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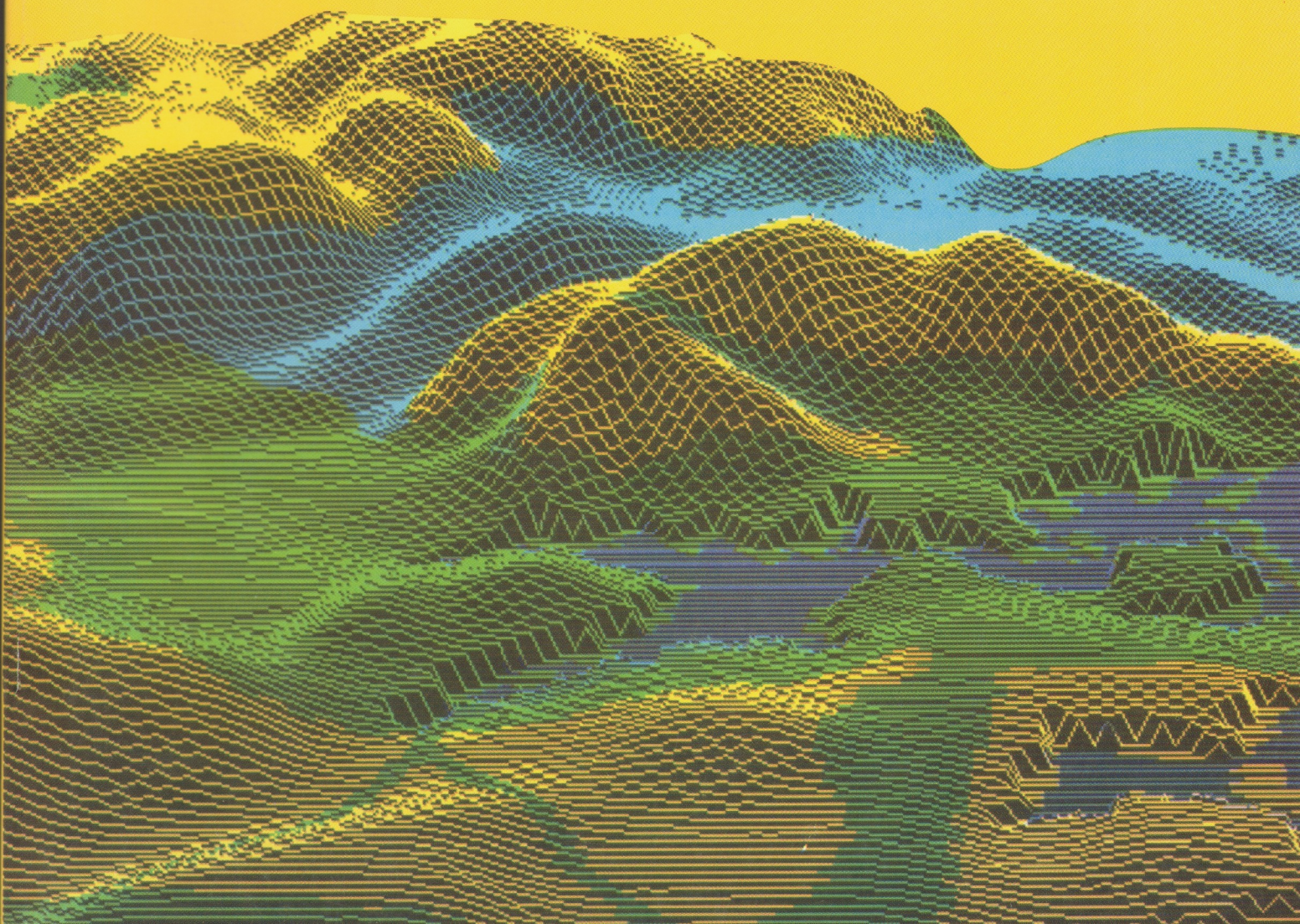
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CONCEPTS OF GLOBAL ASSESSMENT OF ENVIRONMENTAL LIMITS ON MATERIAL ACTIVITY OF THE HUMAN KIND

Dušan PLUT

Abstract

Owing to the increasing world population and consumption of natural resources per capita the environmental pressures have, in numerous cases, already globally exceeded the capacity of environment. Production and consumption will have to be worked out so that they would not endanger the life support system, i.e. without eroding the environmental basis intended for the future generations. The essence of environmental sustainability is to respect the available natural resources and assess the self-purifying (neutralizing and regenerative) capacities of the environment.

In the forefront of concepts made for the global assessment of environmental limits or the sustainable environmental capacity for material activities of the present civilization, are the ecological footprint analysis and the concept of environmental space. The results showed the necessity for radical reductions in the consumption of natural resources and environmental loads of the economically developed countries.

Shrnutí

Koncepce globálního stanovení environmentálních limitů pro materiální činnosti lidstva

Z důvodů rostoucí světové populace a zvyšující se spotřeby přírodních zdrojů na jednoho obyvatele překročily environmentální tlaky v mnoha případech již možnosti životního prostředí. Produkce a spotřeba budou muset být řešeny tak, aby neohrožovaly život podporující systém, tzn. bez erozivního vlivu na základy životního prostředí, které je míněno i pro příští generace. Základním principem udržitelnosti životního prostředí je respektování dostupných přírodních zdrojů a stanovení přirozených samočistících (neutralizačních a regeneračních) schopností životního prostředí.

V popředí koncepcí vytvořených pro globální stanovení environmentálních limitů či udržitelné kapacity životního prostředí pro materiální činnosti současné civilizace stojí ekologická stopová analýza a koncepce environmentálního prostoru. Výsledky ukázaly nutnost radikálního snížení spotřeby přírodních zdrojů a environmentální zátěže v ekonomicky rozvinutých zemích.

Key words: consumption, environmental limits, ecological footprint analysis, environmental space, natural resources.

1. Introduction

The present civilization is undoubtedly faced, for the first time in the history, with the universal planetary limits on material activities, or to put it in another way, with limited space, natural resources and self purifying capacities of the environment. The growing number of the world population and consumption of natural resources (unrenewable and renewable) per capita are the two elementary causes of continually increasing environmental pressures. The exhausting of natural resources and the condition of the planetary ecosystem prove that the present model of production and consumption can not provide a long-term development and survival of the humankind (European Environment Agency, 1999). The urgent need to change the

course of the present civilization is further emphasized by an ever greater gap in material standard between the developed and less developed countries, and great welfare differences (Agenda 21, 1992; Belz et al., 1998). Prosperity or human progress can no more be evaluated one-sidedly only, for example, with the development of material standard alone. The overall sustainable human development includes social equity, safety, and protection of environment also for future generations. Even the EU as a world macroregion with the highest environmental awareness has reached a threshold of weak sustainability. (Plut, 1997; European Environment Agency, 1999).

The increasing number of environmental problems with planetary dimensions, and the exploitation of natural

resources issue new challenges for the interdisciplinary research into the state of environment and effects of environmental quality changes, and for the planning of spatial, regional and economic developments of states and regions. The global aspect of the effects in the environment caused by the increasing material energy flows calls for the assessment of "acceptable" anthropogenic exploitation of the geographical environment and pressure on it in a certain area relative to the whole planetary ecosystem. The assessment of environmental capacities and natural resources for the material activity of humankind today and in the future issues an exceptional challenge from the aspect of methodology and contents.

2. Determination of environmental limits on material activities of the society

The ethically framed demand for sustainability (Agenda 21, 1992) emphasizes that the material needs of the present generation must be satisfied without a threat to satisfying the needs of the future generations. Consumption of natural resources and load on environment shall not exceed the natural regenerative capacities of environment and its absorbing capacities for emissions and wastes. Environmental sustainability means that economic and social developments are worked out so that their effects in the natural environment remain within the ecological limits (Jacobs, 1999). Material activity with its pressures on environment is unacceptable when causing disbalance in the ecosystem and environmental degradation, or exerting negative impacts on human health and quality of life. Thus, the material activity of humankind must be organized so that welfare can be improved without eroding the ecosystems, which means, by observing the inter-generation responsibility.

Management of limited natural capital should be, according to Daly (1991), determined by the following three fundamental rules:

- 1) level of exploiting renewable natural resources shall not exceed their regenerative level;
- 2) consumption of renewable resources shall increase by the same extent as the reserves of unrenovable natural resources decreased;
- 3) level of emissions (and wastes) shall not exceed the absorption (neutralizing) capacities of the environment.

Ecological limits on the material development of the society are roughly defined as a continuous maintenance of health and integrity of ecosystems and capacity of biosphere to preserve the life support system – clean air and water, climate regulation, non-jeopardizing the genetic diversity, circulation of nutrients, etc. (Jacobs, 1999). Thus, the essence of environmental sustainability concept is to recognize the biophysical and spatial limits on economic activities. The assessment of environmental limits, particularly the self purifying (neutralizing and regenerative) capacities of the

environment, is the key issue (Špes et al., 1999). In the 1970s, the experts called attention to a threat of pending global shortage of unrenovable resources (oil in particular) due to the increasing consumption. In the 1990s, they warned particularly against a threat of exceeding the regenerative level of renewable resources (natural fertility of soil, forests, pastures, sea fishing), and the neutralizing levels (assimilation, absorption) of the environment and its individual elements, atmosphere, vegetation and water in particular.

The methodology and concepts of assessing the capacities of the planetary ecosystem are demanding and still incomplete due to the geographical and ecological diversity of the planet, uncertainty in assessing the reserves of the planetary natural capital and receptive, neutralizing and regenerative capacities of the ecosystems and their constitutive elements, uncertainty in defining the "rightful" needs of an individual, uncertain assessment of the world population development, and for other reasons. The uncertainty in assessment of the planetary ecosystem capacities is further intensified with the premises of the chaos theory. Namely, the shaken natural balance can dramatically change owing to a slight shift in one or more individual key variables of the environment (Rees, 1999). The continuous stress on the dynamic system of landscape, region, or city increases a possibility of sudden qualitative and quantitative changes in individual elements and in the whole environment. Since all the natural and anthropogenic systems are simultaneously also the subject of entropic decline, a quick disintegration of the system organization can start at a certain degree of "exporting" the entropy of energy-and-material wasteful systems (e.g. degraded areas and huge amounts of waste in the surroundings of big cities). Due to the feedback in the consumption-environment relation, the nature and extent of changes are practically unforeseeable, which is also manifested through local cases of degradation of environment and its elements, as well as, for example, through global climatic changes and thinning of the ozone layer in the stratosphere.

There are several concepts of how to assess the global extent of exploitation of natural resources and load on environment, so as to provide the continuous maintenance of the planetary natural balance and the elementary life support system. In front of empirically formulated general concepts of assessing the environmental limits are the analyses of the so-called ecological footprints and of the environmental space.

3. The concept of ecological footprint analyses

The concept of ecological footprint analyses proceeds from the premise that people as an integral constituent of ecosystems simultaneously discharge and receive diverse types of emissions. The anthropogenic material-and-energy flows, the consumed natural resources, and the generated wastes and emissions can all be transformed to a common

indicator of the pressure on the environment, i.e. to adequate equivalents of productive lands (land and water areas). The ecological footprint of a certain population is an area of land/water which is required for the continuous reproduction of consumed natural resources and the assimilation of generated emissions and wastes of the selected population anywhere on the planet (Rees, 1999). Thus, the ecological footprint is a common area of biologically productive ecosystems with the biophysical output which regularly satisfies the supply of the selected population, e.g. a state, a region, or a city.

The researchers established by means of extrapolation that the ecological footprint of a city in the developed country, e.g. Vancouver (pop. 472,000, at least 5 hectares per capita), is by more than 200-times larger than the city area (Rees, 1999). A similar research on 29 Baltic cities showed, that the equivalents of adequate areas (i.e. biologically productive - forest, farming land, sea and wet ecosystems) for the present level of consumed natural resources and generated wastes and emissions are by 565 to 1130-times larger than the total areas of the investigated cities. The present supply of raw materials and energy to the Londoners (7 million) is so demanding that London alone consumes the total biophysical input of the entire productive territory of Great Britain (Rees, 1999).

In spite of certain methodological inexactness and incertitude of assessment, the data confirm that particularly the modern cities in the economically developed countries significantly diverge from the concepts of sustainable development, because the cities and the urban population (consumption of resources) need very extensive productive lands outside the urban and even state territory to cover their material- and energy requirements, discharge diverse emissions and dump wastes (e.g. because of the larger import than export of food, energy, raw materials, products). The consequences are evident as exhausted natural capital in rural areas, and excessive, even transborder load on environment.

Moreover, productivity of local and regional ecosystems is not exceeded by the cities solely of the developed countries. Total ecological footprints of most economically developed countries are by several times larger than their own state territories, so that they are marked with ecological deficit and unsustainable use of natural resources. Concrete research into ecological footprints of the populations in countries with high material standard, based on average consumption of food, raw materials and fossil energy, shows that their ecological footprints rank to class 5-6 hectares of productive land per capita. Furthermore, according to later, more thoroughly worked out research projects, ecological footprints of the economically most developed countries were assessed to 9 hectares per capita (Rees, 1999). So, for example, in the USA, 5 hectares of productive ecosystem are required to satisfy the needs for commodities and services of an average inhabitant, while on the other hand, in

economically less developed countries, 0.5 hectare per capita is enough (World Resource Institute, 2000).

The ecological footprints show that the consumption of the modern civilization has already exceeded the long-term productivity of the ecosphere in numerous cases. Experts judge that, for the life with contemporary technologies at an average level of consumption, the present number of the world population has already exceeded the carrying capacity of the planet by one third, approximately (Rees, 1999). No more than 19% of the world population, who live in 744 big cities, with their emissions of greenhouse-effect carbon dioxide already exceed by 10% the capacity of all the forests on the planet for assimilating the surplus carbon. Concurrently, the richest fifth of the world population consumes 80% of raw materials and energy. This means that the material model of consumers' style of living in the "first world" (1.2 billion people) cannot be continuously spread to over 6 billion of the world population without global consequences in the form of destroyed environment for the future generations.

4. The concept of environmental space

Outstanding in the interdisciplinary methodological approaches to the assessment of global environmental limits on the consumption of natural resources, and to the assessment of the capacities of environment to absorb diverse emissions, is the so-called environmental space concept. From the aspect of contents and values, the concept proceeds from recommendations and principles of Agenda 21, which was adopted in 1992 at the World Conference on Environment and Development. On a motion of the international non-governmental environmental organization Friends of the Earth Europe, the Wuppertal Institute made an attempt to specify empirically the sustainable levels of "environment consumption". The concept of environmental space was started in the eighties and already included some methodological elements of the ecological footprint concept. So, it proceeded from a premise that every moment of the humankind holds the limits on the extent of planetary pressure on the environment. The life support system on the Earth is operative without irreversible damage only if the pressures on the environment remain within the frameworks of the available natural resources of the planet and its productive and self-purifying or absorptive capacities. The planetary life support system is limited by the space, comprehended in two-levels (Hille, 1994, 1997):

- 1) reserves of natural resources (unrenewable, conditionally renewable and renewable);
- 2) capacities (sinks) for absorbing wastes, pollution and interventions into the environment.

The planetarily acceptable level of pressures on the environment is determined by the quality of air and water, land use systems, extent of material- and energy consumption, so that uninterrupted functioning of

ecosystems and human health are still granted (Jacobs, 1999). The concept of environmental space introduces universal empirical indicators of measuring the (un)sustainability of consumption of natural resources and load on the environment. They are derived from the global limits which are defined with the carrying capacities of the planetary environment. The environmental space stands for all the energy, unrenovable resources, agricultural land and forests, that can be used without causing irreparable damage to the environment or depriving the future generations of resources which will be required for satisfying their material needs.

Thus, the environmental space of a state or a region consists of a limited extent of fossil fuels, wood, ground- and surface waters, unrenovable natural resources (e.g. aluminium), and agricultural lands for food production. According to the assessments obtained with the methods of environmental space from the aspect of preserving the functioning of the planetary ecosystem, a society (a state, a region) is considered to be sustainable if it consumes the natural resources to the extent which suits proportionally the number of its population. A new category is being introduced, i.e. the category of "equal shares of environmental space" for all the Earth dwellers, as a practical and concrete method for determining the sustainable development and the principle of parity and social equity (Spappens, 1998). In the next stage of the methodology, the total planetary capacities are calculated per capita of the planet, following the criterion of parity.

The share or the "permitted" environmentally sustainable quantity of individual natural resources, lands and emissions per capita stands for the extent of "environmental space", to which each inhabitant of the planet has the right in one year. So the calculated sustainable extent of environmental space per capita is compared with the present extent of consumed natural resources and emissions per inhabitant of an individual state or a region. The differences between the existing and the desired consumption of natural resources and emission generation per capita correspond to a measure of the present level of (un)sustainability of the investigated sample area. On the basis of discrepancy between the sustainable and existing extents of environmental space per capita per year the required degrees were derived, for the reduction of consumption in order to reach the sustainable level until the year 2050, and an intermediate goal until the year 2010. Considered was also the anticipated increase in the world population which consequently reduces the available extent of environmental space per capita.

5. The use of environmental space concept in the Sustainable EU Project

Proceeding from the limits on consumption from the aspect of global environmental space, the Wuppertal Institute made in 1995 for the non-governmental environmental

organization Friends of the Earth Europe a general assessment for the year 2050, of the globally acceptable level of consumption per capita in Europe (Hille, 1997; Jacobs, 1999) – Tab. 1.

There is a great disparity between the adopted EU environmental aims and the aims of the concept of environmental space. The plan of the EU is to reduce the emissions of greenhouse gases by 8% until the year 2010. According to the environmental space concept, the planned intermediate aim for the year 2010 is to reduce the CO₂ emissions by one quarter, and until the year 2050 by 77% (to 1,700 kg CO₂/capita/year) (Jacobs, 1999). Individual EU countries should diversely, according to the amount of CO₂/capita, reduce mainly their own emissions. Thus, the CO₂ emissions of Great Britain, with 9.86 mt CO₂/capita, were above the EU average. If the sustainable aim of 1.7 mt CO₂/capita is to be reached until the year 2050, the CO₂ emissions of Great Britain should be reduced by 83%, and until the year 2010 by 45% (to 5.4 mt CO₂/capita) (McLaren, 1996).

The assessments of environmental space per capita in the EU show that the present consumption of primary natural resources and the load on environment are greater, on average by 75-90% than the assessed sustainable level. Consumption of key materials (cement, iron, aluminium, etc.) per capita should decrease by 85-90%, the areas per capita for protecting biotic diversity should increase by almost 20-times, and the farming areas (arable lands and pastures) should decrease by about a half.

Should the global material consumption per capita be sustainable and equal for all the people on the Earth, it should amount to only 10% of the present average of the OECD countries, which means the reduction by factor 10. Thus, the production and consumption models should become sustainable only in the form of "dematerialized" economy, at which the level of consumed raw materials in the processes of production and consumption of goods and services should diminish ten-times at least in comparison with the present conditions (Spappens, 1998). Proceeding from the fact that the material flows in the OECD countries are by 3-times greater than those in the less developed countries, and considering the anticipation that it will be hard to prevent the doubling of the world population, the experts from the Wuppertal Institute inferred that the material flows in rich countries should decrease by factor 10-12 (Weizsaecker, 1994). Cities as the greatest consumers of goods and generators of emissions can be the most important contributors to the radical reduction in the consumption of natural resources and environmental pollution.

If Europe and other developed countries resolve to live within the framework of equal shares of environmental space they will have to reduce radically its consumption and release the space for use to the developing countries. If Europe starts using technological and other innovations in

| Resources | Consumption per capita (1990) | Environment space per capita (2050) | Reduction required to 2050 from 1990 | Reduction required to 2010 from 1990 |
|--------------------------|-------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| Carbon dioxide emissions | 7.3 t | 1.7 t | 77 % | 26 % (5.4 t) |
| Total primary energy | 123 GJ (2.93 toe) | 60 GJ (1.43 toe) | 50 % | 12,5 % (56 GJ) |
| - fossil fuels | 100 GJ (2.24 toe) | 25 GJ (0.60 toe) | 75 % | 19 % (45 GJ) |
| - nuclear energy | 23 GJ (0.54 toe) | 0 | 100 % | 100 % |
| - renewable energy | 7 GJ | 35 GJ | + 400 % | +74 % (11.5 GJ) |
| Cement | 536 kg | 80 kg | 85 % | 21 % |
| Pig iron | 273 kg | 36 kg | 87 % | 22 % |
| Aluminium | 12 kg | 1.2 kg | 90 % | 22.5 % |
| Copper | 6.3 kg | 0.75 kg | 88 % | 22 % |
| Lead | 2.3 kg | 0.39 kg | 83 % | 21 % |
| Chlorine | 23 kg | 0 | 100 % | |
| N,P, K fertilizer * | 47 kg | 0 | 100 % | |
| Timber | 0.66 m ³ | 0.56 m ³ | 15 % | 4 % |
| Water | 768 m ³ | Regional level | Regional stage | Regional level |
| Built-up land | 0.053 ha | 0.0513 ha | 3.2 % | 3.2 % |
| Arable area** | 0.237 ha | 0.10 ha | 58 % | 37 % (0.15 ha) |
| Pasture | 0.167 ha | 0.09 ha | 47 % | 32 % (0.113 ha) |
| »Imported« land (net) | No assessment | 0 | 100 % | 50 % |
| Unprotected wooded area | 0.164 ha | 0.138 ha | 16 % | 16 % |
| Protected area | 0.003 ha | 0.061 ha | +1933 % | |

* presumed complete restriction on the use of mineral fertilizers; in sample research projects of individual states, less radical versions are also included

** presumed arable lands required for organic farming

*** oil equivalents

Source: McLaren, 1996; Hille, 1997, Jacobs, 1999

Tab. 1: Assessment of environmental space per capita in the EU in 2050 (sustainable consumption) for basic resources and required reduction of consumption relative to the level of 1990.

order to change the production and consumption models and therefore considerably increases the output of consumed natural resources, the long-term results should be manifested as the raised standard of living and strengthened European economy. However, the European countries in transition could take this opportunity and enter directly the era of sustainable development. More realistically to expect from these countries is that, instead of following the model of dematerialized sustainable development, they will follow the material-and-energy intensive development routines of West Europe (Spappens, 1998). Numerous data obtained for the 1990s show that, after the change in their economic- and social systems, the countries of Central- and East Europe mainly follow the unsustainable models of production and consumption. Even in the developing countries the gradual raising of the material standard is accompanied by an ever stronger exploitation of natural resources and heavy environmental load.

6. Conclusion

Capitalism and globalization of market are based on the increasing accumulation of capital and profit. But, are the

long-term increase in the accumulation of capital and the globalization of world economy compatible with the limits of space and natural resources, and with self purifying capacities of the environment? Is the "green" market economy possible at all? Has the international community, a state, a region or a municipality the right to allocate to market economy or to an individual inhabitant the extent, i.e. the limited share of planetary environmental space to which they are entitled, and then control it? Pearce (1993) rightfully warns that the free market cannot fix prices for biotic diversity or self purifying capacities of the oceans and the atmosphere, for example. We do not know all the answers, so that the idea to restrict the quantitative growth (but not the qualitative development) of economy and consumers' style of living seems to be a very remote vision at the beginning of the 21st century, and hard to be realized. However, every crisis in the environment and reduction in the critical natural capital of the planet further shorten the time for timely actions.

