce bark beetle. There were semi-literate outbursts by politicians (Zeman, Zahradník, etc.) about the need to cut everything down. However, some of the forests in the no-go zones were not cut down, and years later their natural, self-renewing processes were proven to work.

Fig. 405
Natural regeneration of locally native spruce stands

Climate warming is coming, this time clearly. Droughts, spruce monocultures and disorderly forest management are favourable to bark beetles, and the natural zonation of forest cover according to altitude (spruce should be in our suburbs above 900 m above sea level, fir above 500 m above sea level) is confirmed by forest death.

The EU's direct agricultural subsidies, which have been increased gradually – from 25 % of the old EU level to 100 % in 2013 – have almost completely saturated agriculture, and it has become a profitable sector.

The Age of Communist Oligarchs (2013-2020)
(Prime Ministers: Jiří Rusnok – appointed by the President, then Bohuslav Sobotka, Andrej Babiš; President Miloš Zeman)

Zeman-hated Sobotka was in power until 2017. After his downfall, a power pact was formed between controversial politicians – the president and the prime minister – the billionaire Andrej Babiš. In a consensus, they filled the government with their own people. In doing so, the personality emptiness of both groups and a deep decline in the ethical level of politics are revealed. Under the slogan of a government of experts, the government is open to all representatives of big capital (from the president of the supermarket association as minister of industry and trade, to the director of a large transport construction company as minister of transport, to the vice-president of the handball sports association as minister of culture, to the president of the big-estate Chamber of Agrarian Affairs as minister of agriculture). The vast majority of them belong to the profit-communist layer, who joined the party only for personal gain and are unashamed to admit it.

The new civil service law removes civil servants from the thrall of politicians, radically raises their emoluments and gives them significant decision-making powers. Even spatial plans largely depend on the will of the civil service.

At the beginning of the period, direct payments to agriculture were brought up to the level of the old countries and the transformation of agriculture was thus completed from the EU point of view (which our government refuses to accept).

Results of political developments:
- a populist oligarchy rules by manipulating the lower layers of society;
- secularism is replaced by offensive anti-theism and seeks further nationalisation;
- the communist agricultural slogan of "**concentration**, cooperation and specialisation", still alive, is reasserted;
- the internet **creates a virtual reality** of lives and a flood of news of various kinds with sketchy or **unverified** or even false information that, without a systematic overview, causes confusion;
- the sustainability of the landscape is changed to the sustainability of **human populations, not nature;**
- environmental protection **has also become an area for business** (renewables and their technologies, emission allowances, meadow maintenance, etc.).

Landscape

Ever since the "time of the improved communists", cadres surviving from communism have been appearing in key subsidy bodies, often favouring new large companies created by privatisation of former cooperatives.

Smaller restitutionists or even those who have recovered large estates (even 100 ha or more) are in trouble because they have no links to the existing micro-regional and district structures of the pre-revolution period. *"Also, the degradation of work ethic, disrespect for private property and the habit of taking from the common or state property (theft, poaching, commissions) was and is a certain deep-rooted legacy of the transition period that still persists"* [Bičík a Jančák, 2005].

Paradoxically, a new layer of landowners (former functionaries of the Communist Party of Czechoslovakia, Socialist Youth Union, JZD and state farms) took control of the agricultural sector and continued to maintain large-scale production practices with all the ills of socialism and monopolized European subsidies. In a number of cases, the large estates, linked to the food and chemical industries, continue to grow into huge estates, far exceeding even the old aristocratic domains.

The final restitution dot (July 2018) was to be an important milestone, definitively fixing the new property relations. However, it was annulled by the Constitutional Court.

Meanwhile, the last major floods in 2013 were replaced by a four-year drought (2015–2018), set by tropical heat. Into this enter significant hurricane winds (2017 Hurricane Herward, 2020 Hurricane Sabine).

Major droughts have weakened habitat-unsuitable spruce monocultures, and we are facing a massive bark beetle calamity that will certainly not be the last.

Temperature changes lead to a shift in the vegetation scale of our ecosystems not only upwards (altitude), but also northwards (great bustard and bog turtle near Přerov, unfrozen fig trees and rosemary in gardens, mantis in northern Moravia, etc.).

In response to this critical situation, "new scientific findings" are emerging in the agricultural sector. Measures that are in fact at least 45 years old are being proposed as new (the old "concepts for the creation and protection of the environment in the agriculture and food sector"). Then and now, they have met with a reluctance to fundamentally change the farming practices of large companies and have been redirected, as today, to well-funded, non-agricultural measures (dams, canals, irrigation, and drainage). However, the situation today is critical and out of line with even then. There is no going back and inspiration must be drawn from arid countries at lower latitudes (southern Italy, Spain, Israel, Lebanon, Morocco, etc.).

The trend towards the emergence of landscapes for entertainment continues and is gaining momentum (canals, including the Danube-Oder-Elbe, the Vltava River to České Budějovice for cruise ships, equestrian complexes, sports complexes for marginal branches – golf, etc.), all with European money.

11.5 Reactions to post-revolutionary developments

The search for new ideas and ideologies

The old Enlightenment assumptions are increasingly being questioned.

Into these ideological confusions, the EU brings a set of values on which it de jure relies. The EU Charter of Fundamental Rights (also the EU Charter of Fundamental Rights) includes the right to dignity, freedom, equality, solidarity, civil rights, and justice.

European values are listed as:
- liberal democracy = free elections, independent press, independent judiciary;
- human rights (see below European Convention on Human Rights);
- free movement of people, goods, and ideas;
- developed civil society system = gender and orientation equality, association, assembly, freedom of religion;
- secularisation;
- free enterprise, social market economy.

The Convention for the Protection of Human Rights and Fundamental Freedoms (abbreviated as the European Convention on Human Rights) contains: *right to life, right to liberty and security of person, freedom of thought, conscience and religion, protection of property, right to free choice, freedom of movement and residence, freedom of expression, freedom of assembly and association, prohibition of discrimination, right to respect for private and family life, equality in rights and obligations between spouses, right to education, prohibition of torture, slavery and forced labour, prohibition of debtors' prisons, absolute prohibition of the death penalty, right to appeal in criminal cases, prohibition of expulsion of nationals, prohibition of collective expulsion of foreigners, procedural guarantees in expulsion of foreigners.*

The problem, however, is that these values are a direct result of the millennia-long history of ancient and Christian civilization and are far from being fully shared by the other great world civilizations that were formed in a different ideological environment (Islam, Hinduism, Buddhism, Taoism, etc.). In the global world today, the "European model" is interpreted and penetrated to the point of being disintegrated in different ways (as are other cultural models). The notion of a democratic state can, and often does, mean something quite different from the Euro-Atlantic space (how many states outside of Australia and New Zealand can be classified as liberal democracies in our terms?).

In fact, what we are witnessing in Europe today are veiled attempts by states to limit the influence of Islam and its immigration in Europe through various "correct" interpretations of freedom of religion and expression, as well as circumventing the prohibition of collective expulsion of foreigners and their rights to procedural guarantees.

The practical destruction of a homogeneous European society by anti-Christianity leads even outside the immigrant communities to search for alternative ideas, and the ideas of the society develop into a whole fan of mostly incompatible visions, from which a fragmented and non-conceptual approach to solving problems in the landscape is derived.

Among the ideologies, the following should be mentioned at least:
- **Materialist antitheism** – the result of the profanation of Christianity – a return to communist class struggle, social engineering, and the struggle against the churches.

- **"Somethingism"** as an expression of the claim by the majority of the population that they "believe" in something.
- **Ecologism** – lifestyle, promoting immutability and modesty – ecological awareness, in our country long ago Czech Union of Nature Protectors, Brontosaurus movement, Eco-program, etc.
- **Auto-isolationism** – apparent individualism – private life in a functioning world – return to the closed life under socialism.
- **Religious romanticism** – the starting point in the search for rituals of the past, but romantically improved (Celts, Buddhism, New Age fantasy, "natural nations" ...).
- **Extremism** – the search for new and old identities – immigration and xenophobia (anti-theist population suddenly demanding the protection of „Christian foundations"), etc.
- **Islam** – its presence is increasing with immigration and is beginning to have a significant share in some countries (France, Germany); it is harmless in itself, but its extreme manifestations are clearly violent. As some argue, it is 500 years behind Christianity in development, and so it is violent (remember the religious intolerance and fighting in 16th century Europe!).

Searching for a new landscape

The present landscape is made up of historical developmental stages from the changing natural conditions of the Pleistocene and Holocene, through Neolithic deforestation, the fixed outline of the main erosion retarders since the time of the attachment system, to the fixed outline of land block boundaries of the Middle Ages.