Sustainability and diverse concepts of assessment of environmental limits on material activity (production and consumption) of the humankind call for the development of

economic activities only within the framework of environmental limits on the planetary level as well. The fact is that the environment is a planetary, regionally and locally limited commodity. At the time being, the ecological footprint concept and the environmental space concept both bring a

moral demand only, to the developed countries in particular, to plan the development of a country, a region, or a municipality by observing the radical decrease of pressures on the environment on the planetary level until the mid-21st century.

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METHODOLOGICAL ISSUES OF LOCATIONAL EVALUATION

Fritz W. HÖNSCH

Abstract

The paper addresses geographers who are engaged in the field of locational evaluation (Standortbewertung) and interested in comparisons. The author is convinced that the geographical way of thinking and working may contribute to registration and presentation of locational peculiarities (Standortqualitäten) as well. This refers first of all to synoptic-cartographic presentation. The paper presents conceptional and methodological experience the author acquired in German cities in the 1990s. In the limelight were traffic areas of some 10 ha (goods railway stations) the transport function of which would come to an end. The areas are to be converted into superior utilization.

The locational evaluation in the paper is made in three steps (macroposition, mesoposition, microposition), which are in each case linked with cartographical examples. In the first step of evaluation, advantages or disadvantages of the position in the national or (western) European economic space (macroposition) are considered. In the second step, chances of the location in regional context are investigated (mesoposition). Connection between macroposition and mesoposition is demonstrated on an example of the city of Pforzheim between Karlsruhe and Stuttgart in southern Germany (Fig. 1). The third step of the locational evaluation refers to microposition. In this part the author passes experience on the presentation of a) selected economic and social spatial peculiarities of the location (surroundings of goods railway station) such as local position, accessibility, characterization of neighbourhood, environment and services (Fig. 2) and b) of contaminated plots in old traffic areas (Fig. 3).

Shrnutí

Metodická východiska pro hodnocení lokalit

Článek se obrací na geography, kteří se zabývají tematikou hodnocení lokalit a zajímají o srovnávání. Autor zprostředkuje své zkušenosti, které získal při průzkumu lokalit v devadesátých letech 20. století v německých velkoměstech. Středem pozornosti jsou nákladní nádraží, která ztrácejí svou funkci dopravního střediska. Cílem je jejich využití na kvalitativně vyšší úrovni. Hodnocení lokality je v textu prováděno ve třech krocích, které jsou spojeny s příklady.

V prvním kroku hodnocení je v popředí poloha z hlediska hospodářského situování v národní nebo (západo)evropské souvislosti (makropoloha). V druhém kroku jsou zkoumány vyhlídky lokality v regionální souvislosti (mezolokalita). Souvislosti mezi makropolohou a regionálními konkurenčními podmínkami jsou znázorněny na příkladu jihoněmeckého velkoměsta Pforzheim (obr. 1).

Třetí krok se vztahuje k mikrolokalitě. V této části autor sděluje své zkušenosti s prezentací a) vybraných hospodářsko a sociálně prostorových kvalit polohy jako situování / napojení, okolí, prostředí a služby (obr. 2), jakož i b) kvality půdy starých stanovišť. Tato stanoviště jsou po více než stoletém železničním provozu a průmyslovém užívání pravděpodobně znečištěna a představují riziko pro potenciální investory. Na tomto pozadí je provádění evidence těchto starých lokalit významným a odpovědným úkolem pro aplikovanou geografii (obr. 3).

Key words: *evaluation of geographical location, regional competition, thematic maps, geographical position, contamination of soils, southern Germany.*

1. Introduction

With the exhaustion of building estate reserves in agglomeration areas growing significance is attached to the conversion of waste business land, deserted army camps or

goods railway areas being or going out of traffic function. Preparing the marketing as a rule the owner places an order for locational evaluation. The author's experience shows that within the bounds of such expertises the geographical way of thinking and working may contribute helpfully. This refers

first of all to the registration and presentation of locational peculiarities.

The following remarks want to submit some experience the author acquired in German cities in the 1990s. In the limelight were traffic areas of some 10 ha (goods railway stations) the transport function of which would come to an end. The areas are to be converted into superior utilization. The idea is to stimulate the discussion with geographers in transforming countries who are engaged in similar duties and interested in comparisons.

2. Regional competition

The first step of evaluation the locational analysis usually examines advantages and if necessary disadvantages of the spatial economic position in the national or (western) European economic space (macroposition). Communities and regions advertise with their alleged central situation in Europe and accessibility advantages in comparison with regions in competition. "Europe" as a rule means the western part of the continent and its economic backbone (the "blue banana"). In our opinion there is still a lack of convincing new spatial models which could contribute to convert chances of social and economic transformation in former socialist countries of central and eastern Europe into real locational activities.

In this situation geographical investigation should regard the accessibility of the economic core and the impact of competing actors on the regional market as well (mesoposition). Favourable accessibility on the one hand offers competition advantages. So, for example, nearly all Japanese car traders or designers in Germany are located inside or near the Rhine corridor. A good accessibility on the other hand may signify the risk of "backwash effects". Regional authorities in charge of spatial organization are tempted to improve connection to the European corridors of development and to mobilize in this way "spread-over effects" by enlargement of missing links (the regional transportation network). Of course, the importance of regional planning to real locational decision should not be overestimated.

The connection between macroposition and mesoposition should be demonstrated on an example of the city of Pforzheim (117,000 inh.) in southern Germany (Fig. 1). The blueprint clarifies the ambivalent spatial situation: On the one hand both neighbouring large cities Karlsruhe (270,000 inh.) and Stuttgart (560,000 inh.) represent regional competitors. Their supplying areas theoretically touch the regional market of Pforzheim in an elliptical way. On the other hand the geographical position between two large European corridors of development opens chances as well: From Pforzheim one can supply more than one million consumers inside a 50 km radius with goods and services.

By the way, personal experience shows that during the presentation of expertises a complex and easily comprehensible spatial sketch has a remarkable stimulating effect on discussions.

3. Microposition: locational peculiarities

The third step of the locational evaluation refers to the microposition. It is known that there is no individual indicator which could measure locational peculiarities (Fig. 2). For that reason expertise has to consider a multitude of indicators. The contribution of geographers should be concentrated with priority on the locational factor (surroundings) and on a part of the spatial peculiarities of the traffic area itself. The cartographical illustration has to draft the way that it combines synoptic realization with a clear presentation of the study results. The study outcome substantially influences expensive investment decisions. Nevertheless, geographical investigation on the microlevel is surprisingly rare and frequently the real estate economy formulates evaluation of locational peculiarities as an armchair-evidence.

Summarizing and choosing from comprehensive studies during the 1990s we acquired on traffic areas of some 10 ha in the following there will be presented two examples. The first example refers to some economic and social indicators evaluating the surrounding position of the area under study (the goods railway station near the city centre of Pforzheim). The second example refers to locational peculiarities of the area itself - the soil conditions of an imaginary traffic station in transition.

The cartographical key Fig. 2 illustrates in sequence:

(1) position in the inner city area

- goods railway station itself (the area under study)
- main city centre
- attractive secondary shopping centres in the northern part of the city

The information was collected by one walking inspection, individual photos, interpretation of digitalized telephone directory, aerial photography and the topographic map 1 : 5,000 (Deutsche Grundkarte 5). From the topographical position one can derive that the area as building plot could be integrated in the surrounding residential district without any problems. The competition situation in the service sector would not obstruct in future an additional shopping centre on the transformed traffic area.

(2) accessibility

- distance from bus stop
- pedestrian subway
- transit traffic street

The public transport of Pforzheim is organized exclusively with buses. The spatial distance details in 50 m intervals clarify that from the nearest bus stop a pedestrian can reach the middle part of the real estate (the goods railway station) within five minutes (400 m). But the connection with the shopping opportunities of the main city centre achieves a critical threshold. The reasonable walking

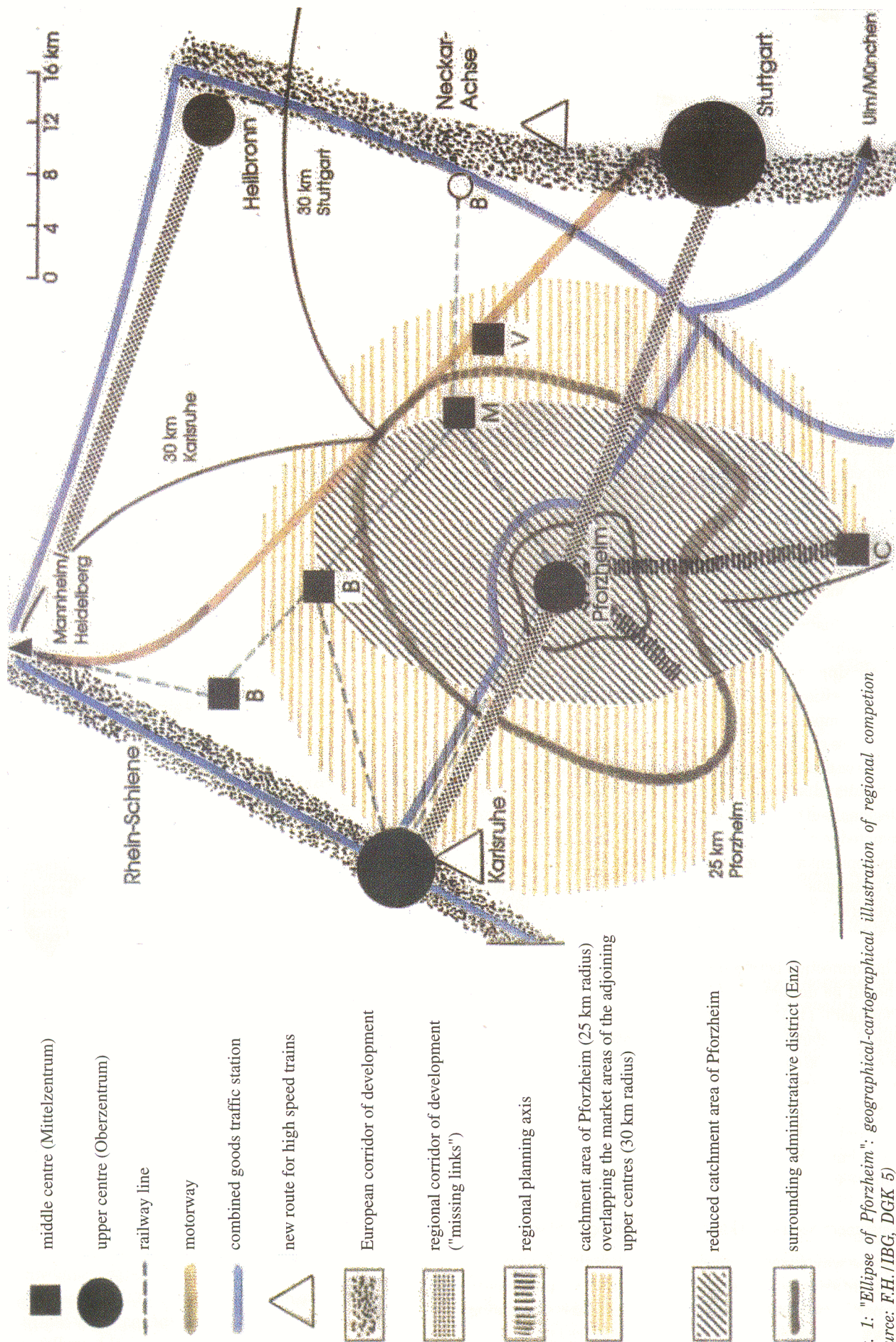


Fig. 1: "Ellipse of Pforzheim": geographical-cartographical illustration of regional competition (source: F.H./IBG, DGK 5)

distance depends on the attractiveness of the destination as well as on the length of the path way. In our case, using subway or bridge, the threshold is at some 300 m. In the case of attractively designed footpaths a pedestrian can accept distances up to 10 min. or 800 m (Schmid 1993).

(3) parking situation

- multistorey car park and parking place

As one can recognize in the figure parking opportunities are concentrated in the main city centre and in subcentres. The given situation promotes the construction of an individual subcentre with its own parking opportunities in the area under study.

(4) neighbourhood position

- favourable surroundings
- surroundings with a medium locational quality
- rather negative surroundings

Potential investors gladly ask if the current social structure in the surroundings (200 – 300 m) does support a superior utilization of the land after giving up the transport function. Therefore we made inquiries on the above mentioned items and transformed the result in a three-stage scale: (a) favourable surroundings (dwelling utilization at good quality, dwelling utilization mixed with catering and retail trade), (b) surroundings with a medium locational quality (less attractive dwelling position, not disturbing business, mixed utilization), (c) rather negative surroundings (filling station, prison, scrap dealer, unbuilt real estate).

(5) environment quality

- green space

To characterize the environment quality in our limited time budget we could register only green space in the surroundings. To evaluate dwelling environment in detail there is a great variety of physical and social factors to study (Špes, M. et al. 2001). The urban attractiveness of Pforzheim is rather small. But the city has at its disposal extensive local recreation areas in the northern Black Forest and along the river bed adjoining the goods railway station in the east.

(6) services

- retail trade market
- branch market
- selected public buildings
- hotel.

4. Microposition: soil condition

Locational peculiarities of the traffic areas were investigated in the 1990s comprising not only the surrounding position but also the history of the railway station and its buildings and the soil conditions as well. Subsequently, we present a

methodological example where geographers can take part in the investigation and presentation of probably contaminated plots in traffic areas without competing with specialized soil laboratories. After more than 100 years of railway and trade utilization these traffic locations were probably contaminated. As it is well known, these pollutions represent a risk for potential investors. Therefore the registration and evaluation of these old utilized areas present a responsible task. In Germany the examination of soil condition in case of suspicious contaminated plots as a rule takes place in three stages:

- 1: registration (historical exploration or audit 1)
- 2: technical exploration
- 3: redevelopment (decontamination).

Geographical way of thinking and working may be applied first of all at stage one. The historical exploration investigates the area and its surroundings without soil samples (stage 2). Using archives, historical, geological and hydrological maps, development plans, single earlier soil samples, photos as well as questioning and chronicles historical studies inquire former utilization, buildings, loading facilities, storehouses, scrapyards, pump installations, consequences of operational accidents, air raids and so on. This way preparing the second stage a profound historical registration may not only reduce the expense of technical exploration, but permits the first preliminary classification of the area and a provisional roughly assessed value of decontamination expenditures. A simplified cartographical image of stage 1 as example one can be seen in Fig. 3.

Cartographically the registration and preliminary classification is represented in plots (a) without suspected contamination or storage, (b) probably contaminated plots without need of action, (c) suspected plots with a probable need of action and (d) contaminated plots with pressing necessity of action.

The cartographical presentation of audit one reflects comprehensive geographical knowledge. Namely this preliminary and cautious differentiation of action needs facilitates preparation of investment decisions and development plans for superior utilization of goods railway stations the transport function of which will come to an end.

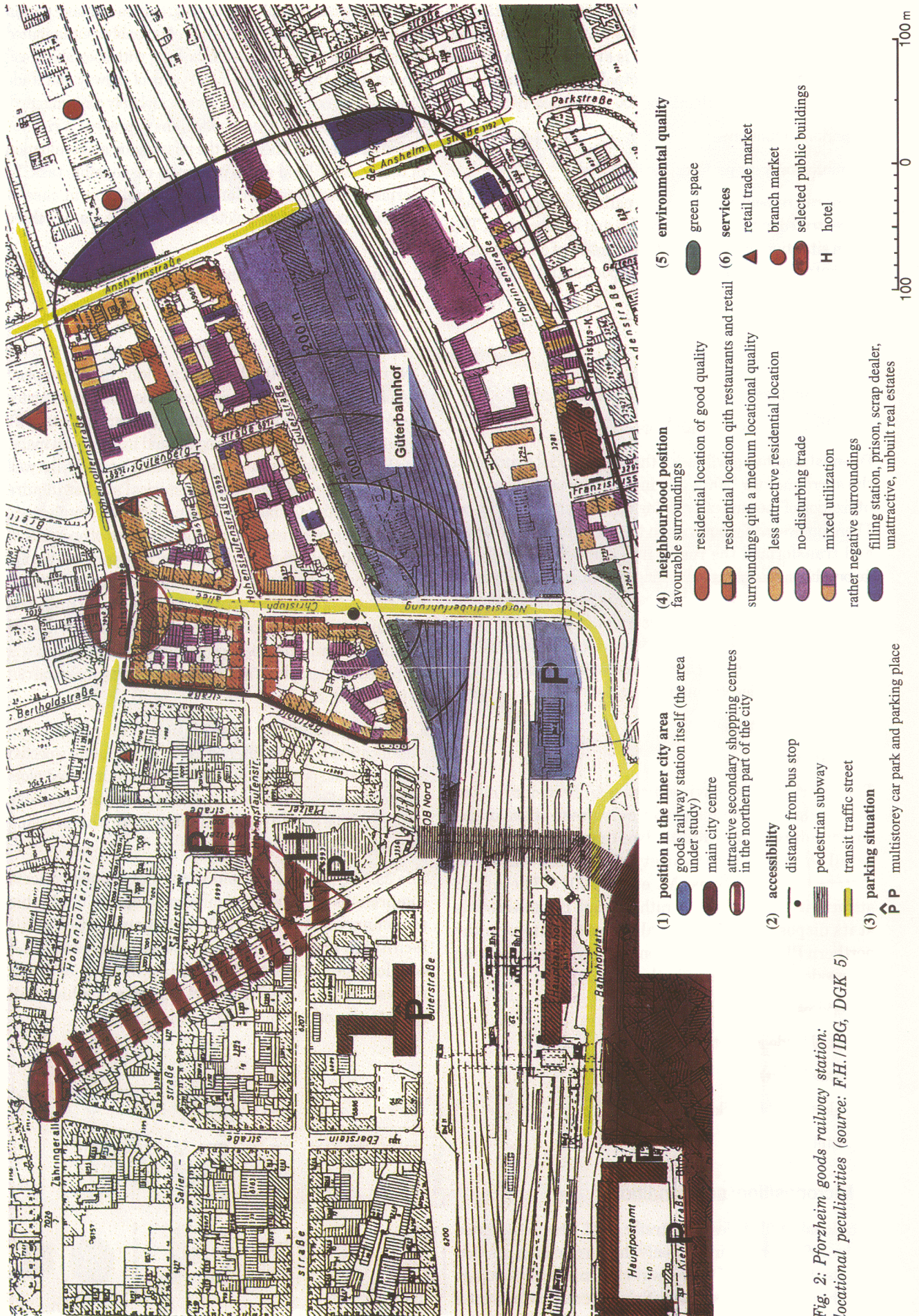


Fig. 2: Pforzheim goods railway station: locational peculiarities (source: F.H./IBG, DGK 5)

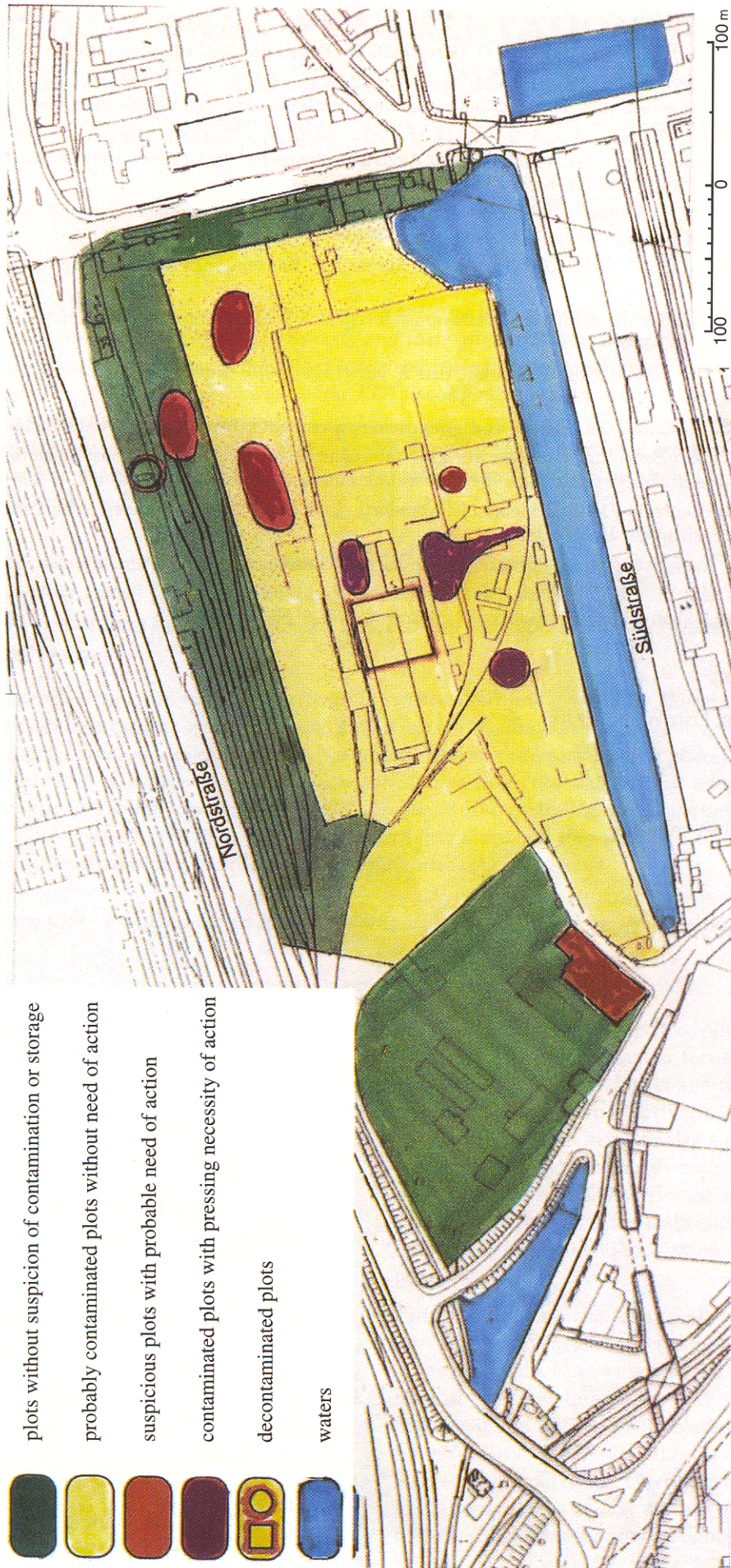


Fig. 3: Registration and preliminary classification of probably contaminated plots (source: F.H./IBC)

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INSTITUTIONAL FRAGMENTATION AS AN IMPEDIMENT TO SUSTAINABLE LAND-USE IN THE MORAVA RIVER FLOODPLAIN

Sandra SWEENEY, Pavel PTÁČEK, Aleš LÉTAL

Abstract

In this paper we focus on the mechanisms affecting land-use patterns, namely urban sprawl, within the Morava River floodplain. The extreme conditions of the 1997 floods and their aftermath have been chosen to demonstrate the ineffectiveness of the Czech bureaucracy in the field of landscape protection and land-use management. The main aim is not to describe all the causes and consequences of the 1997 floods for which there is mushrooming literature, but to show how, in spite of a well established bureaucratic and legal system, institutional fragmentation, institutional lock-in and institutional thinness contribute to this system's ineffectiveness. Three examples of new post-flood development are introduced as examples of brittle thinking on the part of those institutions responsible for land-use management within the Morava River floodplain.

Shrnutí

Institucionální fragmentace jako překážka pro uplatňování principů trvale udržitelného využívání půdy v nivě řeky Moravy

V článku se autoři zaměřují na mechanismy ovlivňující využívání krajiny v nivě řeky Moravy, především na její územní rozvoj. Na příkladu extrémních záplav z roku 1997 a jejich důsledků je demonstrována neefektivnost institucí odpovědných za územní plánování a ochranu přírody a krajiny. Hlavním cílem není popsat příčiny a důsledky záplav z roku 1997, jimž se v dostatečné míře věnuje odborná literatura, ale ukázat, jak navzdory rozsáhlému administrativnímu a právnímu aparátu přispívají institucionální roztržitost a institucionální blokování k neefektivnosti tohoto systému. Na třech příkladech nových pozáplavových stavebních aktivit je dokumentováno zastaralé myšlení institucí odpovědných za územní plánování v nivě řeky Moravy.

Key words: Morava River floodplain, urban sprawl, restoration, institutional lock-in, sustainability, Czech Republic

1. Introduction

Through carelessness, misunderstanding or ignorance of ecosystem properties the Morava River floodplain has often been degraded unnecessarily. Nationally, there are several new Acts and government policies taking shape in which ecological integrity, river basin management and flood protection are highlighted. Efforts appear to be intensifying to both forestall deterioration and to restore where degradation has occurred. The restoration of the landscape with special attention focused on the floodplain ecosystem is intended to result in a more integrated nature-culture interface at the landscape level. However, recent non-sustainable land-use patterns within the floodplain demonstrate the ineffectiveness of national laws to inhibit ecological damage to an already impaired ecosystem, the river-floodplain continuum.

In this paper we focus on those institutional mechanisms which affect land-use patterns, namely urban sprawl,

within the Morava River floodplain (Fig.1). As an example we have chosen to focus on the extreme conditions of the 1997 floods and their aftermath to demonstrate the ineffectiveness of the Czech bureaucratic system in the field of landscape protection and land-use management. The main aim of the paper is to show that in spite of a well established bureaucratic and legal system, in practice institutional fragmentation, institutional lock-in and institutional thinness feature prominently.

First we focus on the legal tools, programmes and institutions responsible for regulating land-use patterns in the floodplain. Next we couple the ecosystem and the institutions to sustainability. Both the extent and the duration of the 1997 floods in relation to the increasing vulnerability of the floodplain environment are described in section four. The responses of the land-use planning system and case studies of non-sustainable post-flood development are highlighted in section five.

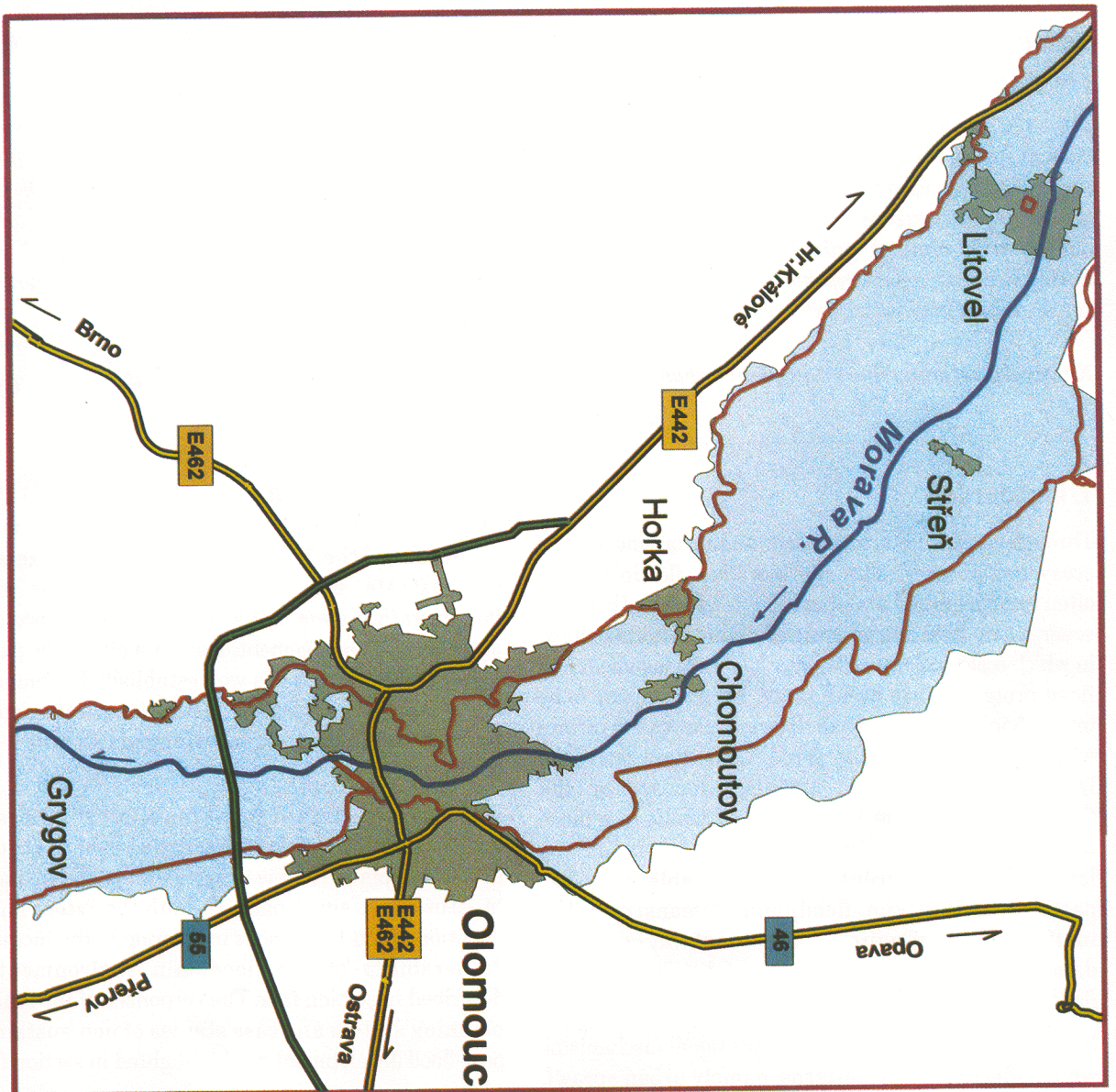
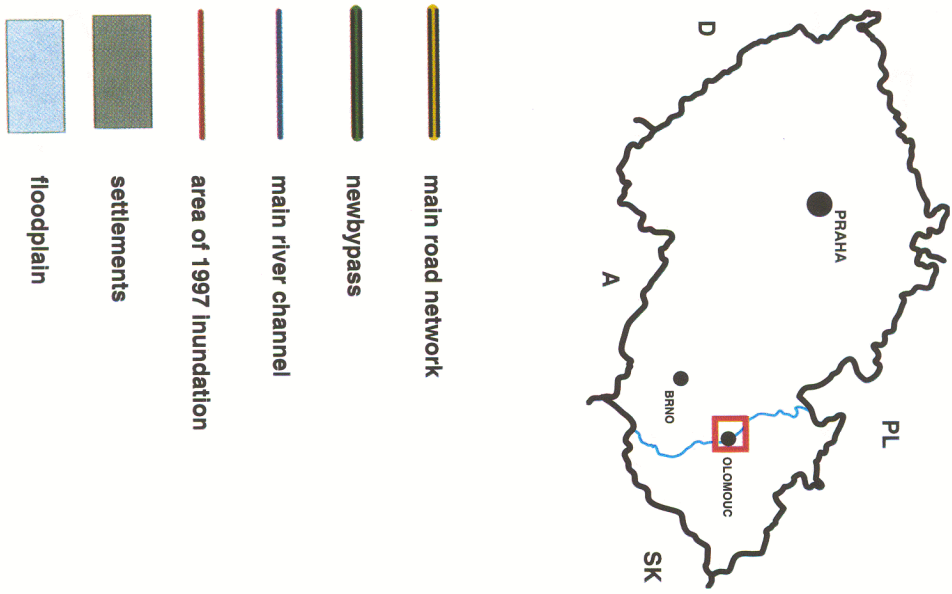


Fig. 1: Location of study area

2. A water-related Czech environmental focus

At present, in the Czech Republic, the responsibility for and management of water resources and river basins are fragmented (Mlčoch et al., 1998) and policies are piecemeal. The absence of legislation continues to restrict the development of a truly competent legal framework for effective river basin management. The river basin authority charged with managing the Morava River remains hampered from effective management. Broadly speaking, the ability of the Czech river basin management agencies (povodí) to introduce good water practices or to modernise and maintain flood protection facilities is criticised by many Non-governmental Organisations (NGOs) for not taking into account environmental criteria in their decision-making (Regional Environmental Centre – REC 1997; Český svaz ochránců přírody – ČSOP 1996, 1998). Yet, ecosystem integrity, to be managed at the river basin level, will require integrated land and water resources management.

A river basin management authority should integrate the application of the various programmes and tools at its disposal for floodplain protection. But, the primary water-related objective of the Czech state environmental policy has been to improve water quality by limiting pollution discharges. The river basin management authority's aim has been to protect drinking water resources and to further reduce pollution concentrations in surface and groundwaters. The legal framework does not yet meet European Union water standards (Thalmienerová, Závadsky, 1999). The integrated river basin management system, in practice, has neither an appropriate legal framework nor administrative structures to ensure an ecosystem approach to river basin management (Sweeney 2001a). A properly functioning authority does not pay excessive attention to engineering aspects while paying only lip service to environmental issues.

2.1 Land-use and landscape protection policies

Although the Czech Environmental Policy emphasises the need to integrate environmental considerations into such policy areas as transport, agriculture and industry, sectoral policies remain outside the overall framework. The following are among the many problems in implementing environmental restoration policies:

- Environmental management in the Czech Republic still tends to be partitioned into sectors, e.g., air, water, nature protection. The present institutional arrangements are not suited to integrated environmental assessment, decision-making or planning within the boundaries of river basins.
- Difficulties continue to exist in implementing the required legislation together with its regulatory and economic regime, all of which must be done in a short period of time and under rapidly changing economic conditions. The developmental context is compounded by parallel expectations in the economic sector which continues to

seek alternative and cheaper ways in which the public and industry will have to solve environmentally related ills.

- The institutional framework and associated mechanisms for monitoring and enforcement need strengthening. This includes the establishment and operation of the necessary infrastructure.

The Czech Ministry of Environment publication *State Nature Conservation and Landscape Protection Programme*, reports a significant overall disturbance in the country's hydroecological stability with a loss of one third the total length of water courses during this century alone (Mlčoch et al., 1998). Typical of heavily urbanised countries, the Czech Republic's rivers suffer from straightened water courses, artificial river banks, weirs, dams, increased contamination from both residential and industrial waste waters, erosion and chemical contamination from intensive agricultural and aquacultural practices. The *Programme* calls for the renewal of the country's water regimes using a river basin concept and is straightforward in stating what is needed: protection and restoration of alluvial and wet meadow ecosystems and compatible agricultural management (especially in the floodplain). To restore for ecological function within the floodplain channelisation should cease, old channels be restored, natural retention methods augmented, and all forms of management seek to create wildlife habitat for water-dependent plants and animals (Mlčoch et al., 1998).

The purpose of the new Czech "Nature and Landscape Protection Act" (Act 114/92 Sb.) is to contribute to the maintenance and restoration of the natural balance in the landscape, the protection of biodiversity, and the wise-use of natural resources. The Act calls for landscape protection in the interests of ecological stability, namely, from the perspective under discussion, the appropriate placing of buildings to foster ecological integrity and not impair the aesthetic value of the landscape.

Here, it must be recognised that flooding is, at least in part, natural, and contributes to landscape character. To prevent damage to human settlements, as well as riverine functions and to ensure sustainable development, the special case of flooding as part of the natural life cycle of the river will have to be considered. Flood protection necessitates a restructuring of the relationship between human society and rivers (World Water Council – WWC, 1999). In the case under discussion, it means ceasing with construction in the floodplain.

A programme to restore the riverine health of the Czech landscape was initiated in 1992. Its principle aim is to restore for ecological function at the landscape level. Several of the restorative acts are focused on ecological function within the floodplain. The restoration of streams, oxbows, and wetlands are specifically noted. The reconstruction and stabilisation of retention capacity in the floodplain is described in both technical terms, i.e., dry polders, and biological ones, i.e., riparian vegetation strips and wetlands (Czech Ministry of Environment, 1998).

2.2 River basin management

A common pattern observed over time in managed ecosystems is that the ecosystem itself becomes less resilient, the management agencies become more rigid, industries become more dependent and static, and the public loses trust (Gunderson et al., 1995). Analysis, design, monitoring and innovation depend as much on ecological theory as they do on social theory. At heart, successful adaptive approaches rely on the democratic process in which the complexity and ambiguity of environmental issues can be synthesized and managed for change. Within the Morava River floodplain, a region-wide managed ecosystem, intensive agricultural practices, a rapidly growing urban population combined with historical land-use patterns that have sought to divorce the river proper from its floodplain, have seriously affected the water in the river as well as water cycling in the floodplain.

Modern engineering, technology, economic and administrative expertise have dealt with the problem of flooding in the Morava floodplain by straightening water courses, destroying oxbows, building artificial banks, polders, and dykes. Central to past management strategies has been augmenting the river's capacity to flush water downstream. Natural values across a variety of temporal and spatial scales have been impaired (Šarapatka, Štěrba, 1998), from the loss of localised essential breeding and feeding habitats of both aquatic and wetland species to basin-wide loss of absorption capabilities. The sinuosity ratio of the Morava has decreased by a third, the water table in the floodplain continues to drop, and many floodplain wetlands have disappeared.

At the same time, consistent with the pattern seen elsewhere, elements of the system have been slowly changing as a consequence of the initial success of the policy. A typical example is the increase in settlement development and industrial plant found directly in the floodplain because flooding is no longer perceived as a problem. Instead, the increase in population and subsequent economic activities in the floodplain proper amplify the vulnerability of both the natural and the built environments. Holling (1973) reported nearly three decades ago that success in controlling an ecological variable that normally fluctuates, for example, water discharge in rivers, leads to more spatially homogenized ecosystems over landscape scales. Ecosystems are then more likely to flip into a persistent degraded state, triggered by disturbances that previously could have been absorbed: a 20-year flood now causes damage equivalent to a 100-year flood.

2.3 Spatial planning and land-use management

Czech land-use planning is composed of a bright array of planning instruments. These should avoid inconvenient land-use patterns and co-ordinate spatial development at different territorial levels. Chief among them is the Czech "Spatial Planning Act," which dates from 1976 (50/1976 Sb.). It distinguishes between different spatial and temporal frameworks for planning, all of which are legally binding. The most frequently used planning document is the municipal master plan which includes all the territory of a self-governing municipality, and the regional master plan which usually includes all the agglomerations of a district or a larger territory. The temporal framework for such plans is about 10 years.

Planning documents at the local level are ratified by the municipal government, at the regional level by the national government, and since 2001, the new regional assemblies. According to this framework there should be strict subordination of lower spatial and temporal level plans to higher level ones. Changes to the law protecting arable land is another factor contributing to pressure on land.¹⁾

The final actor in land-use is the construction bureau (stavební úřad) which issues building permits. Because the construction bureau is the final arbiter it is a very powerful institution in those cases where there is no legally binding master plan. A special case accrues when a building is to be situated in the floodplain wherein the recommendations of different institutions are necessary. In most cases the responsible institution is that of a District Office's Department of Environment. In the case of the Morava River floodplain it is the Litovelské Pomoraví Landscape Protected Area Administration (LPA). In special cases, for example, the draining of water during floods, it is Povodí Moravy, the river basin management authority. In most cases, agreement between these institutions is a formality. If a piece of land is in private ownership and the master plan is not yet finished, the river basin management authority can grant permission for construction and there is no restriction on building. Formally, from a legislative point of view, there is a well established land-use planning system. However, the actual spatial planning and land-use policy is ad hoc. Urban sprawl and new buildings in the floodplain are not perceived as serious problems by the responsible institutions. Vaishar et al. (2000) report that in the Hanušovice/ Jindřichov region when constructing new homes, production facilities or infrastructure the strategy of either moving buildings or not constructing them in areas inundated by the 1997 floods is

¹⁾ This new law weakens the previous protection given to arable land, especially against construction. Taxes, which should be paid because of changes in land-use, are now the income of the local community, whereas earlier an income of the state. This increases the effort of communities to change land-use patterns to garner more tax income (Zákon na ochranu zemědělského půdního fondu – Agriculture Soils Protection Law, 1992).

hardly ever employed. The construction of second homes, which are scattered throughout the countryside, is another significant problem which goes largely unnoticed by planning institutions.

3. Coupling ecosystems and institutions for sustainable land-use

It is important to note that not as much is known about river ecosystems as we would like to imagine. Scientific uncertainty underscores contemporary research in large river systems, thus the shift to perceiving and managing ecosystem processes as natural processes which exercise their own agency. This is a far cry from the strictly engineering perspective in which nature is an object, at best a trained object. In the Czech Republic the engineering paradigm continues to dominate drawing criticism from several NGOs and university departments. A typical example of the evident lag in adopting a more integrated social-nature interface in floodplain management can be seen in the lack of support for the World Wildlife Fund freshwater programme which exists in all the countries of Central Europe except the Czech Republic (World Wildlife Fund – WWF, 2001)

Despite the importance of large rivers, our understanding of how they function and how human activities influence river processes is limited (Davies, Walker, 1986). Large rivers have received scant attention when compared to small rivers and lakes. There is no clear theoretical basis for how large river ecosystems operate (Johnson et al., 1995). What we do know is that higher trophic level populations are more stable in floodplain rivers compared with non-flooding rivers and that biologically driven cycles may be imposed on hydrological ones. Bayley (1991, 1995) has consistently shown that productivity is enhanced by flooding and predicts that variability in the flood cycle, especially the coincidence of appropriate temperatures and rates of inundation, is critical in determining productivity levels. Adaptive ecological management is moving toward manipulating flow regimes to regulate sediment transport and to restore the flood pulse (Sparks, 1995). Better methods and tools are needed to explain system function at the river-floodplain, or what is increasingly being, the "riverscape," level. Increased understanding and better tools for predicting a river's physical and biological characteristics, including the flood pulse concept, are essential to guide the management of the river floodplain's dynamic equilibrium within appropriate time scales.

Ecosystem management focuses on natural process (Soussan et al., 1999), sustainability, use of models, cognisance of context, adaptability and accountability (Spies et al., 1991). Adaptive management stresses the need to adjust and change as research and monitoring provide new information (Holling, 1973). The most apparent institutional barrier to enhanced ecosystem viability has been the interaction or connectivity among institutions (Gunderson et al., 1995; Ptáček, 2000). The devastating 1997 floods failed to

trigger a major shift in learning among policy makers. Calls to determine whether modifications to the existing watercourse, i.e., channelised riverbeds and straightened banks, and flood protection projects, i.e., dykes and polders, although advisable due to changed physical, biological, demographic and economic conditions, were restricted to the NGO community. Instead of being open to the possibility for change, the Ministry of Environment chose to rescind the law calling for an Environmental Impact Assessment on the reconstruction of all water management structures that existed before the flood. The most compelling evidence demonstrating the Ministry of Environment's decision-making paralysis was the decision to rely on "river training" as the dominant management regime. Thus, we can say that currently ecosystems, policy-makers and managers are trapped in a brittle model of resource use and incapable of envisioning alternatives (Costanza, 1999). The continuing focus on water quality characterised by top-down decision-making through statutory water management plans with priority given to investment in water infrastructure in the service of economic production ties management systems and their rules to prevailing technologies and flood protection strategies that fail to evaluate land-use in the floodplain. They highlight instead the extent to which the institutions exhibit slow rates of change. They have become trapped in technological competencies that persist but have become increasingly dysfunctional (Arthur, 1984). A sign of learning would be the recognition that both the ecosystems and the management institutions responsible for them need to be renewed.

Conceptually, a landscape perspective is required within which social and institutional learning can begin and adaptive management regimes be applied. Decisions that are being made today will turn on ecosystem responses to management plans that take place over a decadal or centurial time scale, i.e., the Great Lakes plan aims for partial restoration within 200 years (Regier, 1992); the California Redwood Forest restoration plan within 400 years (Ziemer, Ried, 1997). Thus, management plans will have to involve time scales appropriate to the landscape level and what we know about cycles nested within it. The political time frame is four years, the institutional or budgetary time frame one, while that of ecosystems more than a professional lifetime and in some cases more than a life span.

4. Causes and consequences of the 1997 floods in Moravia and Eastern Bohemia

Historically river valleys served as preferential transport corridors. Increases in population and subsequent economic activities increasingly brought construction and urban settlement into floodplains. The number and extent of activities affecting water regimes have increased, lifestyles have changed significantly in relation to the use of natural resources, particularly agriculture and the exploitation and processing of raw materials. The vulnerability of the environment has increased in tandem, and thus, a twenty-year flood can now cause the equivalent effect of a hundred-year flood.

This was overwhelmingly the case with the 1997 floods. A flood of such size and extent (Fig. 1) has a probability of occurring on the Morava River once in one to eight hundred years. The flood affected an exceptionally large area, 1248 km², and damage reached CZK 62 bn. (\$US 2bn.). The flood affected approximately 700,000 people in 538 cities and municipalities in 31 of 76 districts.

In the district of Olomouc about 60,000 people were affected, of whom 46,000 were in Olomouc itself. Throughout the district the floods affected 27 % of the population. Material and other damages in the Morava River basin have been estimated at CZK 20 bn, of which CZK 5.5 bn accrue to the Olomouc district. The highest share of damages (CZK 2.6 bn) in the Olomouc district was suffered by businesses while infrastructure and housing account for CZK 1.3 bn (Povodí Moravy, 1997).

The majority of summer floods with a peak flow exceeding a one-hundred-year discharge, including the 1997 floods in Moravia and eastern Bohemia, is caused by a long period of rainfall. In 1997 extended precipitation was locally increased by convective storms. The extreme precipitation in July 1997 affected north Moravia, the Krkonoše Mts., the northern part of the Českomoravská Highlands and the Orlické Mountains. The highest precipitation was measured in the mountain ridges. The highest monthly amount was observed at the Lysá hora Mt. (812 mm or 412 % of the average value). The most significant precipitation appeared in two episodes from the 4-8 July and from 17-21 July and generated two corresponding flood episodes.