These fundamental lines of water movement in the landscape and the development of its micro-relief have not been destroyed even by collectivisation and continue to shape the landscape today, regardless of natural climatic changes. However, with the increase in the leisure of the consumerist type of the broadest classes, there is increasing pressure to promote a "landscape for fun", breaking out of this long-term development.

The main, relatively new problems of today, which are linked to climate change, are long-term droughts and extreme heat on the one hand, and torrential rains and major floods on the other. This requires fundamental changes in approaches to our landscapes, especially in water management concepts and responses to extreme and increased average temperatures [Löw, 2020].

In terms of abnormally dry periods, the crucial goal is to keep as much rainwater as possible in the area – at the point of impact of the water droplet.

The main measures are therefore primarily:
1. Increase the soil's ability to take up and retain moisture throughout the soil profile, primarily by radically increasing the proportion of organic matter in the soil and loosening it, but also by slowing down surface runoff with appropriate crops.
2. Ensure the best possible infiltration of water into the soil substrate and underground aquifers, primarily by slowing surface runoff and eliminating tamping of the subsoil by machinery.
3. Methodologically and legally ensure direct responsibility of primary producers for erosion = soil runoff from their cultivated land. The vast majority of erosion processes are due to their poor management.

Only in the second row – in places of change from planar outflow to concentrated one:
4. Slow down outflow by using retarders (bounds, small basins, and catchment ditches). Retention of as much accumulated water as possible in the upper parts of the catchment area by reservoirs (or, due to excessive evaporation, by covered water tanks) – for self-supply in times of drought.
5. Introduce economical types of irrigation, especially self-regulating irrigation.
6. Retain water in valley reservoirs, at the lowest points of the basin (ineffective for agriculture), which are only important for industrial needs. However, the focus of industry must also reflect water scarcity and water-intensive manufacturing must be moved out of our arid region.

These measures should also be able to capture and utilise normal, local torrential rainfall.

In terms of abnormal floods, the situation is different. Once all the previous detention facilities have been filled, the aim must be to ensure the collision-free passage of the rest of the huge floods through our landscape, in a natural way and in a natural regime. It must not be forgotten that it is these great floods that have shaped and are shaping our wide river floodplains and it is therefore necessary to preserve their natural functions (e.g. to maintain wet, floodplain habitats for forest growth, seepage into underground collectors, etc.).

This primarily means:

7. Release of recent wide river floodplains. Active flood zones must be expanded and protected, and most passive zones must also be respected – any construction in the floodplain must automatically allow for flooding.
8. Any artificial narrowing of the floodplain by dredging must be examined in terms of the natural runoff and detention functions of the reach and the effect on groundwater levels. Therefore, both meandering and wildflowing flows must be allowed to prevent their colmatage.

Only secondarily in incised valleys:

9. Modify the handling schedules of all current dams to substantially enhance their retention functions at the expense of energy and recreational functions. To this end, technical adjustments should also be made.
10. Use the retained water for economical downstream use in addition to ensuring a hydrobiologically minimum flow in the streams in times of drought.

In terms of extreme summer heat, the situation is particularly critical in built-up areas, especially cities. It is important to note first of all how the inhabitants react (have reacted) in places where this climate has been common for a long time.

Cooling in the built-up area:

11. By shading buildings from each other and the public spaces between them. In general, narrow but well-ventilated streets or arcades are most advantageous for new building sets.
12. Massive use of photovoltaic collectors converting incident solar radiation into electrical or thermal energy and shading buildings and streets.
13. Covering spaces with shading sheets or reflective shading elements.
14. Cooling water features in areas of concentrated stay.
15. Cooling by evapotranspiration of greenery – effective but requires sufficient water (it may be that evaporation of water is greater than recharge – irrigation).
16. Shading by trees – in terms of treetop formation, especially deciduous (also sufficient available water, but also space in the ground – utilities).

Cooling in the field landscape:

17. There is a need to increase evapotranspiration in particular, transferring a significant part of the precipitation back to the air, which it moistens. Linear tree form is most effective. However, there is also a risk of water scarcity here, where the tree species in question will be crowded out.
18. Rainwater harvesting in water tanks (covered tanks without evaporation) and use for irrigation of vegetables and fruit – newly conceived suburban agriculture.