Some important contributing factors are to be found in landscape level ecosystem processes in both land and water. They can be summarised as follows: retention capacity of soils, infiltration ability, melioration arrangements, wetlands and peat-bogs, floodplain forests, floodplain and meadows, natural channels, ponds and small natural lakes. Overall, these factors were considered less important than the atmospheric situation in generating the 1997 floods. Arrangements to increase the retention capacity of the Morava river basin could not protect the densely settled floodplain from more than a twenty-year flood. Because of the intensive precipitation, which is the cause of one hundred-year floods, the influence of landscape factors on the duration of such a flood is thought to be about 10 % and to be most effective in the initial stage of the flooding event (Matějček, Hladný, 1999).

5. Examples of responses or non-responses to floods in the Morava River floodplain

Brittle thinking, when managers look at the efficiency of the institution they increasingly serve, instead of the impact of their management on the trajectory of natural processes within the ecosystems themselves, is well entrenched in Czech resource management institutions. Many examples of reaction, rather than response, to the catastrophic floods by

the different institutions responsible for enacting the policies described above can be observed directly, either in the landscape or by investigating institutional processes. In this section we describe the changes that have been made in spatial planning documents which should be the most effective tool for developing sustainable land-use practices over the long-term. Case studies from the Olomouc region are then introduced. In the final sub-section radical solutions from Canada are presented.

5.1 The impact of the 1997 floods on land-use planning patterns in the Morava River floodplain

Despite arguments in section four that bettering land-use patterns and restricting new development affects only Q20 floods, spatial planners did react to the 1997 floods. The main goal, however, was merely to minimise losses to the built environment within the floodplain in terms of regulating construction activities.

Following the 1997 floods many new municipal master plans in the Morava River floodplain were accepted. They were: the Olomouc master plan, from October 1998, including Černovír, Týneček and Chomoutov (Alfa projekt Olomouc, 1998); an urban study of Střeň, elaborated in late 1997 as a tool for the reconstruction of a very damaged village (Šnyrchová, 1997); the Hlušovice master plan (Stavoprojekt Olomouc, 1998), and the Grygov master plan, from September 1999 (Arch, 1999). Other municipalities either have pre-flood master plans or have not yet finished their master plans. It is important to look at which kind of arrangement prevails in the new master plans. They can be roughly divided into two sections:

- technical arrangements for the defence of built-up area against Q5 floods
- limitation of new development outside the built-up area, but a total restriction on new buildings in the 1997 area of inundation refers only to public buildings (public services, factories, etc.); private homes are not included.

It was recommended that the reconstruction or new construction of private homes not be built in areas where the level of the 1997 floods exceeded 0.9 m above the ground floor. Garages or other non-living rooms can accordingly still be completely flooded. The final decision on construction lies with Povodí Moravy.

In August 2000, the first change to the Olomouc regional master plan was elaborated (Terplan Praha, 2000). This document includes a section dealing with the problem of flood defence. After being accepted, all community-level master plans in this region should respect the prescribed limitations on land-use. A principle question is the complex solution of flood defence. The main emphasis has been placed on settlement and on minimising the number and extent of interventions into the river ecosystem and landscape.

Arrangements for flood protection consist, among other things, of building a new system of wharves along built-up areas, respect for the floodplain and prohibition on new construction within its boundaries. A very important part of this section is the description of those technical arrangements which should protect larger towns in the region. It allows for new construction in the 1997 flood area only under certain conditions. The importance of both re-enforcing the retention abilities of the landscape and restoring the floodplain ecosystem has been stressed. However, the question remains: when will this master plan be accepted and in which form?

As part of a PHARE process a Danish company has elaborated various flood models. These variants demonstrate the differing impacts of floods of varying extent and duration following the construction of different technical arrangements (dams, ecosystem restoration, etc.). At this point, the institutions responsible are in the process of selecting the most suitable technical solution. To summarise: at both the regional and municipal levels short-term technical solutions prevail.

5.2 Case studies from the Olomouc region

In this section we introduce three examples of non-sustainable land-use patterns in the Morava River floodplain. All told, the examples of new urban sprawl following the floods, including in situ (re)construction and linear construction, again demonstrate outmoded thinking. The main goal of this section is not to give a comprehensive overview of all the unsustainable activities to be found in the Morava River floodplain, but rather to show how changes within the institutions themselves are insufficient for the task at hand. The examples demonstrate the extent to which institutional lock-in in landscape level land-use management is typical of the Czech Republic's environmental policies.

Urban sprawl in Chomoutov

Chomoutov is a village of 800 inhabitants situated about 5 km north of the city centre of Olomouc in the Litovelské Pomoraví Landscape Protected Area (LPA). In administrative terms it is a part of the city of Olomouc. During the 1997 floods it was heavily flooded. As an attractive suburban locality it has attracted new housing development. Since 1995 new houses have been built in the southern part of the village in the Morava River floodplain despite its location within the LPA. The total capacity of the locality is for 147 new houses, 52 of which were built before the 1997 floods. The LPA authorities agreed with the construction of this satellite village which is situated in a 100 year flood area. The only condition was that dams and drainage grooves should be built as protection against floods. During the 1997 floods these new houses were, of course, heavily flooded. What was the response? The dam (Fig. 2), which should have protected this development against floods, was enlarged and an advertisement in a real estate newspaper stressed that the development is now protected against a hundred-year flood. That the price of housing plots dropped may be taken as a reliable indicator of the public's perception of risk. But, no institution has restricted new construction – it is not against any law, land-use plan or any other norm.

Old and new responses to floods: the case of Střeň

The village of Střeň is 12 km NW of Olomouc. Its population is 550 inhabitants. It lies within the boundaries of the Litovelské Pomoraví Protected Landscape Area. The village was founded in the Middle Ages. It is now a deforested island of settlement surrounded entirely by floodplain forest in the Morava River floodplain lying at more or less the same elevation as the Morava River itself. Dykes surround the village on all sides. Up to the 19th century all houses were



Fig. 2: New housing development in 100 year flood zone initiated prior to the 1997 floods showing illegal positioning at Litovelské Pomoraví Landscape Protected Area

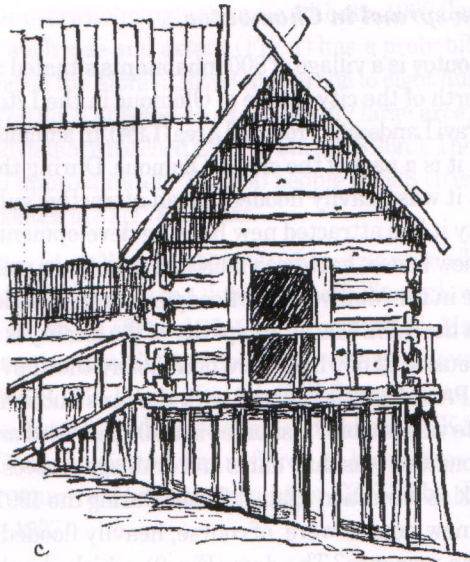


Fig. 3a: Traditional response to living in the floodplain

constructed on stilts (Fig. 3a). Together with both the channelisation and regulation of the river that have taken place in the past century, the villagers no longer perceived the risk of floods as important and began to built houses without stilts. During the 1997 floods, the village was entirely inundated to a depth of almost 2 m. The floodwaters had difficulty in receding because of the dyke embankments. Since the floods, the dykes have been both strengthened and heightened (Fig. 3b).

Střeň, lying as it does in the heart of the floodplain, seems, at first glance, to be injudiciously placed. However, because historically the village was erected entirely on stilts the houses were protected from floods. Now the houses are constructed at ground level ensuring that floods have a highly negative impact. Not only have the houses that were

damaged during the flood been reconstructed in situ, new housing development continues.

Linear construction and the floodplain: a new highway by-pass for Olomouc

Matějček & Hladný (1999) observe that it is necessary to continue to restrict the construction of new linear structures, i.e., road and rail development, industrial, public and any other building activities, so that it corresponds to the need for the free movement of water in the inundation area, thus preventing flood damage. Yet, within two years of the flood, the construction of a new highway by-pass south of Olomouc was undertaken. The highway slices across the floodplain perpendicular to the river in an area of high inundation in direct contrast to both the recommendations of the Ministry of Environment and in contravention of a cardinal rule for floodplain management: roads should never be built across a floodplain (Fig. 4). They are potential barriers to water and sediments rushing downstream (Foreman, 1997). The roadbed has been elevated in that section of the highway crossing the floodplain. Yet, we know that if a solid roadbed is built above floodplain level, water and sediment flows are significantly altered. The well-known way to solve the problem is to elevate the roadbed on pillars across the entire floodplain. Instead of elevating the highway, the Ministry of Transport has chosen to elevate the roadbed. The only modification to project documentation after the 1997 floods was the addition of more culverts to that part of the by-pass crossing the Morava River floodplain. It is cheaper than elevating the road on pillars, but in the event of a twenty-year flood, which the Ministry of Environment admits can have the equivalent effect of a hundred-year flood (Matějček, Hladný, 1999), damages will be exacerbated by floodwaters unable to escape downstream.



Fig. 3b: Contemporary brittle response to living in the floodplain: raised dyke and new housing construction



Fig. 4: Questionable new highway by-pass constructed perpendicular to the floodplain

5.3 Radical visions of settlement devolution

Management institutions value technical solutions over those which would (re)move current human activities from the floodplain. Implementing arrangements to prevent sprawl in the floodplain is very limited. There is no consensus that avoiding sprawl would bring substantial benefits (Gremlica, 2001). However, other countries have experimented with the removal of communities using ecological criteria to justify their argument for environmental restoration. One such example was undertaken in southern Ontario, Canada.

In the late 1950's, Parks Canada recognised that increasing human impacts from private land-uses both in and surrounding Point Pelee National Park were having an extremely negative impact on ecological integrity. In a watershed decision for Parks' management, it was decided to implement a property acquisition programme to remove the upwards of 400 houses, summer cottages, farms, businesses, etc. from the park on a willing seller-buyer scenario. Land expropriation was not used. More than reasonable prices were paid to the owners (usually the appraised value of the property plus a small premium) to encourage them to relocate. Most properties were successfully removed between the early 1960's and about 1980. The few remaining properties have been purchased up to the present. One of the remaining three properties was just purchased and Parks Canada is now actively negotiating for the last two. The programme was basically a departmental initiative to return the areas around the national park to a more natural state. Thus, the newly incorporated areas form a buffer zone along the park boundary. The time frame for the initial acquisition has been almost fifty years. It could take another fifty for the ecosystem to respond to changes in management being made now.

While this type of programme may seem provocative to some and may be easily dismissed out of hand due to the dense settlement pattern found in the Morava River floodplain, it is useful as an example of the extent to which landscape planning needs be both long-term and ecosystem process oriented.

6. Conclusion

Resource use conflicts, frequently mediated over the short-term, as has been the case with the flood protection strategy or "river training" adopted by the Ministry of Environment, continue to ignore the long-term necessity of creating broadly shared visions. The development of an appropriate river basin management infrastructure predicated on effective national laws and their implementation will best be achieved where objectives are consistent (International Network of Basin Organizations - INBO, 1999) and multi-sectoral structures work together to implement programmes (Sweeney 2001b).

Many of the anthropogenetic changes to the floodplain and surrounding countryside for the past century provide examples of brittle thinking in the making, beginning with the belief that the river has too much water and subsequent attempts to force that water downstream faster, to today's over-reliance on river training. The resistance to change can be seen by various institutions' refusal to consider the natural cycles of flooding. True, it may be difficult, especially in Central Europe where floodplain settlements are quite dense, but at the very least we can stop urban sprawl. As a step by step process it seems a reasonable place to begin to remove additional contributing factors to ecosystem vulnerability.

The contemporary state of decision-making is grid-locked denying any possibility for sustainable development initiatives within either the planning process or the Morava's

floodplain. Adaptive management strategies, i.e., managing by change as opposed to managing for change, have yet to take hold. Policy is not yet technically sound relative to the natural system dynamics involved. Integrating water-related issues into Czech environmental policy will remain a complicated process for years to come.

As we can see from the few examples drawn from the Morava River floodplain, changes in post-1997 land-use patterns are only cosmetic. In real terms, contemporary spatial planning and ongoing construction within the floodplain show that institutional thinking patterns have not changed. This is most dramatically demonstrated by Povodi Moravy's decision to rely solely on "river training".

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TRENDS IN THE ISSUE OF PREFAB HOUSING ESTATES WITH EMPHASIS ON THEIR RECOVERY (WITH EXAMPLES FROM THE CZECH REPUBLIC)

Eva KALLABOVÁ

Abstract

The article concerns that part of the housing resources in the Czech Republic, which was influenced by the transformation of economic conditions after political changes in 1989. The complex house building programme which was focused on the construction of prefab blocks of flats condensed in housing estates was brought to an end in accordance with principles of the newly formulated housing policy. Since the prefab housing estates have started to show problems of various types (social, technical, traffic, demographical), they stir attention of not only experts the major goal of the recovery and humanization of these housing estates being the participation of their inhabitants themselves.

Shrnutí

Trendy v problematice panelových sídlišť s důrazem na filozofii jejich regenerace (s příklady z České republiky)

Příspěvek se věnuje dílčí části bytového fondu České republiky, kterou ovlivnila transformace zejména ekonomických podmínek po politických změnách v roce 1989. V souladu se zásadami nově formulované bytové politiky byla ukončena dosavadní komplexní bytová výstavba, která byla zaměřena na panelové domy, koncentrované do sídlišť. Jelikož se v panelových sídlišťích objevily problémy nejrůznějšího charakteru (sociálního, technického, dopravního a demografického), začínají k nim postupně obracet pozornost nejen specialisté. Hlavním cílem regenerace a humanizace těchto obytných čtvrtí je participace samotných obyvatel.

Key words: prefab housing estates, housing, humanization, recovery, Czech Republic

1. Introduction

Housing is an essential need of mankind and its issue enters as a partial element into the complex study of environment. Adequate conditions and requirements for housing are changing in the course of development of the society and determine the life standard of the society.

The subject choice came out – among other things – from results of a workshop organized by the Ministry for Regional Development of the Czech Republic in cooperation with the UN European Committee held in Prague in April 2000 where a question was asked of defining main problems for the recovery of towns. Besides the old residential neighbourhoods and originally industrial areas, one of most difficult problems appeared to be exactly the prefab housing estates.

2. Starting points of building the prefab housing estates

Apart from town centers, projects in the 1940s were focused on residential neighbourhoods; it soon showed, however, that

the recovery of urban areas of towns existing before the war could not satisfy the needs resulting from the post-war shortage of housing facilities. This is why new housing quarters started to be planned and built on vacant plots of town peripheries, for which the term "housing estates" was generally adopted.

The housing estates suited the economic-political post-war reality of the economy controlled from the centre. Thanks to its characteristic features – repeatability – it was possible to easily characterize the housing estates by means of quantitative and statistical methods while the workmanship and aesthetic qualities were neglected as well as the psychological or spiritual mission. Pros praised at the time of their construction have become rather disputable today, e.g.

- Horizon can be seen from upper floors. (But what about people living on lower floors?)
- New aesthetics (Light effects of extensive housing areas at dark)



Fig. 1: Demolition of one of the housing estate blocks (SRN, Leipzig, housing estate Grünau, 2001). Photo: E. Kallabová

- Open character of the built-up area - landscape growing in (Is it possible to speak of this with the population density indicator of 400 inhabitants per hectare?)
- Comfortable and "careless" living, anonymity (Who will inspire spirit to the housing estates?)
- etc.

It appeared in west-European countries that a one-sided orientation towards housing estates cannot meet population's housing requirements. Also, it is necessary to bear in mind that in these countries the construction of housing estates proper was more dispersed and diverse and its share in total

house building not reaching the level common in our country. Moreover, in reality – it brought an impaired functional and social structure of towns and this was the reason for democratic governments of west-European countries to incline once again to the maintenance, regeneration and extension of the existing housing resources (West Berlin). In our country, the very first discussions concerning the issue of housing estates were launched after the year 1989 but the first doubts in literature appeared as early as in 1985 when an article was published in which the author put a question of whether to further build these large housing quarters, more and more housing estates, or whether it would be useful to seek some new ways for housing solution. Even a today's



Fig. 2: Building of new prefab housing estate (Ukraine, Kiev, housing estate Livoberezhna, 2000). Photo: E. Kallabová

comparison of the situation in European countries shows considerable differences between countries in W-E direction. While in France and Germany the housing estates become to be gradually reconstructed (Fig. 1), their development in central Europe was stopped (the use of prefab panel technology for complex house building in the Czech Republic was stopped in 1992) but no reductions in the number of flats have been considered. If we move further to the East, the construction of housing estates still goes on in countries of the former Soviet Union (Fig. 2) with the traditional large scale of building being preserved. The prefab housing estates are not felt to be a problem in these countries yet although there are some new trends to be seen in suburban parts of large cities.

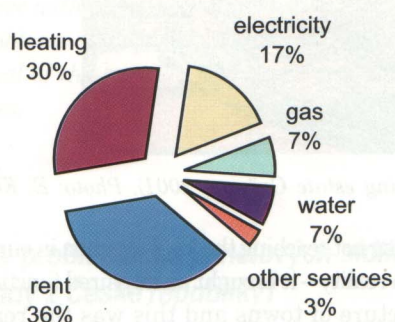


Fig. 3: The proportions of items forming the total household living expenses

Source: Ministry for Regional Development of the Czech Republic

The existing concept of residential geography deals with the study of structural attributes of housing resources, mechanism of housing services, to a lesser extent property relations, the spatial context includes relations to land use, mobility of families, etc. Experts in housing as such, who view the housing issue from another angle, have the housing resources classified into family houses, apartment houses and other buildings. For these categories we can obtain a relatively great amount of quantitative and some qualitative characteristics which are furthermore updated every year at a level of districts. Unfortunately, it is impossible to draw out any data concerning exclusively the prefab housing estates from these sources of information. Correct understanding of changes in the development of housing estates calls for an analysis and classification of topical problems which have to be faced by their inhabitants.

Reasons to the problems of housing estates can be seen in the "dictate" of building production and in the short interval of its establishment. Projection and construction of housing estates lacked the interest in a qualitative living of their potential users. These estates were not growing and developing around natural functional town cores and often lack context with the original residential network and terrain. Very often they are located in inferior locations towards the superior city unit, isolated from surrounding neighbourhoods or communities. Arrival of inhabitants to the

prefab housing estates was usually steered administratively with new residents suddenly finding themselves in an abstract and anonymous land.

3. Economic situation in relation to expenses for housing

The average cost of living varies not only according to the type of ownership of the flat, but also according to its size. After the social changes, together with the economic and social reform, housing also went through price liberalisation. Not only the rents were affected (rents form approx 1/3 of the expenses for household and living), but also utilities and community services (Fig. 3). The proportion of rent in relation to other living expenses is in fact the reverse of that in developed countries. There, the main component of living expenses is the rent – which means the money paid to the landlord for using as part of his property. If we consider the index of consumer spending and statistics of family budgets, living expenses as a percentage of gross monthly earnings during the transformation process are increasing significantly in all kinds of households. An important fact is that the constant rise in prices of energy and services erodes the affordability of housing costs, so the next rise in prices can cause an inability of many people to pay for them. This especially affects low income earners and pensioners. They currently spend half of their incomes on housing, while in 1994 it was only one quarter and in 1990 only 15%. This is also one of the reasons why the housing reform had to start focussing on the current social problems, and addressed social allowances were introduced (a form of housing-bound benefits).

Another economic factor connected with housing is the labor market and migration. Due to the reluctance of most people to move closer to available jobs, the labor market in the Czech Republic is reliant on local sources of labor. On the other hand, inhabitants are forced to work close to home. Only people with above average incomes are prepared to commute more than 10 – 20km. According to the Ministry of Labour and Social Affairs, commuting farther than 150 km in Germany means investing 20% of the average salary, compared to 90% in CR. According to our own research, it is more lucrative for unskilled and semi-skilled workers to be on welfare than to commute even over a short distance to work.

4. Prefab housing estates in the Czech Republic

Living in houses built by prefab technology is one of the most frequent types of dwelling in the Czech Republic. 1.2 mil. flats are built by prefab technology (just 1/3 of the total housing resources of the state), in which 1/3 of population of the Czech Republic lives. On average 18 flats fall on one prefab house. If we do not count Prague, the position of which is in all aspects specific, the prefab house building concentrated in North Bohemia (regions Chomutov, Most, Teplice, Ústí nad Labem) and North Moravia (Ostrava,

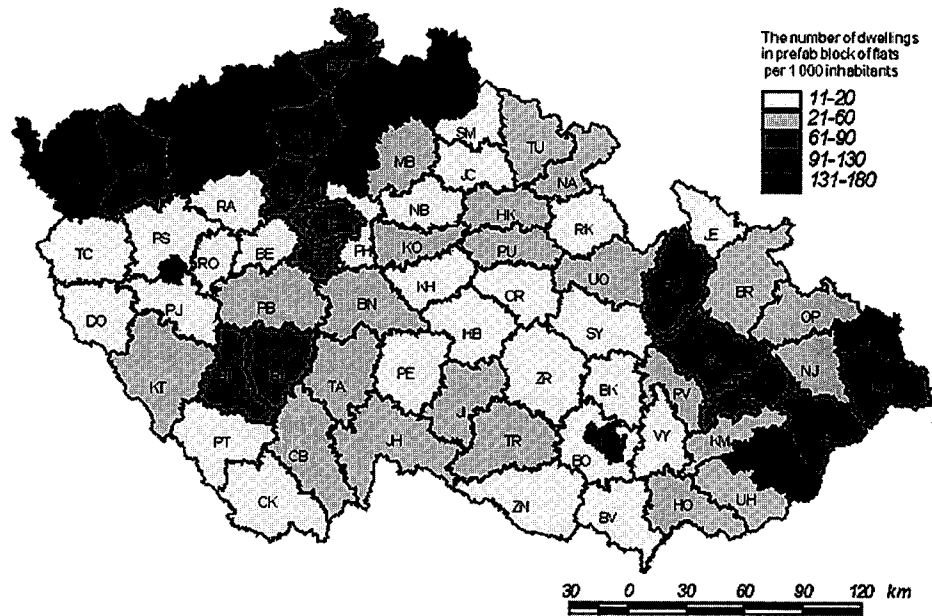


Fig. 4: Share of dwellings in the prefabricated block of flats in the districts of the Czech Republic in year 2000
Source: Czech Institute of Statistics

Karviná) – Fig. 4. The two regions were areas with intense mining and metallurgical industries, areas with strong grants, into which recruitment of employees from all over the country was aimed. They were offered cheap prefabricated flats and above average salaries, which resulted in the migration especially to such areas. On the contrary, the number of flats in prefabricated houses is significantly lower in South Bohemia and South Moravia (with the exception of Brno).

5. Philosophy of humanization and regeneration of prefabricated housing environment

In the changed political and business conditions the remedy of the status of prefabricated housing is becoming more and more urgent; at the same time certain new technical and business possibilities of their overall recovery are being opened. Sociological research has shown that a prevailing part of people living in the prefabricated housing estates is satisfied with their living, but an identical part of them would like to live - without any doubt - in family houses. Recovery of prefabricated housing estates is a many-sided problem, which assumes not only the improvement of pits, completing of services, modification of facades of objects. It is complexly understood program covering the solution to problems of prefabricated housing estates from demographical, sociological, ecological, urban, architectural and construction technical points of view. The target is to form a living environment which would stimulate the establishment of community. Therefore, it is important to remove the monofunctional method of built-up area, to support the integration of functions, new concept of transport, to create jobs not only in the tertiary sphere, but also in light industries. *Influencing factors* are current social and economic conditions, i.e.

- impact of laws on land, municipal property
- new concept of housing policy (formulated after 1991)
- financing of house building
- grants and tax policy
- possibility of private business
- co-operation of local councils with citizens, potential investors and those who prepare territorial plans
- (im)possible purchasing of co-operative and state flats into individual ownership
- leaving and occupation of prefabricated housing estate flats
- territorial differentiation of prices of flats
- etc.

A decisive factor to launch the process of regeneration, which is as such anchored in the government decree (No. 494/2000 Gaz.), Act No. 218/2000 Gaz. is the acquisition of subsidies from state budget for the allocation of which it is necessary to work out and approve the project of housing estate regeneration based on the town's master plan. This does not mean only administrative matters; when the regeneration project is elaborated the legislation sets up an obligation for inhabitants of the housing estate to participate, an obligation to carry out public inquiries, etc. Representatives of many towns are ready to make use of the funds from the subsidies their applications being at various stages of elaboration. This is not to say that no modifications have been made so far in the housing estates; nearly all of them experience - though without



Fig. 5 Example of successful humanization of housing environment of one of the prefab houses (Haviřov, prefab housing estate Šumbark, 2001). Photo: E. Kallabová

harmonized concepts- overladding, façade coats, rectification of technical defects and the like. Some towns (e.g. Frýdek-Místek – housing estate Slezská or Haviřov - housing estate Šumbark) succeeded in the implementation of housing estate humanization projects (Fig. 5); the housing estate in question shows evident traces of attempts to create its natural core, traffic on the existing communications is slowed-down, shops and services appear on groundfloors, the number of children playgrounds is increasing and some ground shaping is made to add colour to the otherwise monotonous environment, etc. An important step at transforming the housing estates from dormitories to full-value town quarters is initiation of their inhabitants.

The research includes data on individual housing estates in the Czech Republic (with min. 2500 apartments), works proceed according to a common lay-out which takes into account factors of housing estate's position towards the town and natural environment, data on population (origin, mobility etc.), infrastructure (location of facilities of supralocal significance), developmental trends within transformation (improvement of living environment, changes of property structure, differentiation of prices), image and prospects of the housing estate (conduct and action of place identity). It appears that there are pronounced differences among the prefab housing estates. There are following trends that can be distinguished between the prefab housing estates in their gradual differentiation:

- The existing status and course of privatization contribute to the growing differences between the housing estates;

- Important factor is a good connection to the town's system of transport (subway);
- Indispensable is the link to recreational or leisure time areas (everyday use) for different age groups;
- Status of equipment with infrastructure, retail shops and services;
- Positively classified are housing estates with lower-storeyed houses built in the 1950s and 1990s;
- Housing estates from the 1970s and 1980s are felt less attractive due to high density of built-up area, financial requirements for maintenance, repairs and refurbishings.

6. Conclusion

In the period of the globalization of market-economic systems a space has arisen for the globalization of sustainable development of living conditions. The issue deeply concerns also the humanization and regeneration of the environment of housing estates built of prefabricated panels. Key themes that can help to find a successful solution to the problem of prefab housing estates include physical conditions (age of buildings, technical standard), institutional conditions (division of responsibilities, missing funds for individual or municipal projects of regeneration and modernization), regulative conditions (insufficient legislation for newly developed forms of mixed ownership, excessive protection of tenants or owners in the new economic situation, etc.), and social and economic processes (unemployment and its impact on the growing number of households with low income, increasing segregation, etc.).

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BIOGEOGRAPHICAL CHARACTERISTIC OF THE AREA FOR THE PROJECTED R43 HIGHWAY TO THE NORTH OF BRNO

Šárka STRÍTEŽSKÁ

Abstract

Biogeographical characteristic of the area is based on the author's dissertation which dealt with possible consequences of the construction of projected highway R43 on the biota and landscape in the area stretch planned for the highway route between Brno-Bystrc and Lipůvka. Based on a comparison of potential and actual condition of biocoenoses and demarcation of valuable landscape segments, the projected highway route was assessed for its collision with the area system of ecological stability and for a possible threat to the protected plant and animal species. The measure and purposefulness of this intervention into the landscape were subjected to a consideration.

Shrnutí

Biogeografická charakteristika území projektované trasy rychlostní komunikace R43 severně od Brna

Biogeografická charakteristika území vychází z diplomové práce autorky, která se zabývala možnými důsledky výstavby projektované rychlostní komunikace R43 na biotu, respektive krajinu území na úseku z Brna – Bystrce do Lipůvky. Na základě srovnání potenciálního a aktuálního stavu biocenóz a vytyčení cenných segmentů krajiny byla posouzena kolize projektované trasy s územním systémem ekologické stability a možné ohrožení chráněných druhů rostlin a živočichů v oblasti výstavby komunikace, dále pak zhodnocena míra a účelnost tohoto zásahu do krajiny.

Key words: *potential and actual condition of biocoenoses, skeleton of the landscape ecological stability, valuable segments of the landscape, surrounding of Brno, Czech Republic*

1. Introduction

The area in question of 85 km² has an oblong shape in the NS direction (Figs. 1 and 2). Its axis is formed by the relics of the "Hitler" imperial motorway in the space between the town quarter of Brno-Bystrc and the village of Malhostovice. The northern portion of the area is characterized by isolated elevations in the field landscape and this is why a local road from Kuřim – Lipůvka – Nuzířov – Malhostovice – Drásov to Čebín was chosen as an area boundary. The southern boundary runs approximately along the eastern ridge of Trnovka and the western part of the Babí hřbet (Ridge).

The construction of the "Hitler" imperial motorway from Vienna to Wrocław was launched in April 1939 and went on until 1942. The landscape still bears traces of construction works such as landfills, embankments, trenches and bridge structures (Fig. 3a, 3b).

On the basis of the government decree from April 1963 the traffic corridor of 97 meters in width was preserved as an area reserve for a planned construction of highway from Brno to Svitavy. The Plan of area development in the City of Brno approved in 1994 included a section between Kuřim and Troubsko as a local highway linked to the four-lane town

feeder through the Svratka River valley. In the Plan of area development in the City of Brno the R43 highway is interpreted as a service communication for the regions of Kuřim and Tišnov from Brno, with 90 – 95% destination traffic in Brno and 5 – 10% transit. The expected frequency of motor traffic is 22 000 cars/day.

There are two concepts for the solution of road traffic in the space of the R43 highway: governmental and unofficial (worked out by the citizen association "Brno Citizens against the Construction of Highway R43 in the Kuřim-Troubsko Space" and the "Conservationists for the Nature and Landscape in the Surroundings of the Brno Dam Lake" in cooperation with independent experts in urban science, traffic, ecology and non-governmental ecological organizations residing in Brno). The governmental project (Fig. 4) assumes the construction of new four-lane roads R43 linking with R35 at a distance of up to 20 km from the existing roads I43 (Svitavy-Brno) and I35 (Olomouc-Moravská Třebová-Hradec Králové).

Those who advocate the alternative solution fear that the connection of R43 to R35 near Moravská Třebová will provide an offer of new international transit in the prominent European N-S direction and hence the subsequent take over

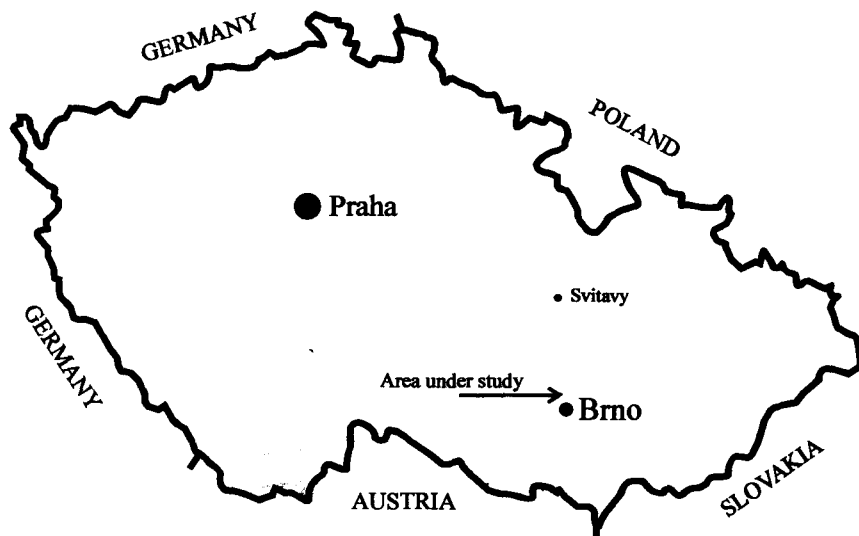


Fig. 1: Location of the studied area in the Czech Republic.

of a part of the long-distance traffic operating now on the overloaded highway D1 (Prague-Brno). It is also feared that the connection will impair conditions for housing and recreation not only in the space of the Brno Dam Lake. Therefore, they propose to separate the long-distance and local traffics and to lead the long-distance one either along a newly built road passing through the Boskovická brázda (Furrow), i.e. around Ostrovačice and Veverská Bitýška, or along the Svitavy traffic vein and the sub-surface clearway through Brno from the Faculty of Law of the Masaryk University in Videňská street. Local traffic would be driven along a newly built big town circle in Brno and linked with the Kuřim traffic vein. Collection parking lots should be built to link up with the city traffic and citizens should be motivated for their use (singule, 1997). Another alternative is to construct a road that would lead through a tunnel under the elevation of Holedná and through a smaller tunnel near the town quarter of Medlánky with a linkage to the existing road I43 near the village of Česká.

The final decision will be made by the Ministry of Environment of the Czech Republic where the project documentation of the construction for administrative procedure is now negotiated along with a study assessing the impact of the construction on environment (EIA) for all variants. One of partial steps is to consider the impacts on the biota as outlined in the following text.

2. Biogeographical characteristic of the area

2.1 Potential condition of the vegetation

From the viewpoint of biogeographical division (Culek *et al.*, 1996), the studied area is a part of the province of

central European deciduous forests, Hercynian sub-province, bioregion of Brno. This bioregion is situated on the eastern margin of the Hercynian sub-province, in the vicinity of the northern margin of the Pannonian province apparently under the Carpathian influence. This location on the thermophyte-mesophyte contact point is responsible for the species diversity of the biota.

A reconstruction of potential geobiocoenoses in the given region follows out from the geobiocoenological concept of the nature introduced by A. Zlatník. Basic biogeographical units in this concept are groups of geobiocoene types as ecologically-coenological units associating segments of nature by their mutually similar ecological conditions and by mutually similar potential vegetation (Míchal *et al.*, 1994).

Groundwork documentation used for the geobiocoenological typification and landscape division consisted of forest typological maps 1:10 000 for the forest land resources and maps of evaluated soil-ecological units 1:5 000 for the farmland resources. Guidance for the conversion of forest types and evaluated soil-ecological units onto the groups of geobiocoene types was the publication "Handbook for a designer of the local area system of ecological stability" (Löw *et al.*, 1995) and consultations with Ing. J. Lacina.

There are 14 groups of geobiocoene types in the area in question as follows:

| | |
|----------|--|
| 1A/B3 | Oaks (<i>Querceta petraeae</i>); |
| 1B1 | Dwarfed Oaks (<i>Querceta petraeae humilia</i>); |
| 1D1, 2D2 | Cornelian Cherry-Pubescent Oaks (<i>Corni-querceta pubescentis</i>); |

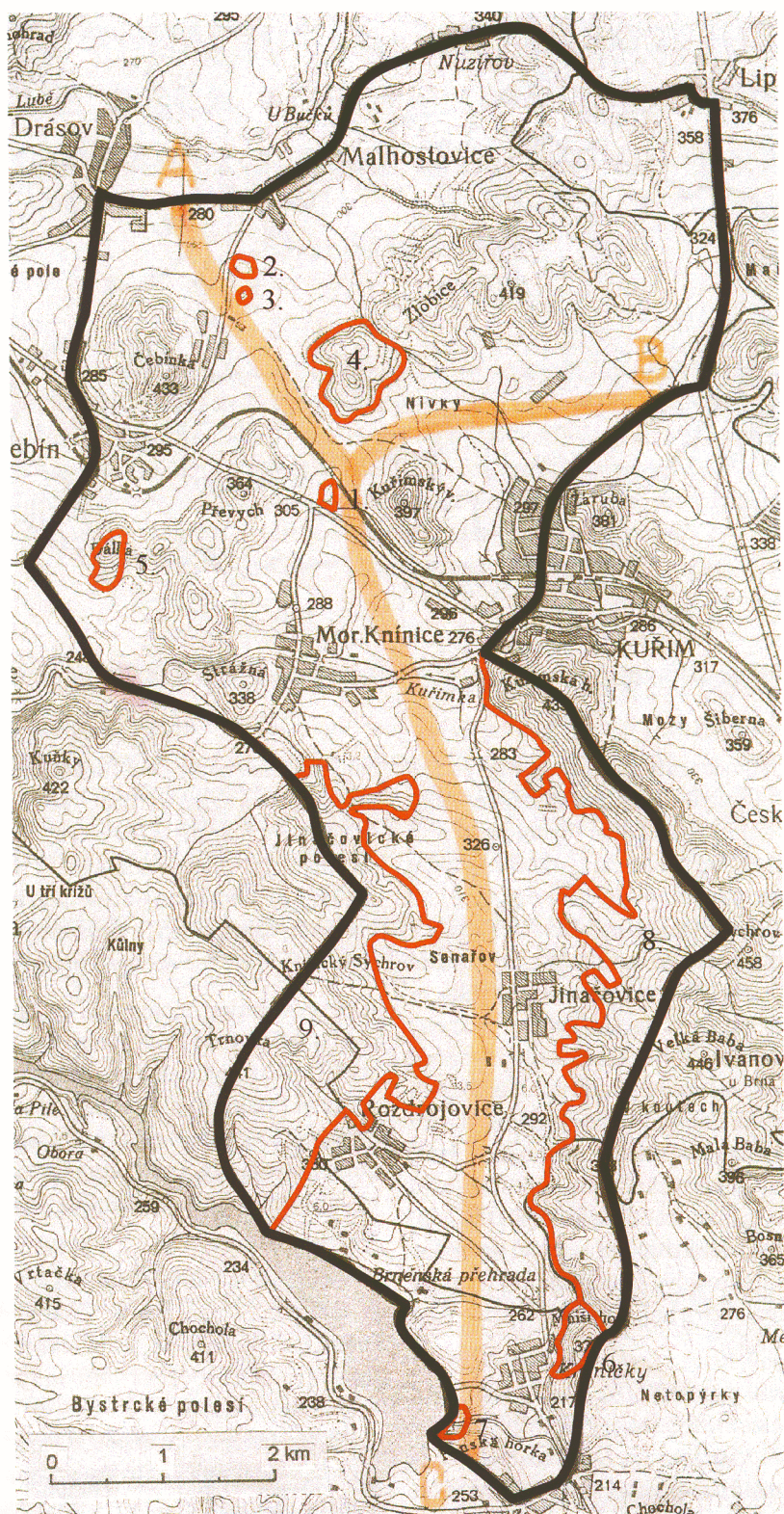


Fig. 2: Demarcation of the area of interest in the space Bystrc-Lipůvka with the illustration of the projected R43 highway track (Variant AC - Connection of R43 to the existing I43 near Černá Hora; Variant BC - Connection of R43 to I43 south of Lipůvka) and of the most valuable landscape segments.

1. Nature reserve Obůrky-Trěšněnec
2. Natural monument Malhostovická pecka
3. Natural monument Drásovský kopeček
4. Natural monument Zlobice
5. Natural monument Na lesní horce
6. Natural monument Mniší Hora
7. Natural monument Skalky u přehrady
8. Natural park Baba
9. Natural park Podkomorské lesy



Fig. 3a: Grown-up white robinias (*Robinia pseudoacacia*) on the embankment of the Hitler imperial motorway. (Photo: Š. Střítežská)

2A/B2 Dwarfed Beech-Oaks (*Fagi-querceta humilia*);

2A/B3 Beech-Oaks (*Fagi-querceta*);

2B2-3 Typical Beech-Oaks (*Fagi-querceta typica*);

2B/C3 Maple-Beech-Oaks (*Fagi-querceta aceris*);

2B/D2-3 Lime-Beech-Oaks (*Fagi-querceta tiliae*);

3A/B1 Dwarfed Oak-Beeches (*Querci-fageta humilia*);

3A/B3 Oak-Beeches (*Querci-fageta*);

3B3 Typical Oak-Beeches (*Querci-fageta typica*);

3B/C3 Maple-Oak-Beeches (*Querci-fageta aceris*);

3C/D3 Cornelian Cherry-Beech-Maples (*Corni-acereta fagi*);

2-3B/C4 Ash-Alders (*Fraxini-alneta*).

The greatest territorial representation is that of Altitudinal Vegetation Zone 2; AVZ 3 is bound to higher elevations and



Fig. 3b: Grown-up white robinias (*Robinia pseudoacacia*) in the trench of the Hitler imperial motorway. (Photo: Š. Střítežská)

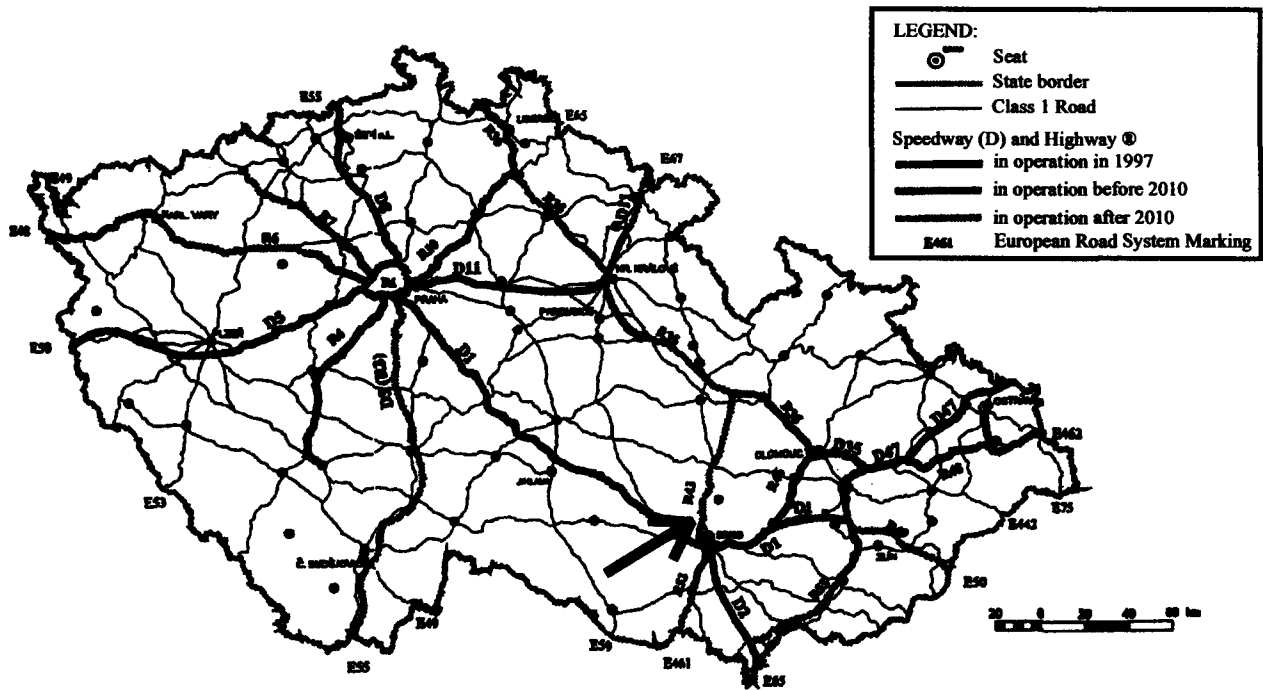


Fig. 4: Development of speedways and highways in the Czech Republic according to Variant III of the proposal of the Ministry of Transport and Communications of the Czech Republic (February 1998).

shaded sites of lower altitudes, AVZ 1 can be found on extreme sites (shallow undeveloped soils) and on sites with the southern aspect. Trophic series are represented in dependence on the bedrock and soil cover, most frequently occurring hydrological seres are limited-to-normal and water-logged along water courses.

2.2 Analysis of the present condition of the biocoenoses

The area in question is historically long settled and considerable changes can be seen in the vegetation cover due to human activities. The today's landscape has a significant although uneven representation of forests and arable land, which form extensive neighbouring complexes.

Plots of arable land are consolidated into vast areas while the proportion of qualitative perennial vegetation formations such as balks, grassed areas, extensive orchards and riparian stands is rather low. Their shortage effects not only the landscape's aesthetic appearance but it also shows in the increased susceptibility of soil to water erosion, missing hiding places for wildlife and impaired species diversity resulting mainly from the shrinkage of thermophilic species whose occurrence in the former harmonic cultural landscape was typical.

Forests cover approximately 20% of the total demarcated area. Significant is the representation of **natural and near-natural thermophilic oak stands** (ca. 30%) with the herb layer abundant in species and dominant meadow-grass *Poa nemoralis* - more details see chapter 2.3 (terminology of

individual plant species was unified according to Dostál, 1989). For better orientation, we can mention percentual representations of some tree species in the area: oak 36%, spruce 28%, pine 23%, larch 4%, robinia and hornbeam 2%, other species do not reach the occurrence above 1%.

From the viewpoint of ecological stability, least functional are the artificially planted **monocultures of Norway spruce (*Picea abies*)** which is **non-autochthonous on these sites**, less frequently those of Scots pine (*Pinus sylvestris*). Herbs occurring in the undergrowth are *Oxalis acetosella*, *Senecio ovatus*, *Luzula luzuloides*, *Viola reichenbachiana*, *Calamagrostis epigeios*, *Calamagrostis arundinacea*, etc. Shrub species occurring in the **degraded stands of false acacia (*Robinia pseudoacacia*)** are represented by European elder (*Sambucus nigra*) and *Ligustrum vulgare*; the herb layer of these stands is usually entirely suppressed.

A significant ecological and stabilization function in the landscape which is used for agriculture is played by **perennial grass stands** - semicultural meadows, pastures, sub-xerotherm grassy fallow lands and extensive orchards (Fig. 5), and ecotone communities. Common species of grass-herb stands use to be for example *Tragopogon orientalis*, *Eryngium campestre*, *Agrimonia eupatoria*, *Galium verum*, or *Hypericum perforatum*.

Important landscape-forming and ecostabilizing elements in the landscape are also **riparian stands and accompanying stands of water courses**. However, most streams in the area under study were regulated. The riparian stands are very often of poor quality and formed for



Fig. 5: Wild orchards on the southern slopes of Zlobice. (Photo: Š. Strážská)

example by *Urtica dioica*, by the invasion species of *Impatiens glandulifera*, etc.