In terms of overall warming of the landscape

19. Massive planting of trees and care of existing ones on all landscape lines – from biocorridors and interaction elements through riparian vegetation of streams, windbreaks, baulks to paths and roads. Planting must be of geographically native tree species, with geographical units being modified appropriately according to changing climatic conditions (by adding xerothermophilous tree species to the landscape).
20. The possibility of using surplus energy for photovoltaics should be investigated.
21. Need to prepare for new synanthropic species in urban and open landscapes.

However, landscape transitions to other types are happening very slowly and differentially. Our interventions must also be evolutionary. We must not forget the temporal dimensions of tree planting (a tree planted today will only become involved after many decades). All changes in the landscape must respect natural and technological life cycles (change as the existing function is outlived).

11.6 Lessons from the crisis development

To summarise the lessons from the preceding texts in terms of the implications for our rural landscape, we can conclude:

- Climate change, which is undoubtedly already underway and will only continue to intensify, is changing the characteristics of the primary landscape system, and with it the secondary and tertiary systems.

The combination and mutual reinforcement of changes in all three landscape systems will undoubtedly lead to a transformation of the rural landscape. In response to this great unknown, there is nothing left but the good old slogans that are still being ridiculed:

Sustainability – "we only do what we know can be done forever" (even though we know nothing is permanent). But the consumer world has brought in the contradictory aspect of "social" sustainability. But what is a sustainable necessity for society? (Food for everyone, or food and a car, or food, a car and a villa, a residence?) The landscape is lent to us, and like the fideicommised (trust) estates of feudal owners, it is entrusted to us for further refinement through continuous development.

Precautionary – "we only do what we have to do and we are careful" (don't change what you don't have to and assume the worst). This is a reaction to the problem of lack of feedback, where we do something the consequences of which we usually do not know properly (see DDT etc.). Even Robinson on the island, when he planted the corn, kept some of it aside as a reserve and safeguard.

Voluntary frugality – "I need less than I can have" (and often have). Will a 20 % increase in my wealth make me happier? The solution is to make reasonable use of whatever is available. The fundamental question is – do I need it? and why? – This is, of course, the enemy of consumerism. We must truthfully answer and do everything (we don't make monuments if we don't know to whom and why).

Local and global strategies for living – "act locally, think globally". Coordinating autonomous local systems – this is about the only way. Wherever we live, we must become indigenous – study local conditions (archetypes of use) and experience them with local people – then we are home.

And finally, the main answer to the fundamental philosophical question: Why are we, what is the point? – Either go back to the old theistic answer, or find a real, universal answer that is agnostically secular.

But the result in society, like in the landscape, will ultimately be the classic division between matrix and singularity – some answer will be majority and mainstream, with refreshing minorities within it. In our country, the vast majority of the landscape of the past has and will have Christian roots that it makes no sense to destroy. In the spirit of continuity of development, it makes sense to respect and nuance them as properly settled inhabitants. We don't know if we will make it and which path we will choose.

We wish you good luck on your journey!

Finally, let us repeat, together with the persistence of the ancient Roman politician Marcus Porcius Cato (*Cēterum cēnseō Carthāginem esse dēlendam*), that "we judge that truth and love must triumph over lies and hatred".

Jiří Löw

Maxmilian Wittmann

Tomáš Dohnal

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ČSN 73 6110 Design of local roads

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FOLTÁNEK, Martin: fig. 42

KILNAROVÁ, Pavla: fig. 4, 323, 338 a 358, graf 1, graf 2, graf 3

ANNEX – EUROPEAN LANDSCAPES

What landscapes are around us – in Europe?

A team of Dutch scientists defined a set of megatypes of European landscapes for the old EU member countries [Meeus et al., 1988 and 1990], which was partially supplemented for the new countries at the Dobříš conference [EAA, 1995] and is further developed here for non-EU countries. These 30 megatypes, grouped into 8 categories, are described below.

In doing so, we follow the mega-characteristics on these axes of change:
- latitude: along the north-south axis (+ altitude),
- position on the continent: ocean-inland axis,
- landscape openness: along the landscape closed-open axis,
- degree of naturalness of the landscape: along the natural-man-made landscape axis.

This pan-European view is important for all countries and nations (they all believe and promote that their homeland is the rarest and most varied and unique, but the truth is somewhat different). For example, in our ancestral homeland, there are only two types – in the hills and in between (#11 – semibocade and #17 – central European split fields).