Bottoms of trenches and embankment plateaus of the "Hitler" imperial motorway are most often covered with arable land, slopes are characterized by the self-seeding of common shrubs such as *Rosa canina*, *Symphoricarpos rivularis*, *Swida sanguinea*, *Ligustrum vulgare*, *Prunus spinosa*, etc. Hedgerows of diverse species composition serve as hiding places for birds and field animals near bridge structures, usually consisting of sessile oak (*Quercus petraea*), small-leaved linden (*Tilia cordata*), field maple (*Acer campestre*), European aspen (*Populus tremula*), common ash (*Fraxinus excelsior*), willows (*Salix sp.*), poplars (*Populus sp.*), etc. Abundant are also grown-up white robinias (*Robinia pseudoacacia*) with subdominant *Sambucus nigra* and suppressed herb layer. More frequently occurring are negligible fragments of xerothermophytes – e.g. the endangered *Aster amellus* appears directly on the bridge structure near the crossing between Jinačovice and Rozdrojovice.

2.3 Definition of most valuable segments in the landscape

The skeleton of ecological stability includes natural and near-natural landscape segments which are important for

the protection of natural species diversity of the landscape genepool and from the viewpoint of ecological and stabilizing function of the landscape. 7 areas in the studied region were declared to be under special protection in order to protect rare plant species, forest and non-forest communities and to maintain the ecological stability of the landscape and the landscape's aesthetic value. The 7 areas of special protection are as follows:

Nature reserve Obůrky-Třeštnec

The nature reserve of Obůrky-Třeštnec is situated in a depression running alongside the embankment of the imperial motorway. The floor of the depression is affected by groundwater table and covered with the grass-herb communities of wetlands. Plant species under special protection occurring here are the critically endangered *Gymnadenia conopsea ssp. densiflora*, the severely threatened *Epipactis palustris*, etc.

Nature monument Malhostovická pecka

On this medium-sized and isolated outcrop of Devonian limestone tree species appear only in the form of scattered vegetation at the southern foot of the hill where the stone was extracted during the 1st Republic. The thermophilic steppe community includes grasses such as *Festuca pallens*, *Festuca valesiaca*, *Sesleria albicans*, *Sedum album*, *Jovibarba sobolifera*, etc. Plant species under special



Fig. 6: Pasque anemone *Pulsatilla grandis* coming into flower on the southern slopes of the Dálka elevation. (Photo: Š. Strážská)

protection are the severely endangered *Pulsatilla grandis* and *Saxifraga tridactylites*. Animal species are for example locusts *Platycleis grisea*, *Calliptamus italicus* and *Oedipoda coerulescens*.

Nature monument Drásovský kopeček

The rock landforms built of Devonian limestone bear similar xerotherm communities as the Malhostovická pecka, their areas being less extensive.

Nature monument Zlobice

The nature monument is to be found in the south-western part of the forest complex on the Zlobice elevation. The tree layer is dominated by sessile oak (*Quercus petraea*) with sporadically occurring European hornbeam (*Carpinus betulus*). Admixed species are silver birch (*Betula pendula*), European aspen (*Populus tremula*), and small-leaved linden (*Tilia cordata*). The shrub layer is dominated by European hazel (*Corylus avellana*), frequent is also the occurrence of endangered Cornelian cherry (*Cornus mas*) and hawthorn (*Crataegus monogyna*). The species dominating the herb layer is *Poa nemoralis*. Saul (1998) mentions some specially protected plant species occurring here – e.g. the critically endangered *Daphne cneorum*, the severely threatened *Cypripedium calceolus*, the endangered *Melittis melissophyllum*, etc. Plant species are for example the oak longhorn beetle *Plagionotus arcuatus* and the stag-beetle *Lucanus cervus*.

Nature monument Na lesní horce

This protected area is formed of fragments of an originally large limestone steppe on the southern to south-western slopes of the Čebín hill – the elevation of Dálka. The most conspicuous shrubs here are *Rosa canina* and *Ligustrum vulgare*. Plant species under special protection occurring here are for example the severely endangered *Pulsatilla grandis* (Fig. 6) and the threatened *Aster amellus*.

Nature monument Mniší hora

Tree species most frequently occurring in the mixed stand are sessile oak (*Quercus petraea*), pedunculate oak (*Quercus robur*), small-leaved linden (*Tilia cordata*) and European hornbeam (*Carpinus betulus*). The shrub layer is relatively abundant with Cornelian cherry (*Cornus mas*), spindle tree (*Euonymus europaeus*), *Rosa canina*, etc. Protected plant species are for example *Cyclamen purpurascens*, *Lilium martagon*, *Platanthera chlorantha*, and *Daphne mezereum*.

Nature monument Skalky u přehrady

On the steep rocky slopes of northern aspect near the dam lake there is an open stand of sessile oak (*Quercus petraea*), field maple (*Acer campestre*), Norway maple (*Acer platanoides*), small-leaved linden (*Tilia cordata*) with the shrub layer rich in species (e.g. *Rosa canina*, *Ligustrum vulgare*, *Prunus spinosa*, etc.). The southern slopes bear the protected *Pulsatilla grandis* and some species typical of dry,

acidic and sandy substrates such as *Jasione montana* and *Pilosella officinarum*.

Natural parks of Baba and Podkomorské lesy (Forests) were established in forest stands to protect the landscape character and its aesthetic and natural values (Martiško, 1997). The area of these parks has become an important recreational hinterland of the Brno agglomeration.

Natural park Baba

Forest stands in the park area exhibit major secondary changes, especially in the northern and central part. The original tree species composition was replaced with the coniferous species, mainly Norway spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*). A white robinia (*Robinia pseudoacacia*) stand from self-seeding developed in the northern part of the park, which was used as a pasture in the 19th century. Only fragments are preserved of the original beech stands.

The southern part of the area is still dominated by the thermophilic oak stands with a species-abundant herb layer which is however somewhat withdrawing in the last few years due to the enclosure of former coppice stands of pheasant forests and due to their conversion into high forest. The representation of protected plant species is rather high with *Primula elatior*, *Lilium martagon*, *Clematis recta*, *Melittis melissophyllum* and *Cyclamen purpurascens*. There is a lot of orchids coming into flower here such as *Neottia nidus-avis*, *Platanthera bifolia*, *Platanthera chlorantha*, *Cephalanthera longifolia* and *Cephalanthera damasonium*.

Natural park Podkomorské lesy Forests

A greater part of forest stands in the natural park falling in the area of question was in the past altered in terms of their species composition by artificial plantation of spruce and pine monocultures. Forest stands that have still retained their natural or near-natural character can be found in forest corners NW and SW of Jinačovice and on the long mild slope of Trnůvka with the south-eastern aspect. Plants coming to bloom in the herb layer are *Anthericum ramosum*, *Melittis melissophyllum*, *Verbascum austriacum* on forest margins, orchid *Neottia nidus-avis*, *Cephalanthera damasonium*, *Cephalanthera longifolia*, *Epipactis helleborine*, *Epipactis purpurata*, *Platanthera bifolia* and *Platanthera chlorantha*.

3. Conclusions

It follows out from the above text that the area of the proposed R43 highway route contains a cultural and anthropically converted landscape which however includes natural and near-natural ecosystems. From the viewpoint of sustained ecological equilibrium in this cultural landscape it is necessary that the existing situation is preserved or improved via some further possible proposals of biocenters and biocorridors. I assume therefore that the highway route as it is designed could have a very unfavourable influence on the ecological stability of this area.

The area under study is reached by the natural parks of Baba and Podkomorské lesy (Forests) and contains 7 areas under special protection and 38 registered significant landscape elements. The protection of natural parks, areas of special protection and significant landscape segments is guaranteed by law (Act No. 114/1992 of the Czech National Council on nature and landscape protection in the wording of Legal Measure No. 347/1992 of the Chair of the Czech National Council, Act. No. 289/1995 and Act No. 16/1997).

In the close vicinity (at a distance of max. 100 m) of the planned R43 highway there is the nature reserve of Obůrky-Třeštnec, the natural monument of Malhostovická pecka, the natural monuments of Drásovský kopeček and Skalky u přehrady, and three other important landscape elements (Malá horka, U břaka, Rozdrojovická lada). These valuable landscape segments would be bitterly affected by the construction of the highway itself as well as by its subsequent operation. Such an extensive building site with the working heavy building machinery would mean an enormous devastation of soil cover, a great change of the landscape character, soil contamination with oils and fuels and later also emissions of traffic pollutants. All this would result in the reduced diversity of plant and animal species which would not be able to get accommodated to the given changes.

Any new linear element – in our case the highway – forms a barrier in the landscape for the movement of animals. In the whole area under study, the projected highway cuts through two functional biocorridors (of local and supraregional significance) running in ravines south of Jinačovice and connecting the Baba natural park with the natural park of Podkomorské lesy Forests (Collective, 1997). The general plan of the local area system of ecological stability provides for the R43 highway to be taken over them (as a superstructure) in order to ensure their functionality. Even in this case we can expect – although at a lesser extent – some future negative effects on these biocorridors.

At a distance of about 1 km north of Jinačovice there is a shrubby fallow ground situated right in the trench of the

"Hitler" motorway, with representatives of xerothermophilic vegetation and self-seeded tree species. This locality – immediately jeopardized by the construction of the R43 highway and entirely neglected in the general plan of the local area system of ecological stability – is a place of occurrence of the sandlizard (*Lacerta agilis*) population. Protection and registration of localities and individuals of this severely endangered species should be ensured by Act No. 114/1992 Gaz. The highway line in this landscape segment should be reevaluated in the interest of the preservation of this locality.

It can be said in general that in the severely anthropically affected landscape formed by consolidated plots of arable land an important role is played by all forest and grass formations in spite of the fact that they are at some places consisting of species not autochthonous in our country. Their significance particularly consists in their ecological and stabilizing function and they are no less important for the aesthetics of the anthropically entirely changed landscape. And there is a whole range of places like these on the projected R43 highway. If the R43 highway is built in the footprints of the "Hitler" imperial motorway, the last refuges of the field biota would be removed from the field landscape of the Jinačovice ramp valley, with important predators of field pests.

It follows out from the above facts that the construction itself which is to be launched after the year 2005 and the subsequent operation of the projected communication will be an enormous burden for the given localities. Although the conflict with the industrial development – in this case demonstrated by the rapidly increasing motor traffic – can hardly be prevented, all persons responsible for these serious decisions should do their best to find an optimum solution and not turn down all alternative variants as a matter of general principle. The building approval is in powers of the Ministry of Transport but its issue is conditioned by an approval from the Ministry of Environment of the Czech Republic. This paper can perhaps be considered one of source materials for the assessment.

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ACCESSIBILITY OF DISTRICT TOWNS AS A CRITERION OF PREPARATION AND ASSESSMENT OF THE TERRITORIAL- ADMINISTRATIVE DIVISION: CASE STUDY OF THE BANSKÁ BYSTRICA REGION (SLOVAKIA)

Daniel MICHNIAK

Abstract

The aim of this paper is to expose the possibilities of application of the district town accessibility criterion to the assessment of the existing or preparation of a new territorial-administrative division on example of the Banská Bystrica region. Accessibility of district towns was assessed by using six simple indices of accessibility. Some existing district towns are characterised by poor accessibility and therefore some changes were proposed with the purpose of its improving. These changes are classified into three groups: re-location of district town on the basis of the mean weighed distance, establishment of new districts in extensive poor accessibility zones (30 and more km from the district town) and changes of boundaries of the districts based on the proximity of villages to the district towns, followed by the effect of the changes on the accessibility level. This study stresses the necessity to apply the accessibility criterion in any administrative-territorial reform.

Shrnutí

Dostupnost okresních měst jako kritérium při tvorbě a hodnocení územně-správního členění na příkladu Banskobystrického kraje (Slovensko)

Cílem této studie je poukázat na možnosti uplatnění kritéria dostupnosti okresních měst při hodnocení existujícího nebo vytváření nového územně-správního členění na příkladu Banskobystrického kraje. Dostupnost okresních měst byla hodnocena pomocí šesti jednoduchých ukazatelů úrovně dostupnosti. Některé současné okresy jsou charakterizovány nepříznivou úrovní dostupnosti a proto byly navrženy změny územně-správního členění s cílem jejího zlepšení. Změny jsou rozděleny do třech skupin: relokace okresního města do jiného centra na základě průměrné vážené vzdálenosti, vytvoření nových okresů v rozsáhlejších oblastech špatné dostupnosti (ve vzdálenosti 30 km a víc od okresního města) a změny průběhu hranic jednotlivých okresů na základě proximity obcí k jednotlivým okresním městům. Následně byl posuzován vliv navrhovaných změn na úroveň dostupnosti okresních měst. Tato studie poukazuje na nutnost zohlednění kritéria dostupnosti při reformě územně-správního členění v mnohem větší míře, než při poslední reformě územně-správního členění na Slovensku v roce 1996.

Key words: *accessibility, administrative division, spatial efficiency, spatial equity, Banská Bystrica region, Slovak Republic*

1. Introduction

The new territorial-administrative division of the Slovak Republic (8 regions, 79 districts) came to force in 1996. The purpose of every territorial-administrative division is to ensure the best possible functioning of the public administration in the territory of the State. The State provides its citizens public services, which are concentrated in the centres of the territorial-administrative units. Consequently, in order to be able to make use of these services the citizens must travel. The

natural requirement is to provide the public services as accessible as possible. This fact is often treated and discussed in the geographic literature and it is referred to as accessibility. The aim of this paper is to conclude the assessment of the accessibility level of the 13 district towns in the region of Banská Bystrica (see Fig. 1), part of which has been already published (Michniak, 2000) and subsequently to highlight the application possibilities of the criterion accessibility of the district towns to the preparation of the territorial-administrative division.

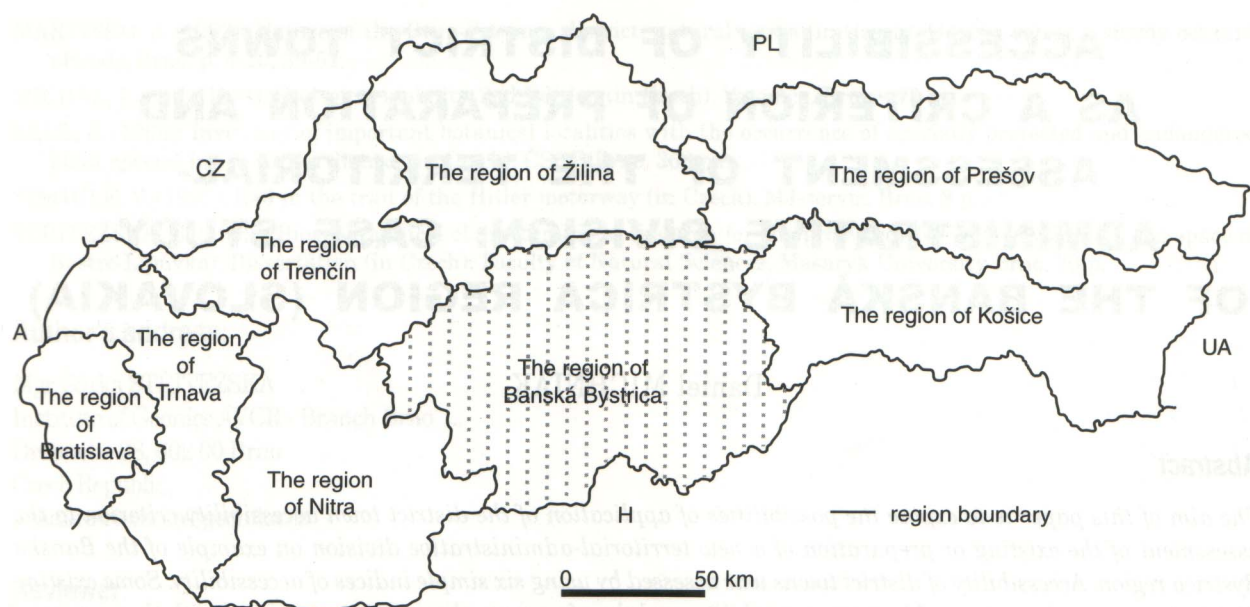


Fig. 1: The regions in the Slovak Republic established in 1996

2. Approaches to the assessment of the territorial-administrative division

Preparation of the new territorial-administrative division should apply several criteria and certain rules should be adhered to. R. Ištók (1999) quotes sixteen criteria including accessibility applicable to the delineation of the territorial-administrative units. The individual criteria are functionally linked and they mutually overlap and supplement each other. In terms of their nature they can be classified as political, economic (minimisation of public administration expenditure), and geographical. Assessment of the territorial-administrative division should be also based on the judgment of the rate of application of the individual factors in the reform.

Two basic approaches to the assessment of the created or proposed territorial-administrative division dominate in the literature dealing with the subject. The first of them emphasizes the scale or size of the territorial-administrative units, and the second insists on the spatial form and arrangement (Honey, 1977; Bennett, 1989; Bezák, 1997). The objective of the first approach is to find an optimum size of the territorial-administrative unit of a certain order to attain the most efficient public services possible. The approach, which emphasizes the spatial form and arrangement aims at giving an answer to the question what is the spatial organisation of the particular society like and what functions can be aligned to units already formed. The above-mentioned two principles of the quality assessment of the territorial-administrative division are often combined with different additional criteria, one of which is also the accessibility of the centres of the territorial-administrative units (Massam, 1972).

The above-mentioned approaches are always based on some of the principles of the society's spatial organisation such as the principle of spatial efficiency and the principle of spatial equity. Spatial efficiency in general expresses the relationship between the spatial location, spatial arrangement and economic efficiency (Goodall, 1987). In our context it is expressed by the requirement to find such an arrangement, that will provide for a maximized or at least increased benefit of the population in the given area, i.e. it will bring a maximum benefit for a maximum number of inhabitants. However, such an arrangement does not have to suit all inhabitants of the area (Bezák, 1995; 1997). The principle of spatial equity means the application of the principles of social justice in the territorial units (Goddall, 1987). In our case this principle expresses the efforts to find such a spatial arrangement which should satisfy the needs of inhabitants of every territorial unit regardless of its situation (Bezák, 1995; 1997).

3. Accessibility of district towns as a criterion of preparation and evaluation of the territorial-administrative division

Accessibility is one of the most important and also most difficult notions to define in human geography. The literature contains various definitions of accessibility. Concept of accessibility expresses the easiness with which a location may be reached from other locations (Clark, 1990). Accessibility summarizes the relative opportunities for contact and interaction (Goodall, 1987). Accessibility may be defined as the inherent characteristic of a place with respect to overcoming some form of spatially operating source of friction (Ingram, 1971). Thus it can be defined as the relative status of some place in a space. In geography the notion of

accessibility normally relates to the concept of nearness, simplicity/facility of spatial interaction, potential ability of interaction or potential contacts with different services and functions (Taylor, 1997). Interpretation of accessibility is comparatively loose, an advantage from the point of view of broad applicability. On the other side, this is reflected by the large amount of different measures and indicators used for expression of accessibility in the most varied circumstances (Bezák, Michniak, 1999).

Assessing the existing or creating a new territorial-administrative division we can consider various options of application of accessibility (Bezák, 1997). In the first case the boundaries of the territorial-administrative units are considered fixed and a possibility of re-location of the centres of these units is admitted. Subsequently, a change of accessibility level can be researched if the centre is moved into an optimum position. Another option is when the fixed situation of the centres is presumed and the possibilities of changes of boundaries of the units in order to reach the maximum accessibility are admitted. In the latter case, the variable situation of centres and boundaries is considered with the aim to find a certain number of centres of the territorial-administrative units with the best level of accessibility from the remaining municipalities within the unit (Hautamäki, 1972). This problem is denoted as a p-median problem and its solution is an optimum location of centres and an optimum course of the boundaries (Keller, 1986).

Evaluation of accessibility of the district towns is based on six simple indices used in similar studies (Goodchild, Massam 1969; Tykkyläinen, 1981; Rasheed, 1986; Keller, 1986; Bezák, Michniak 1999; Michniak, 2000).

The first index (A_1) is the mean weighed distance of inhabitants of the all municipalities to the district town. The number of population of the individual municipalities was used as the weight. The second index is percentage deviation (A_2) of the value of the mean weighed distance to the district towns from that of the mean weighed distance to an optimal centre represented by the municipality characterised by the minimum value of the mean weighed distance and it enables a comparison of the mean weighed distance between several district towns. The third index of accessibility (A_3) is the percentage of district population living in the municipalities located nearer to other district towns in comparison with the distance to their existing district town. The fourth index of accessibility (A_4) is the maximum distance between the district town and the most distant municipality of the district. Comparison of the accessibility index A_4 for several districts is possible also by means of percentage deviation (A_5) of the value of the maximum distance from the farthest commune to the district town from the value of the maximum distance from the farthest commune to the optimal centre represented by the municipality with the minimum value of the maximum distance. The last index of accessibility (A_6) is the percentage of population living in the zone of poor

accessibility, i.e. at a distance of 30 and more kilometres from the district town.

The low values of all above-mentioned accessibility indices suggest a high level of accessibility and vice versa. The first three indices are based on the principle of spatial efficiency and other three on the principle of spatial equity.

The basic element of all accessibility indices is distance. It can be interpreted in several different ways. The distance between two municipalities in our study equals the length of the shortest transport way connecting their centres. Lengths of individual road sections were taken from the military road atlas of the Slovak Republic at a scale 1:100 000 and Murchland's algorithm (Baxter, 1976) was used to calculate the shortest distances. Data on the population of individual communes were obtained from the population register as of 31 December 1996.

The evaluation of the level of accessibility of the individual district towns is followed by the presentation of particular proposals of changes in the administrative-territorial division with the aim to improve the accessibility level of the district towns. These changes were divided into three groups. The first group contains a re-location of the district town into another centre on the basis of the mean weighed distance in case the contemporary district town was chosen inefficiently, i.e. the principle of spatial efficiency was markedly ignored. The second group contains changes of the course of the boundaries of the individual districts on the basis of the proximity of the communes to the individual district towns. Size of the difference between the distance to the existing and that to other district town, compactness of the district, and historical appurtenance to geographical regions were features taken into account, too. This kind of changes is based on the application of the spatial efficiency principle. The third group of changes includes formation of the new districts in more extensive zones of poor accessibility where the maximum distance from the farthest located communes with respect to the district town reaches the critical 30 and more km, i.e. in the areas, where the principle of spatial equity was insufficiently applied. Meanwhile, also the fact that the new proposed districts contained sufficient population as compared with the already existing districts was taken into account. The basic criterion for determination of the course of the district boundaries was the distance of municipalities from the surrounding districts towns and also the compactness of the district and the historical appurtenance of the communes to some geographic regions were taken into consideration.

4. Accessibility of the contemporary district towns in the region of Banská Bystrica

The detailed evaluation of accessibility of the existing district towns of the region of Banská Bystrica was published in the previous paper (Michniak 2000) and this study only quotes its drawbacks from the viewpoint of the district town

| District | | A ₁ (km) | A ₂ (%) | A ₃ (%) | A ₄ (km) | A ₅ (%) | A ₆ (%) | Population |
|------------------|----|---------------------|--------------------|--------------------|---------------------|--------------------|--------------------|------------|
| Banská Bystrica | BB | 3.3 | 0.0 | 0.8 | 27.5 | 0.0 | 0.0 | 112 995 |
| Banská Štiavnica | BS | 3.0 | 0.0 | 0.0 | 18.0 | 0.0 | 0.0 | 16 934 |
| Brezno | BR | 11.6 | 0.0 | 5.1 | 49.0 | 25.6 | 9.4 | 66 078 |
| Detva | DT | 7.5 | 0.0 | 0.0 | 26.0 | 26.8 | 0.0 | 34 014 |
| Krupina | KA | 11.0 | 4.5 | 12.2 | 31.0 | 51.2 | 5.4 | 23 031 |
| Lučenec | LC | 8.6 | 0.0 | 5.4 | 25.5 | 0.0 | 0.0 | 73 024 |
| Poltár | PT | 9.1 | 0.0 | 3.8 | 29.5 | 20.4 | 0.0 | 23 567 |
| Revúca | RA | 15.7 | 4.4 | 26.0 | 40.0 | 40.4 | 34.1 | 40 900 |
| Rimavská Sobota | RS | 15.2 | 0.0 | 15.4 | 40.5 | 0.0 | 16.6 | 82 289 |
| Veľký Krtíš | VK | 11.9 | 0.0 | 0.6 | 35.0 | 9.4 | 4.2 | 46 840 |
| Zvolen | ZV | 3.8 | 0.0 | 9.4 | 30.0 | 27.7 | 0.3 | 67 955 |
| Žarnovica | ZC | 9.7 | 8.5 | 4.2 | 22.5 | 7.1 | 0.0 | 27 780 |
| Žiar nad Hronom | ZH | 7.2 | 0.0 | 12.2 | 25.0 | 16.3 | 0.0 | 48 617 |

Tab. 1: The values of accessibility indices of district towns in the existing districts

accessibility. The results of all six accessibility measures are summarised in Tab. 1 and some of them are depicted in Figs. 2 and 3.

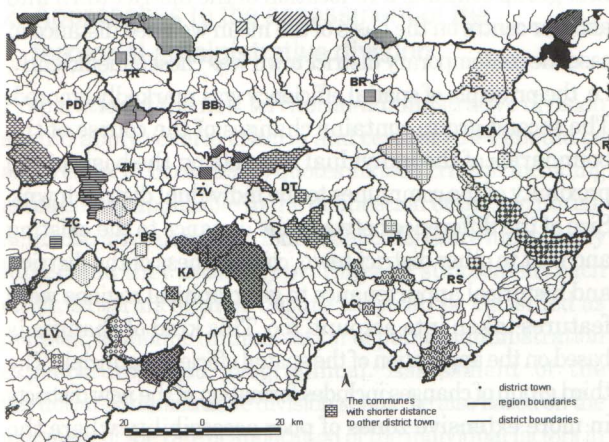


Fig. 2: The communes of the region of Banská Bystrica with shorter distance to other district town (the communes not aligned to the nearest district centre)

The value, starting by which the level of the accessibility estimated by the given criterion becomes unfavourable, was established for each accessibility index. On the basis of the mean weighed distance to the district town the value equalling at least to 10 km (found in five districts) was considered unfavourable. From the viewpoint of the mean weighed distance, in three districts it was found out that other municipality of the district was better accessible than the district town. Four districts with the value of the index of population share living in the communes, which were not included in administration of the nearest district town, of at least 10 % are characterised by unfavourable level of the district town accessibility.

From the viewpoint of the maximum distance of the commune farthest to the district town, unfavourable level of accessibility was assessed in six districts with this distance

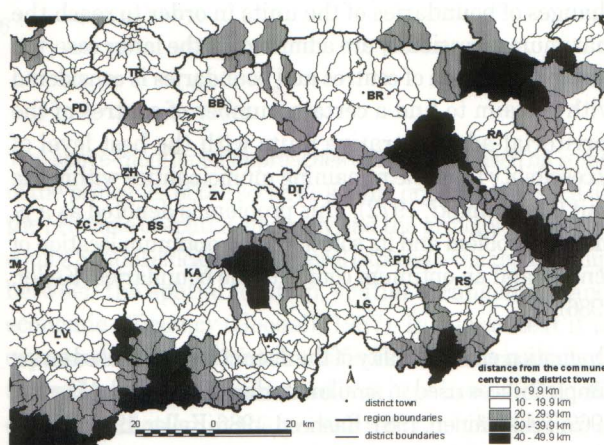


Fig. 3: Distance from the centre of the commune to the district town in the region of Banská Bystrica

equalling to 30 and more kilometres. In case of the maximum distance, other municipalities than the district towns were found nearer by at least 20% in six districts. With regards to the percentage of district population living in the communes 30 and more kilometres away from the district town, the level of accessibility was found unfavourable in four districts with the value of this index equalling to at least 5%.

The quoted results suggest that the district towns of Brezno, Krupina, Revúca, and Rimavská Sobota in the region of Banská Bystrica are the least accessible ones and it is the reason why the proposed changes should be applied to them.

5. The proposed changes of the territorial-administrative division

After the level of accessibility of the individual district towns was assessed, proposals of administrative-territorial changes were presented with the aim to improve the level of accessibility of the individual district towns. All these changes

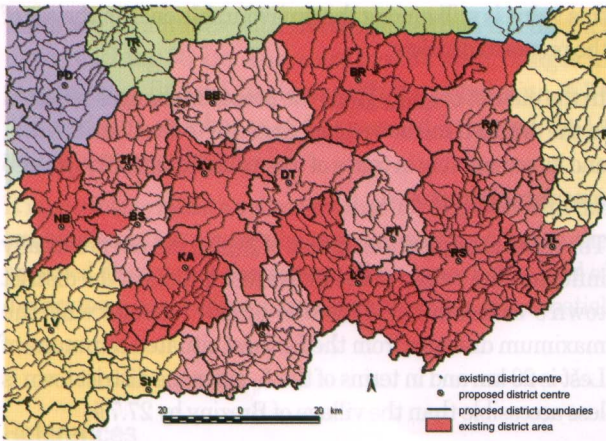


Fig. 4: The proposed changes of the territorial-administrative division aimed at an improvement of the district town's accessibility level

are represented in detail in Fig. 4 and divided into three groups. In the first group, a re-location was selected of the district town into another centre on the basis of the mean weighed distance in case the existing district town was inefficient and principle of spatial efficiency ignored. The optimum centre from the viewpoint of the mean weighed distance is in other commune than the existing centre in three districts, but in spite of it in the region of Banská Bystrica the district administration was moved only in one case (from Žarnovica to Nová Baňa).

The second group comprises the formation of new districts in more extensive zones of poor accessibility where the maximum distance from the farthest communes to the district town reaches the critical 30 and more km, i.e. the areas where the principle of spatial equity was insufficiently respected. In the south of the district of Revúca and around the town of Tornaľa there is a poor accessibility zone with

the population of 13,945. It was the reason why a new district (Tornaľa) was proposed here. The proposed district of Tornaľa contains in total 41 communes with the population of 24,379, which represents a sufficient number compared with other existing districts. The district contains 21 communes taken over from the existing district of Rimavská Sobota, 14 communes from the district of Revúca and 6 communes from the district of Rožňava.

The third group concerns the course of the district boundaries on the basis of the proximity of communes to district towns. The size of difference between the distance to the existing district and other towns, compactness of the district, historical appurtenance to geographical regions were also taken into account. This kind of change is based on the principle of spatial efficiency. While determining the course of boundaries we adhered to the distances of the communes from the surrounding district towns and we also considered the compactness of the district and the historical appurtenance to any particular geographical region. The largest changes in the course of boundaries within the region of Banská Bystrica were made in the districts of Banská Štiavnica, Brezno, Krupina, Revúca, and Rimavská Sobota.

6. Accessibility of district towns in the proposed districts of the region of Banská Bystrica

Results of the six accessibility indices for the proposed districts are quoted in Tab. 2.

No changes were made in the proposed district of Banská Bystrica and it is the reason why the level of the town's accessibility continues to be very good from the viewpoint of all accessibility indices. The location of the district town within the existing district boundaries is also optimal.

| District | | A_1 (km) | A_2 (%) | A_3 (%) | A_4 (km) | A_5 (%) | A_6 (%) | Population |
|------------------|----|------------|-----------|-----------|------------|-----------|-----------|------------|
| Banská Bystrica | BB | 3.3 | 0.0 | 0.8 | 27.5 | 0.0 | 0.0 | 112 995 |
| Banská Štiavnica | BS | 4.9 | 0.0 | 0.0 | 18.0 | 0.0 | 0.0 | 21 561 |
| Brezno | BR | 9.7 | 0.0 | 0.0 | 32.5 | 0.0 | 4.5 | 62 683 |
| Detva | DT | 7.6 | 0.0 | 0.0 | 26.0 | 26.8 | 0.0 | 34 290 |
| Krupina | KA | 7.5 | 0.0 | 4.3 | 22.0 | 33.3 | 0.0 | 19 433 |
| Lučenec | LC | 8.5 | 0.0 | 5.1 | 25.5 | 0.0 | 0.0 | 73 200 |
| Nová Baňa | NB | 8.5 | 0.0 | 0.0 | 22.0 | 4.8 | 0.0 | 25 419 |
| Poltár | PT | 10.8 | 0.0 | 1.6 | 29.5 | 20.4 | 0.0 | 26 456 |
| Revúca | RA | 10.1 | 0.0 | 5.2 | 29.0 | 0.0 | 0.0 | 36 193 |
| Rimavská Sobota | RS | 11.6 | 0.0 | 6.3 | 40.5 | 1.3 | 6.6 | 66 043 |
| Torna | TL | 7.4 | 0.0 | 0.0 | 19.5 | 0.0 | 0.0 | 24 379 |
| Veľký Krtíš | VK | 9.0 | 0.0 | 2.4 | 29.5 | 3.5 | 0.0 | 40 151 |
| Zvolen | ZV | 3.7 | 0.0 | 8.9 | 30.0 | 27.7 | 0.3 | 67 543 |
| Žiar nad Hronom | ZH | 6.7 | 0.0 | 1.4 | 25.0 | 16.3 | 0.0 | 46 351 |

Tab. 2: The values of accessibility indices of the district towns in the proposed districts

In the consequence of changes in the proposed district of Banská Štiavnica the value of the mean weighed distance to the district town and the values of other indices remained unchanged and the accessibility of the district town is excellent after these changes.

The values of five accessibility indices have distinctly improved after the changes proposed for the district of Brezno and the location of the town is optimal from the point of view of the mean weighed distance and the maximum distance to the district town. The maximum distance from the farthest situated commune of Pohorelá to the district town (32.5 km) is unfavourable.

A small change was proposed for the district of Detva, which practically did not influence the values of the individual indices of accessibility. The district town is characterised by an acceptable level of accessibility although from the viewpoint of maximum distance it is by 26.8% worse than the commune of Kriváň.

Several changes in the district of Krupina lead to substantial improvement of the district town's accessibility. However, the value of A_5 , which reveals that the district town is less accessible in terms of maximum distance to the district town by one third than the commune of Devičie.

Changes proposed in the district of Lučenec improved efficiency of the district town's accessibility, which is at a good level. The location of the district town within the boundaries of the district is optimal.

Changes proposed for the district of Poltár slightly increased the mean weighed distance to the district town to 10.8 km and from the point of view of maximum distance from the farthest situated commune to the district town its accessibility is worse by 20.4% than the commune of České Brezovo.

The existing district of Revúca characterized by a very poor level of accessibility of its district town. Several changes in order to improve its accessibility were proposed. The results of these changes are improved values of all accessibility indices and district town location in terms of the mean weighed distance and the maximum distance to the district town is also optimal. Out of respective accessibility indices only the mean weighed distance to the district town (10.1 km) is unfavourable.

Accessibility of district town in the district of Tornaľa is at a very good level and its location in terms of the mean weighed distance, as well as the maximum distance to the district town are optimal.

Changes proposed for the district of Rimavská Sobota improved the efficiency of the district town's accessibility though the comparatively high value of the mean weighed distance to the district town (11.6 km) persists. The maximum distance from the farthest situated village of Tachty did no change and is 40.5 km. The share of the district population living in the communes 30 and more kilometres away from the district town also dropped (6.6%) by 10% but

this value is still among the unfavourable ones in the set of the proposed districts.

In the district of Veľký Krtíš the proposed changes reflected in the dropped mean weighed distance to the district town, and its accessibility in terms of the spatial equity principle also considerably improved.

The small change in the district of Zvolen did not practically influence the values of the individual indices of the district town's accessibility. It is one of the reasons why the maximum distance from the farthest situated commune of Lešť is 20 km and in terms of the A_5 index the district town is less accessible than the village of Breziny by 27.7%.

The proposed district of Nová Baňa where the district centre was moved from the town of Žarnovica to the town of Nová Baňa on the basis of the spatial efficiency principle, the values of the individual indices suggesting efficiency of the district town's accessibility improved.

The changes in the district of Žiar nad Hronom led to improvement of the district town's accessibility from the point of view of application of the principle of spatial efficiency and the values of other studied indices were not changed.

7. Conclusions

A specific way of application of the criterion of district town accessibility is proposed in the paper for the assessment and formulation of territorial-administrative division. Several changes were made after an evaluation of the existing accessibility level of district towns with the aim of its improvement. The most important changes include a re-location of the inefficiently chosen district administration seat from Žarnovica to Nová Baňa and a formation of the new district of Tornaľa in the zone of poor accessibility in the south of the Revúca district. Remaining changes concern the course of district boundaries based on the proximity of the population to the respective district towns.

The result of these changes is a general decrease of mean weighed distance values (excepting the districts of Banská Štiavnica, Detva and Poltár) while in the terms of mean weighed distance all district towns are at the same time optimum district centres within the proposed boundaries. With the exception of the district of Veľký Krtíš, the share of district population living in communes within a shorter distance to other district towns dropped. There are now 59 communes with the population of 48 440 in the region of Banská Bystrica and this number is to be changed (reduced) to 31 with the population of 19 549.

A marked improvement is observable in the case of the maximum distance from the farthest commune to the district town. The A_5 index values improved, too, but in four district (Detva, Krupina, Poltár and Zvolen), the deviation of maximum distances is greater than 20%. The share of the district population living within the zones of poor accessibility dropped, too. Only in three districts,

there are communes with the distance from the district town reaching 30 km. There are now 42 such villages in the region of Banská Bastrica with the population of 34 859 and this number is to be changed (reduced) to 13 with the population of 7 365.

It is possible to make a statement that as compared with the level of district town accessibility in the existing districts, the proposed districts are characterized by a much better level of district town accessibility in terms of application of the spatial

efficiency and spatial equity principles. Although the district town accessibility is not the most important criterion for the preparation of the territorial-administrative division, the achieved results highlight a fact that the criterion of accessibility should be paid much more attention than in the last territorial-administrative division of Slovakia. The criterion of accessibility simply reveals the basic drawbacks of the territorial-administrative division, offering at the same time a method of their rectification.

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DRUG ADDICTION AND QUALITY OF LIFE IN SLOVAKIA: SOME GEOGRAPHICAL ASPECTS

Tomáš BEDNÁRIK

Abstract

The content of this paper is the picture of drug addiction as one of life quality indices. Incidence of drug addiction increased in Slovakia after political changes in 1989. The critical development in recent years has provoked numerous discussions focused on the problem. The drug problem is a subject treated by different scientific branches such as sociology, medicine, criminology, psychology and human geography. The paper reflects the geographically relevant results of drug addiction research in Slovakia while the dependence between the number of drug addicts and the selected indices is studied, too. The paper points out a distinct spatial differentiation of the incidence and delimits the areas of the highest concentration. Emphasis is put on the structure assessment of the drug addict population by selected traits, which eventually leads to the identification of the population group, which is most affected by the problem.

Shrnutí

Drogová závislost a kvalita života na Slovensku: geografické aspekty

Obsahem příspěvku je pohled na drogovou závislost jako jeden z indikátorů kvality života. Drogová závislost na Slovensku akceleruje po politických změnách v roce 1989. Kritický vývoj v posledních letech podmiňuje četné diskuse o tomto problému. Problematika drogové závislosti je předmětem, který je v pozornosti řady vědních oborů (sociologie, medicína, kriminologie, psychologie a další), široké uplatnění má i na poli humánní geografie. Článek reflektuje geograficky relevantní výsledky výzkumu drogové závislosti na Slovensku. Poukazuje na výraznou prostorovou diferenciaci jejího výskytu a vymezuje areály nejvyšší koncentrace. Důraz je kladen také na hodnocení struktury drogově závislých dle vybraných znaků, což umožňuje identifikaci skupin obyvatelstva, které jsou tímhle problémem postihnuty v nejvyšší míře.

Key words: drug addiction, quality of life, life quality indices, social pathology, Slovakia

1. Introduction

Life quality interpreted as the option to live a long, sound and full-value life has acquired many forms while it is determined by uncountable factors (Vagač 1999). The term denotes qualitative parameters of human life, way of life, life style, and life conditions (Hanušín et al. 2000).

Quality of life is a complex subject which has provoked a considerable amount of academic and public debate over its definitions and measurement. Whether the topic has been studied under the heading of social indicators research, level of living or well-being research, no agreement exists over the types of indicators to be used or the criteria to be incorporated at any particular scale of study. Indeed, some researchers have suggested that a definitive list of dimensions is impossible to achieve (Rogerson, 1989).

Concern over the quality of life is a characteristic of the contemporary society. As general levels of affluence have

increased in the countries of the developed world, people have come to realise that quality of life is not necessarily a simple function of material wealth. The meaning of the phrase "quality of life" differs greatly as it is variously used but, in general, it is intended to refer either to the conditions of the environment in which people live - for example air and water pollution, type of housing, scenic quality or to some attribute of people themselves - health, educational achievement etc. (Pacione, 1986)

The feeling of human satisfaction is based on man's social and economic security, feeling of personal safety, level of health care and educational systems, observation of human rights and democratic principles. This is, of course, an abbreviated outline of some life quality dimensions.

Another important dimension of life quality is social pathology, which is a summarizing term for unsound, abnormal and generally undesirable social phenomena such

as crime, alcoholism and drug addictions, suicides, prostitution, traffic accidents, work accidents, etc. (Veľký sociologický slovník, 1966)

Several authors include precisely the elements of social pathology such as crime, alcoholism and drug addictions (Siirilä, 1984; Rogerson, 1988) among the main life quality dimensions.

Drug addiction is interpreted as a negative social phenomenon. Its impact is tremendous, it affects a whole set of other life quality indices such as crime, health status of population, mortality of young people, and the like. This is one of the proofs that drug addiction is not a marginal problem of the society, all the contrary, drug addiction with regard to its possible consequences must be paid considerable attention while researching into the life quality. Drug addiction connected with drug crime considerably reduce life quality of regions.

2. Drug addiction in the context of socio-political changes in Slovakia in 1989

Certain traces of drug problem appeared in Slovakia in the 1960s though they were hidden and in any case insignificant before 1989. The drug problem aggravated in the years following 1989 especially as far as the youngsters under 20 are concerned. The way of drugs used has changed from the excessive use to frequent abuse of hard drugs, above all of heroine (Nociar, 2000). While Slovakia was a comparatively stabilized country from the point of view of drug problem, where drug transit prevailed before 1989, it changed into a target country with a drug market and customers of its own in the years that followed. Increased occurrence, distribution and use of drugs were caused by the following factors:

- opening of the frontiers and travel options create favourable circumstances to an increased movement of foreigners across the frontier,
- the situation of Slovakia is from the geographical point of view very favourable for drug smuggling as the country lies on an important drug route heading from the producer countries in the south and south-eastern Asia to the sales points in the western, central and northern Europe.
- the aspect of geographical situation of Slovakia is also interesting for the drug transfer from the opium producing centres in Middle Asia (Kirghizia, Tadjikistan) westward,
- the potential outlet of drugs in our territory, which was isolated before,
- taking advantage of the poor economic situation existing in our country for recruiting and contracting the drug-transporting couriers,
- insufficient legislation and prosecution of crime in the Slovak jurisdiction.

3. Spatial differentiation of drug addiction at the level of administrative units of Slovakia

Data concerning the number of drug addicts (DA) at a level of the present territorial administrative units of the SR are available for the years 1996-1999. Only the drug addicts who have undergone therapy for the first time (newly registered) are included. The data contain the address of their permanent residence. It has to be said that according to the expert estimates only 20-30 % of drug addicts are registered. It is the only database in Slovakia relevant from the geographical aspect.

The DA(96-99) index expresses the mean annual number of drug addicts per 100,000 inhabitants for the years 1996-1999. With regard to the fact that at the lowest observed level, i.e. at the level of districts, the number of drug addicts is low and characterized by oscillations within the individual years, it proved useful and justified to use the index which encompasses and represents the whole four year period.

There are disproportions in the number of drug addicts at levels of regions and districts. Regions were classified into four groups by data obtained in 1996-1999. A criterion for this classification was the DA (96-99) index value for the individual regions. These values were compared with the national value and the regions were divided by the extent to which the value of the indices DA(96-99) surpassed or fell short to the national value.

I. Region of Bratislava

It is characterised by its stable first position and a distinct advance as compared with the rest of the territory (Fig. 1 and Fig. 2). In total, there were 1308 DA registered. Important shares in these high values are those of Bratislava V (475) and Bratislava II (291), the districts which represent an area of concentration not only with regards to the region but also at a national scale. The share of the above-mentioned two districts in the total number of DA in Slovakia represents as much as 20 %. The region of Bratislava participated in the total number of DA in the SR in the years 1996-1999 by 43.01 %. The DA₍₉₆₋₉₉₎ value is 52.86, i.e. much higher than 14.11 (national). This region is dominant in the SR in terms of drug addiction.