Landscape megatypes of Europe

1	Arctic tundra	16	Former openfields
2	Forest tundra	17	Central collective openfields
3	Boreal swamp	18	Eastern collective openfields
4	Northern taiga	19	Mediterranean open land
5	Middle taiga	20	Puszta
6	Southern taiga	21	Steppe
7	Subtaiga	22	Semi-desert
8	Northern highlands	23	Sandy desert
9	Mountains	24	Kampen
10	Atlantic bocage	25	Poland´s strip fields
11	Semi-bocage	26	Cultura promiscua
12	Mediterranean semi-bocage	27	Dehesa/montado
13	Atlantic openfields	28	Polder
14	Continental openfields	29	Delta (artificial forms)
15	Aquitaine openfields	30	Huerta

Table 11
Inventory of 30 megatypes of European landscapes [Meeus et al., 1990; EEA 1995]

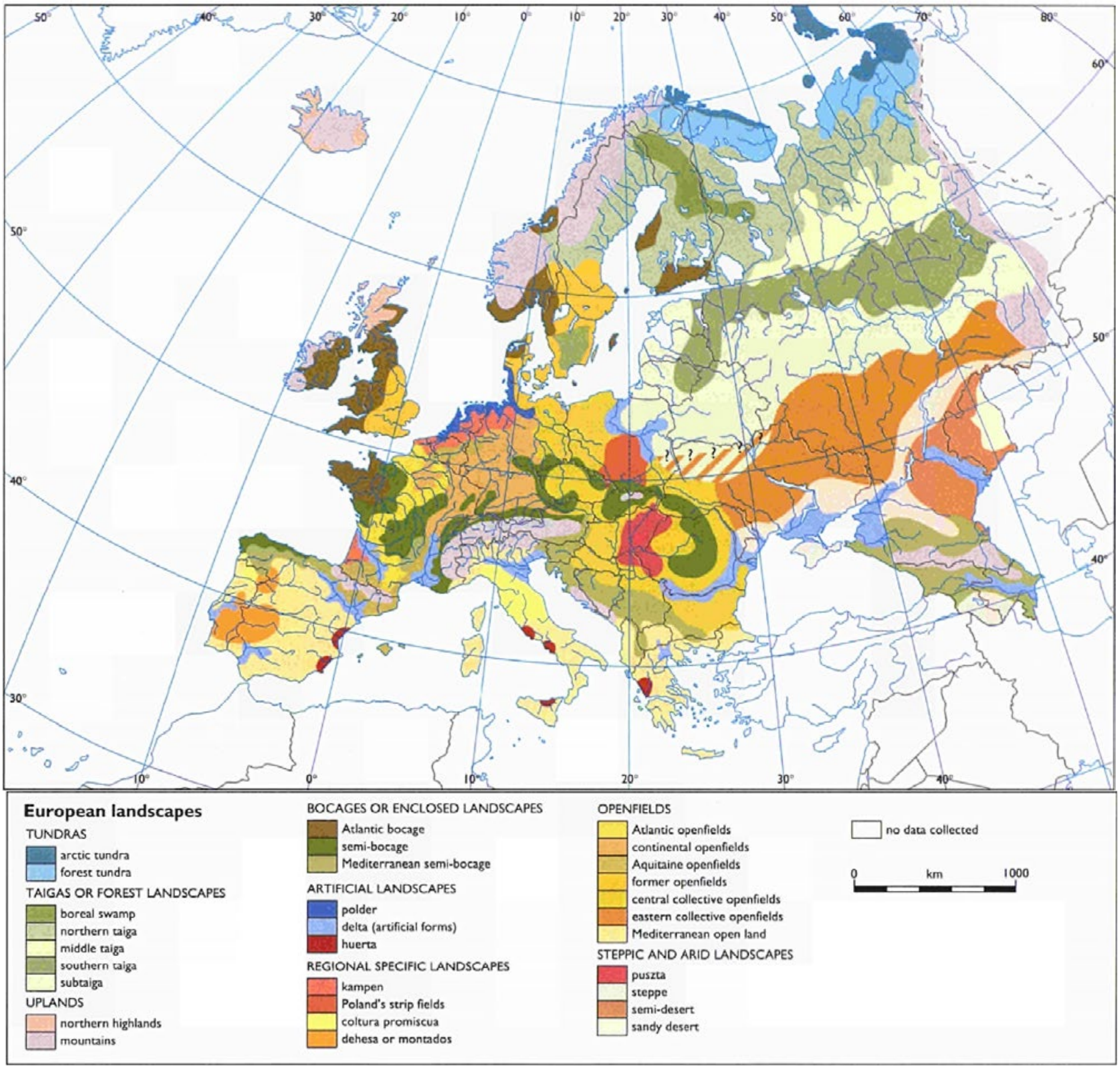

Fig. 406
Map of the distribution of megatypes in European landscapes [EEA, 1995]

Category of tundra landscapes *(northern Norway, Finland, Kola Peninsula, Siberian coast) = mostly natural landscapes, permafrost – problems for buildings and trees.*

1. **Arctic tundra –** treeless ice wilderness, permafrost prevents tree growth, except for dwarf forms, cover consists only of mosses and lichens. In summer, surface swamps full of mosquitoes are formed.
- latitude: polar
- position on the continent: oceanic
- landscape openness: open
- degree of naturalness of the landscape: natural

Fig. 407

2. **Forest tundra –** usually occupies a relatively narrow belt stretching in a parallel direction. At first, individual trees appear, while tundra vegetation with numerous peat bogs and pools still occurs in open areas. Spruce, birch, and alder trees appear in the valleys.
- latitude: polar
- position on the continent: oceanic
- landscape openness: open
- degree of naturalness of the landscape: natural

Fig. 408

Categories of taiga landscapes *– boreal zones (in Sweden, Finland, slightly in Norway, Baltic republics, northern Poland, and Russia) and extrazonal occurrences with a predominance of coniferous forests on a continuous area.*

3. **Boreal swamp** – impassable with lakes – not used economically, peat bogs, wetlands. Poor acid soils with sparse mixed forest.

- latitude: subpolar
- location on the continent: continental
- landscape openness: open
- degree of naturalness of the landscape: natural

Fig. 409

4. **Northern taiga** – monotonous, homogeneous forests (larch, birch, spruce, pine), extensive grazing in forest remnants.

- latitude: subpolar
- position on the continent: continental
- landscape openness: closed
- degree of naturalness of the landscape: natural

Fig. 410

5. **Middle taiga –** part of the area is forestless (mixed coniferous forests, sometimes pastures and fodder crops), plains with sandy soils, moraines, swamps, sometimes clearings with small meadows and pastures.
- latitude: north
- position on the continent: boreal
- landscape openness: closed
- degree of naturalness of the landscape: natural

Fig. 411

6. **Southern taiga –** dispersed forests (mixed coniferous, minority of pastures), hilly areas and plains, clayish and sandy soils
- latitude: north
- position on the continent: boreal
- landscape openness: closed
- degree of naturalness of the landscape: semi-natural

Fig. 412

7. **Subtaiga** – predominantly economic forests and fields (mixed forests, arable land), plateaus with loess, wild landscape.

- latitude: north
- position on the continent: boreal
- landscape openness: closed
- degree of naturalness of the landscape: close to nature

Fig. 413

The category of alpine forest-free landscapes *– in the northern uplands with heaths and moors of Scotland, western Ireland and Norway and parts of the high mountains – above the alpine forest boundary, with shrub vegetation as an analogy of tundra, downwards with an adjacent sequence of regionally diverse vegetation stages with the character of "extrazonal taiga" – Pyrenees (Spain, France), Alps (France, Italy, Switzerland, Austria); the high mountains of the Carpathians (Slovakia, Poland, Ukraine, Romania) and the Balkans (in the former Yugoslavia).*

European high mountains	*- similar to taiga and tundra, but in layers,* *- often artificially reduced forest boundaries by grazing,* *- in our country, scarce areas of the peaks of the Krkonoše and Hrubý Jeseník mountains*

8. **Northern highlands** – dominated by the Atlantic influence of the Gulf Stream, hill areas to mountains with lakes and marshes, heaths, pastures, rocks, and woodland – deserted, open, wild landscape, sometimes used for grazing.

- latitude: north to subarctic
- position on the continent: oceanic
- landscape openness: open
- degree of naturalness of the landscape: close to nature

Fig. 414

9. **Mountains** – predominantly zonal altitudinal influence, wild, rugged landscape – mountains, glaciers, mosses, meadows, forests, use determined by relief, often intensive agriculture in valleys.

- latitude: central, azonal
- position on the continent: boreal
- landscape openness: open
- degree of naturalness of the landscape: natural, somewhere close to nature

Fig. 415

The category of closed to semi-open landscapes *= bocage – the Atlantic coast of temperate zone and semi-open agricultural landscapes of Europe, in addition to Spain and areas of central France and southern Germany, also extends to our border mountains and central Russian hills. The following types are already common cultural landscapes of forest to forest-field, fields enclosed in forests – originally all colonised medieval landscapes, always less fertile than open landscapes.*

10. **Atlantic bocage** – moderate slopes and plateaus, Atlantic, oceanic climate, mosaic of pastures and cropland with hedgerows (bocage), enclosed, heterogeneous, intensively managed.

- latitude: medium
- position on the continent: oceanic
- landscape openness: closed
- degree of naturalness of the landscape: cultural

Fig. 416

11. **Semi-bocage** – transition between closed and open landscape, humid uplands to highlands, mosaic of mixed forests, extensive pastures, and arable land.

- latitude: medium
- position on the continent: oceanic and transitional
- landscape openness: semi-open
- degree of naturalness of the landscape: close to nature

Fig. 417

12. **Mediterranean semi-bocage** – relatively open, dry uplands and highlands, extensive agriculture, permanent crops, stone walls and walls.

- latitude: south, Mediterranean
- position on the continent: transitional
- landscape openness: semi-open
- degree of naturalness of the landscape: cultural, close to nature

Fig. 418

The category of openfields *(the most widespread European category of agricultural landscapes, including the Czech Republic), the main common European old settlement landscapes – the most profitable agricultural landscapes (also in our country).*

13. **Atlantic openfields** – rolling plains, oceanic climate, large open monocultures on loamy and clayish soils, trees only in valleys, converted from deciduous forest landscapes.

- latitude: medium
- position on the continent: oceanic
- landscape openness: open
- degree of naturalness of the landscape: cultural

Fig. 419

14. **Continental openfields** – reverberation of oceanic influence, plains to hills, unevenly large areas of landscape features, intensive cultivation, forests on hilltops.
- latitude: medium
- position on the continent: transitional
- landscape openness: open
- degree of naturalness of the landscape: cultural

Fig. 420

15. **Aquitaine openfields** – plains and limestone slopes, loess, and clayish soils, intensively cultivated – field plains, forest slopes, permanent crops in valleys.
- latitude: Mediterranean
- position on the continent: oceanic
- landscape openness: open
- degree of naturalness of the landscape: cultural

Fig. 421

16. **Former openfields –** rolling plains, loamy and clayish soils, cooler oceanic climate, changing over time, intensively cultivated, large areas of fields or pastures, treeless crop rotation, with isolated farms.

- latitude: north
- position on the continent: oceanic
- landscape openness: open
- degree of naturalness of the landscape: cultural

Fig. 422

17. **Central Europe merged openfields** – socialist variant of the type of continental openfields (14) – large scale, homogeneous, open plains to hill areas, unevenly large areas of landscape elements, intensive cultivation, forests on the tops of hills.

- latitude: medium
- position on the continent: transitional
- landscape openness: open
- degree of naturalness of the landscape: cultural degraded

Fig. 423

18. **Eastern merged openfields** – flat and undulating plains, continental climate – black earth, large scale, homogeneous, open fields, meadows in depressions.
- latitude: medium
- location on the continent: boreal
- landscape openness: open
- degree of naturalness of the landscape: cultural degraded

Fig. 424

19. **Mediterranean open land** – dry hills, plateaus, valleys, Mediterranean climate, contrast in the formation of hill surfaces (forests and macchia, pastures) and valleys (orchards, fields).
- latitude: Mediterranean
- position on the continent: transitional
- landscape openness: open
- degree of naturalness of the landscape: cultural reduced

Fig. 425

The category of steppes and arid landscapes = deserts *(semiarid climate of Hungary, Romania, Ukraine, and Russia) extend into Europe from the east – the western edge of the great steppe – a transition to the previous ones, a nomadic area, so the landscapes were depopulated and settled only in modern times.*

20. **Puszta** – plains, saline soils in places (evaporation prevails over soaking), Pannonia, forestless, extensive cattle breeding.
- latitude: medium
- position on the continent: boreal
- landscape openness: open
- degree of naturalness of the landscape: close to nature

Fig. 426

21. **Steppe** – treeless, continental drought, windy, flat black soil, often salty, extremely open, pastures, locally ploughed.
- latitude: south
- position on the continent: boreal
- landscape openness: open
- degree of naturalness of the landscape: close to nature

Fig. 427

22. **Semi-desert** – dry, often salty, open, extensively farmed lowlands, sparse cover of hardy grasses.
- latitude: medium
- position on the continent: boreal
- landscape openness: open
- degree of naturalness of the landscape: close to nature

Fig. 428

23. **Sandy desert** – sand, shifting dunes, dry riverbeds, no vegetation, unmanaged, only marginal extensive grazing.
- latitude: south
- position on the continent: boreal
- landscape openness: open
- degree of naturalness of the landscape: close to nature

Fig. 429

Category of regional landscapes *(regionally restricted specific landscapes of northern Germany, the Netherlands, Poland, and the Mediterranean), anthropically strongly conditioned landscapes – structure of ploughlands (hamlets, longitudinal ploughlands, mixtures of cultures, poor Iberian landscapes).*

24. **Kampen –** oceanic climate, closed landscapes of northern Germany and the Netherlands, a small-scale mosaic of fields and lonely farms.

- latitude: north
- location on the continent: oceanic
- openness of the landscape: closed
- measure of naturalness of the landscape: cultural

Fig. 430

25. **Poland's strip fields –** undulating relief, intensive (but small-scale) cultivation, high diversity in a small area, strips behind farms.

- latitude: medium
- location on the continent: boreal
- landscape openness: open
- degree of naturalness of the landscape: cultural degraded

Fig. 431

26. **Cultura promiscua** – mixed cultures – uplands with fertile valleys, loamy soils, heterogeneous, small-scale mosaic, high diversity of crops and cultures.
- latitude: Mediterranean
- position on the continent: transitional
- landscape openness: semi-open
- degree of naturalness of the landscape: cultural

Fig. 432

27. **Dehesa/montado** – poor, dry, and stony soils on moderate slopes and plateaus, forest-agricultural (pastures, cork oak) pastoral landscape.
- latitude: Mediterranean
- position on the continent: oceanic
- landscape openness: open
- degree of naturalness of the landscape: close to nature

Fig. 433

Category of artificial landscapes (*better man-made landscapes of Netherlands and Mediterranean), anthropogenic landscapes – below sea level, delta deposits and secondary regulation, terraces – their creation is expensive, therefore only special cultures.*

28. **Polder** – drained seabed, clays, peat, flat, open, intensively used, uniform, treeless.
- latitude: central
- position on the continent: oceanic
- landscape openness: open
- degree of naturalness of the landscape: cultural degraded

Fig. 434

29. **Delta (artificial forms)** – estuaries and wide floodplains of large rivers in coastal plains, irrigated from rivers, intense, flat, uniform but fertile.
- latitude: central and Mediterranean
- position on the continent: transitional
- landscape openness: open
- degree of naturalness of the landscape: cultural

Fig. 435

30. **Huerta** – irrigated fertile slopes and valleys in the Mediterranean, with permanent crops.
- latitude: Mediterranean
- position on the continent: transitional
- landscape openness: open
- degree of naturalness of the landscape: cultural degraded

Fig. 436

Each megatype of landscape is differently fertile and therefore also differently suitable for settlement.

Table 12
Rough estimates of natural primary production of some megatypes

landscape megatype	rough estimate of primary production tons/hectare
tundra	10
northern taiga	100
central taiga	250
southern taiga	300
central European deciduous forests (bocage and semi-bocage)	400
steppes	20
semi-desert	4
desert	1

Note that forest biomes have the highest primary production, while forest-free biomes (including steppes and prairies) have an order of magnitude less (which is why steppe grain yields much more under forest conditions – this potential has been freed up for our agriculture by deforestation).

Jiří Löw, Maxmilian Wittmann and Tomáš Dohnal

RURAL LANDSCAPING AND ITS TOOLS

Brno University of Technology
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Department of Urban Design
5 Poříčí Str.
639 00 Brno

Published by AKADEMICKÉ NAKLADATELSTVÍ CERM®, s.r.o.,
95a Purkyňova Str.
612 00 Brno

2022

1st edition

Peer-reviewed monograph
Reviewers: Petr Sklenička, Lubor Fridrich

Translation: Bohdan Fridrich

Layout: Pavla Kilnarová

Unsellable digital publication
348 pages
ISBN 978-80-7623-085-9

ISBN 978-80-7623-085-9
9788076230859