II. Region of Trnava

It ranks at the 2nd place among the regions of Slovakia. The region of Trnava with 460 registered DA in the study is dominated by the district of Galanta with 160 and Piešťany with 101 DA. Trnava distinctly lags behind Bratislava and slightly surpasses the group consisting of remaining regions. The region of Trnava participated in the total number of DA by 15.13 % in the 1996-1999 period. The DA₍₉₆₋₉₉₎ index value is 20.92. Along with the region of Bratislava they are the only regions where the values of relative indices surpass the national values.

| REGION | 1996 - 1999 | | | | |
|-----------------|-------------|--------|------|----------------------------------|------------|
| | NDA | % SR | Im | total population (31.12.1997) | DA (96-99) |
| Bratislava | 1308 | 43.01 | 2674 | 618 673 | 52.86 |
| Trnava | 460 | 15.13 | 3466 | 549 621 | 20.92 |
| Trenčín | 246 | 8.09 | 3556 | 610 349 | 10.08 |
| Nitra | 270 | 8.88 | 2802 | 717 241 | 9.41 |
| Žilina | 214 | 7.04 | 2202 | 689 504 | 7.76 |
| Bánská Bystrica | 259 | 8.52 | 4180 | 663 845 | 9.75 |
| Prešov | 85 | 2.80 | 2036 | 777 301 | 2.73 |
| Košice | 199 | 6.54 | 3522 | 761 116 | 6.54 |
| Slovak republic | 3041 | 100.00 | 2946 | 5 387 650 | 14.11 |

NDA = newly registered drug addicts (total)

% SR = share of regions in the framework of Slovakia

Im = masculinity index (‰)

DA (96-99) = mean annual number of drug addicts per 100,000 inhabitants

source: ÚZIS (2000). Evidencia drogovu závislých 1996 – 1999 (výberová databáza). Bratislava

Fig. 1: Newly registered drug addicts in the regions of Slovakia (1996 – 1999)

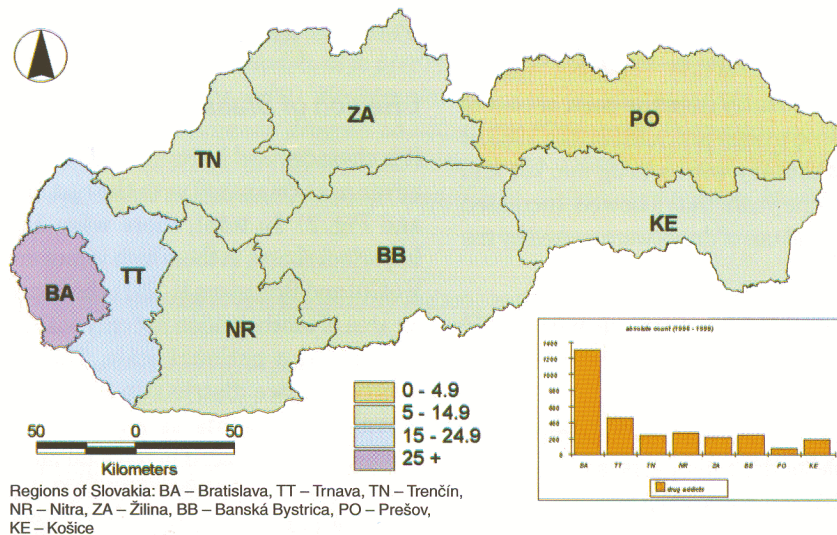


Fig. 2: Mean annual number of drug addicts per 100,000 inhabitants in regions of Slovakia for the years 1996 – 1999. Total number of drug addicts in period 1996 – 1999 in regions of Slovakia.

III. The regions of Trenčín, Nitra, Žilina, Banská Bystrica, and Košice

The values of relative indices in the regions of this groups during the study period slightly oscillated below the level of the national values.

The region of Trenčín ranks at the third position with the drug addiction index value of $DA_{(96-99)}$ 10.08. The districts of Prievidza (80) and Považská Bystrica (52) have the highest numbers of registered DA within the region's total of 246.

The fourth position is occupied by the region of Banská Bystrica with the $DA_{(96-99)}$ index value of 8.75. The districts of Banská Bystrica (84) and Žiar nad Hronom (43) contributed with the highest numbers of DA.

The $DA_{(96-99)}$ index value of 9.41 characterizes the region of Nitra ranking at the fifth position. The highest number of DA was found in the districts of Topoľčany (70) and Nitra (65). The total of 270 DA are registered in this region. The $DA_{(96-99)}$ index values of the regions of Trenčín, Nitra, and

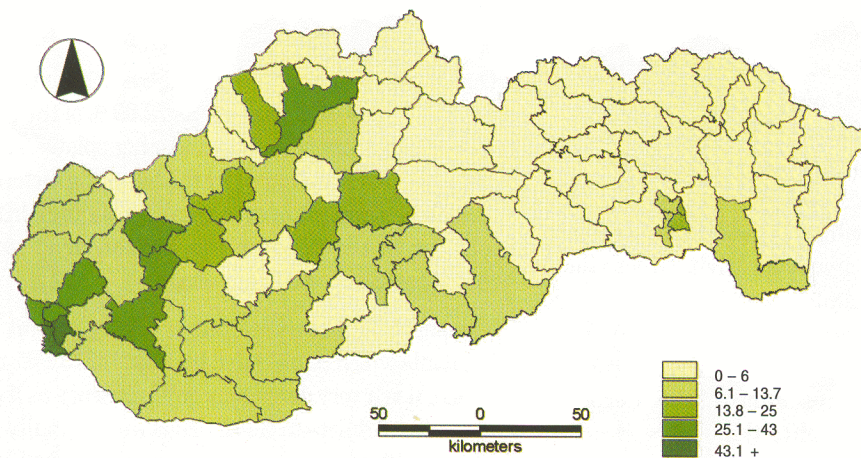


Fig. 3: Mean annual number of drug addicts per 100,000 inhabitants in districts of Slovakia for the years 1996 – 1999

Banská Bystrica are very close and oscillate between 9.41 and 10.08.

The region of Žilina with its $DA_{(96-99)}$ index value ranks at the sixth position. Compared to the rest of the regions it is specific by a very high concentration in one district. Out of the total number of 214 DA, 157 were registered in the district of Žilina.

The $DA_{(96-99)}$ index value of the last region in this group, that of Košice, is 6.54 with 199 registered DA. The district of Trebišov (35) and the urban districts of Košice IV(33), Košice II (32) and Košice I (31) were the ones with the highest number of DA registered.

IV. The region of Prešov

The values of this region are far below the national average. The region can be considered an opposite pole to the region of Bratislava with regards to the Slovak drug scene. There were only 85 DA registered in this region over the study period. The share of the Prešov region with the highest population number and the 14.43 % participation in the total population of Slovakia in the total number of DA is lowest in the SR. This share represents only 2.8 %. The $DA_{(96-99)}$ index value reached in the relevant period 2.73, a five-times lower value than the national one. The highest number of DA was found in the districts of Prešov (21) and Poprad (13).

The low number of drug addiction cases is caused by several factors: The region is characterized by the highest degree of religiousness, only 5.6 % of population are nondenominational. For a comparison, 13% of the Slovakia's overall population are nondenominational while the largest portion (25%) of them live in the region of Bratislava. The process of secularization and the implicit changes of the traditional Christian values are least visible in this region. This fact can contribute to a higher "immunity" of the region to the problem. The overall economic situation characterized by the high unemployment level and the lowest income level as compared to the rest of the Slovakia's population is also an important factor. The north-eastern part of the region represents the periphery of Slovakia

with an extra purely developed transport infrastructure, which is the factor possibly preventing the development of drug traffic characterized by a high level of organization and operativeness. According to the data of the Police Corps Presidium, this region also depends on a very irregular supply of drugs from Bratislava and due to successful eradication of the organized crime there is the lowest level of drug consumption.

The disproportions in number of drug addicts are even higher at the level of district (Fig. 3). A suitable instrument for proving the disproportion is the concentration index which is a measure of the degree of concentration of an observed phenomenon in a certain territorial unit (Ivanička, 1983). In this case, a comparison of the population number in the respective districts with the number of registered drug addicts was applied.

Generally said, the higher the index, the higher the geographical concentration. The lower the index, the more dispersed is the observed phenomenon. If the two phenomena are evenly distributed in every territorial unit, an equal percentage of the whole would correspond to them and consequently the concentration index would equal to 50. The concentration index never equals 100 because the phenomenon does not occur in the area with no population.

Concentration index of drug addicts reaches the value of 85.8. It means that more than 50 % of DA are concentrated in the territory where only 14.2 % of Slovak population lives, while the area of spatial concentration of drug addiction is formed only by eight districts: Bratislava I-V, Piešťany, Galanta, and Žilina. With the exception of Žilina, they are all districts of the regions of Bratislava and Trnava.

The urban districts Bratislava I-V occupy a specific position on the Slovak drug scene. A comparison of the drug situation in the capital town with the national situation suggests a pronounced concentration of the drug problem in Bratislava

with the principal drug being heroine. More than 25 % of drug addicts in Slovakia were concentrated in two urban district of Bratislava in the study period: Bratislava V (including the most critical quarter of Petržalka) and Bratislava II. The extent of drug problem in Bratislava is caused by the metropolitan environment, which offers anonymity, a possibility to keep the environs unaware of the problem for a longer time, while the accessibility of drugs and opportunity to acquire money for buying them (thefts and burglaries) are important factors. On the other side, there is also a greater probability of registering the drug addicts as the city possesses several therapeutic centres. According to the data of the Presidium of Police Corps, the town of Žilina, which represents the centre of north-western Slovakia is currently becoming another centre of drug imports to Slovakia. Apart from the supplies coming via the Balkan route, imports of cocaine from Poland and Pervitin from Czechia are organised here. The proximity of the Polish and Czech frontiers, the strategic position in terms of transports and the good connection to Bratislava are factors which predetermine Žilina to become the second drug centre of Slovakia (the Presidium of Police Corps data, 2000). The district of Piešťany as a seat of the spa of world importance is also specific. It is characterised by high rate incidence of drug addiction, crime, and other negative phenomena. The factor of multiple opportunity resulting from the function of the town (spa) and the ensuing high fluctuation of national and foreign visitors is manifested in Piešťany (Michálek, 1996).

4. Structure of drug addicts by the individual drugs abused

Explosion of drug abuse was accompanied by the spectre of drugs used after political changes in 1989.

The drugs are classified into seven categories in the register of drug addicts in Slovakia:

- a) Heroine and other opiates
- b) Cocaine, amphetamines and other stimulants
- c) Hypnotics and sedatives
- d) Hallucinogens
- e) Volatile inhalants
- f) Cannabis
- g) other

The epidemiological data from the second half of the 1990s reveal an accelerated growth of the illegal drug traffic as manifested in all indices studied – starting with the number of treated persons and ending with the number of those prosecuted, sentenced and imprisoned for crimes connected with drugs. The first warning about a possible heroine epidemic came in 1992 as a sudden increase of treated cases and capture of smuggled drugs. Soon after this, the expected increase of heroine abuse and intravenous drug application

above all in the city of Bratislava were confirmed (Nociar, 2000).

Out of the total number of drug addicts in the SR for the period of 1996-1999 as many as 72.69 % of the treated were from the category of heroine and other opiates. High number of heroine users is caused by the following factors: high risk of addiction implicit in even small amounts of drugs, and the location of Slovakia on the Balkan drug route which facilitates the access to the drug.

The second most numerous category is that of volatile inhalants which represented the share of 10.74% in the study period. It is a very dangerous group of drugs as it shows high mortality. Addicts to these drugs are normally not able to estimate the capacity of their organisms, which leads to frequent mortal overdosing. At the same time, this drug represents the cheapest and best accessible drug in our territory.

At the level of regions considerable disproportions in the representation of individual categories of primary drugs in the period 1996-1999 are observable (Fig. 4). The category of heroine and other opiates, most spread in Slovakia, is most represented in the regions of Bratislava (93.2 %) and Trnava (85.7 %). The share of heroine addicts is enormous in these regions. The remaining groups of drugs are less represented here than at the national level. Heroine is least represented in the region of Prešov (18 %). The share of addicts to the volatile inhalants drops increases from the west to the east. It can be demonstrated by the share of addicts to these substances in the individual regions of the SR. While it is only 1.6 % and 4.3 % in the regions of Bratislava and Trnava respectively, in the regions of Trenčín, Nitra, and Žilina it is 15 %, while 28 % correspond to Banská Bystrica and 35 % and 42 % to the regions of Košice and Prešov respectively. The hypnotics and sedatives are most used in the regions of Prešov and Košice (18.2 % and 11.6 % respectively and least in the regions of Bratislava and Trnava (0.8 % and 0.9 % respectively). It seems that the regions of eastern Slovakia (Prešov and Košice), which rank at the last positions in terms of economic prosperity in the SR have, compared to the remaining regions of Slovakia, the highest share of users of "cheap" drugs (volatile inhalants, hypnotics and sedatives, cannabis), while in the western regions (Bratislava and Trnava) the use of "expensive" heroine prevails.

5. Structure of drug addicts by sex

Socio-demographic factors (age, sex, education and other) are traditional subjects in an effort to search for circumstances existing around the drug consumption (Zášková, 1995). In the structure of drug addicts by sex there is a distinct disproportion between the two sexes. In 1996-1999, 74.66 % of drug addicts were men and only 25.34 % were women (Fig. 5). This proportion remained stable during the whole above-mentioned period with interannual changes being minimal. This disproportion found in Slovakia exists also in other European countries while it is higher in many of the

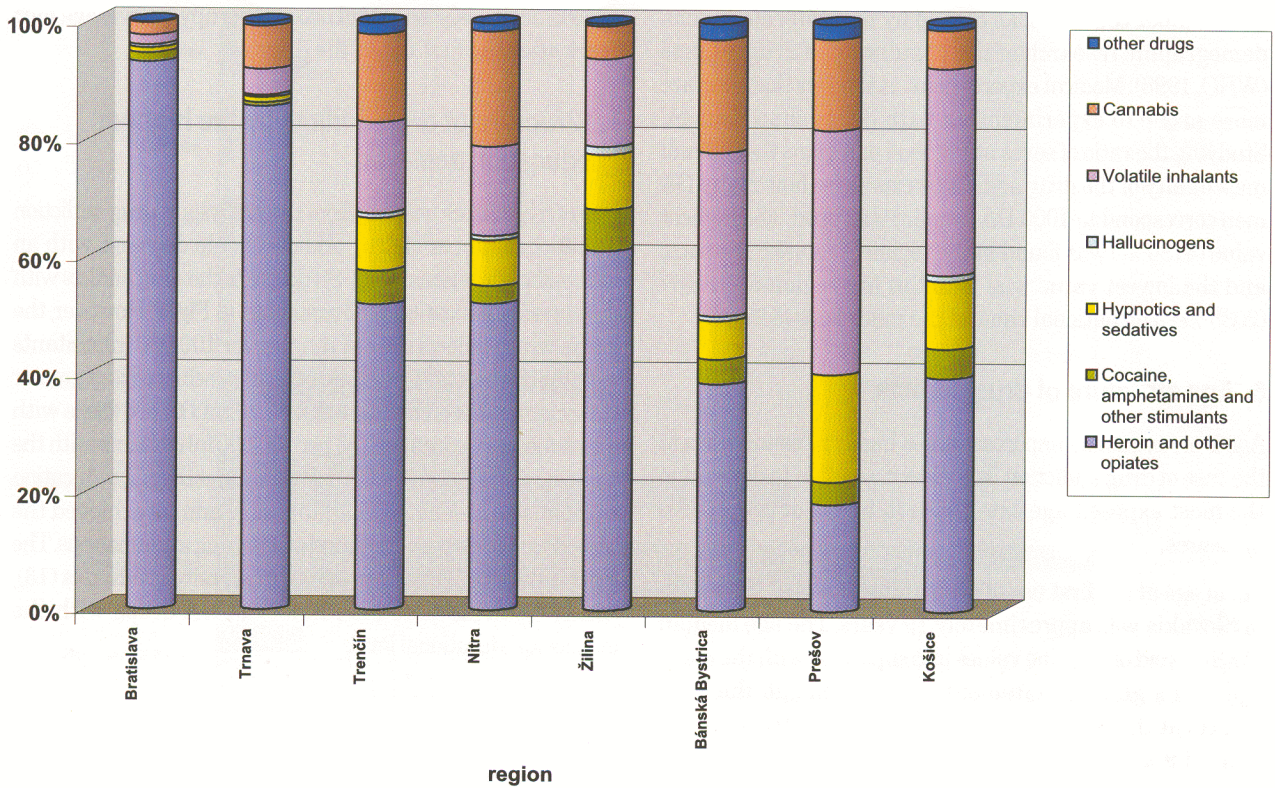


Fig. 4: Structure of treated drug addicts by drug used in regions of Slovakia (1996 - 1999)

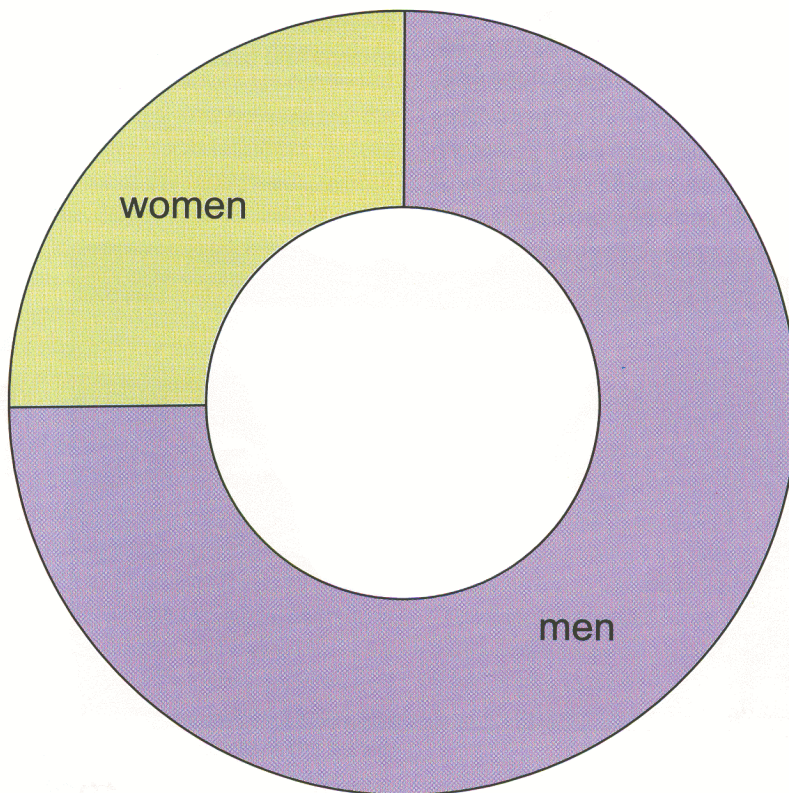


Fig. 5: Structure of treated drug addicts in Slovakia by gender (1996 - 1999)

EU member countries, as proved by the reiterated socio-demographic research of the population of drug addicts (WHO, 1998). Medical experts point at the fact that men are more prone to experimenting with drugs than women. Studying the ratio of sexes at the level of regions the index of masculinity of the drug addicts (it expresses how many DA men correspond to 1000 DA women) was used. The highest value (4180 ‰) was found in the region of Banská Bystrica, and the lowest value was found in the region of Prešov (2036 ‰). The national value of the index is 2946 ‰.

6. Age structure of drug addicts

Age is an extremely important and a highly relevant index in the case of drug addiction. It makes it possible to determine the most exposed age categories in terms of preventive measures.

Mean age at the first use of drug in the period of 1996-1999 in Slovakia was approximately 19 years. The age median which is void of extreme values in comparison with the mean age is of a greater statement value. Although the drug addicts at the age of 0-14 years represented the smallest share (1.9 %-3.2 %), the figures reveal that this age category is affected too (Fig. 6). Representation of the 15-19 year category was 44.1 % in 1996 while in the following period a decrease to 30.6 % (1999) was observable. The decrease was compensated by an increase in the 20-24 year group (from 31.6 % to 39 %) and 25-29 year category (from 9.4 to 16%). Mean age of the first therapy of the drug addicts was 23 in 1999. Mean age at the first use of drug at the national level was stable (19 years) while in case of the age scale of the drug addicts at the time of the first therapy was 23 years. This difference represents about 4 years. It means that the drug

addicts seek assistance and accept therapy on average four years after the first use of the drug.

7. Structure of drug addicts by the highest education achieved

One of hypotheses ensuing from the analysis of drug addiction is that the number of drug addicts should decrease with an increasing educational level. Structure of the drug addicts with the superior education is documented in Fig. 7. However, the graph which follows the DA number for 100,000 inhabitants with the corresponding highest education achieved is of greater statement values. The highest number of DA are those with the elementary education (85 per 100,000 inhabitants with the highest education), 78 of DA are with the secondary education without school-leaving examinations, and 53 achieved the secondary education with the school-leaving examinations. The least number of DA is among the university graduates (13), which confirms that the number of DA drops with the increasing educational level.

8. Conclusion

Drug addiction is one of the most serious problems of the present world. It represents an important socio-pathological phenomenon which greatly contributes to the decrease of life quality. It negatively affects both the mental and physical health, it threatens the sound development of young people, disturbs the moral and social relationships, causes breakages of families and influences an increased incidence of other negative phenomena such as crime and prostitution. Eventually, it also threatens lives, health and property of citizens and causes considerable economic losses. Drug

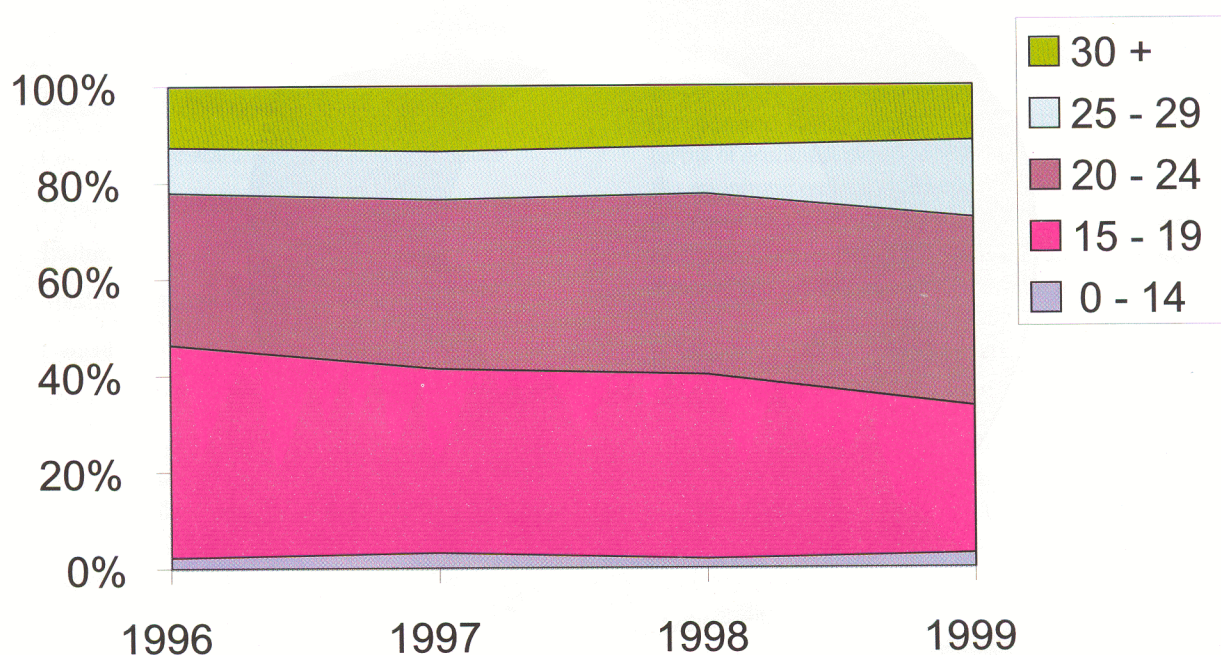


Fig. 6: Structure of drug addicts at the time of first therapy in Slovakia by age categories (1996 – 1999)

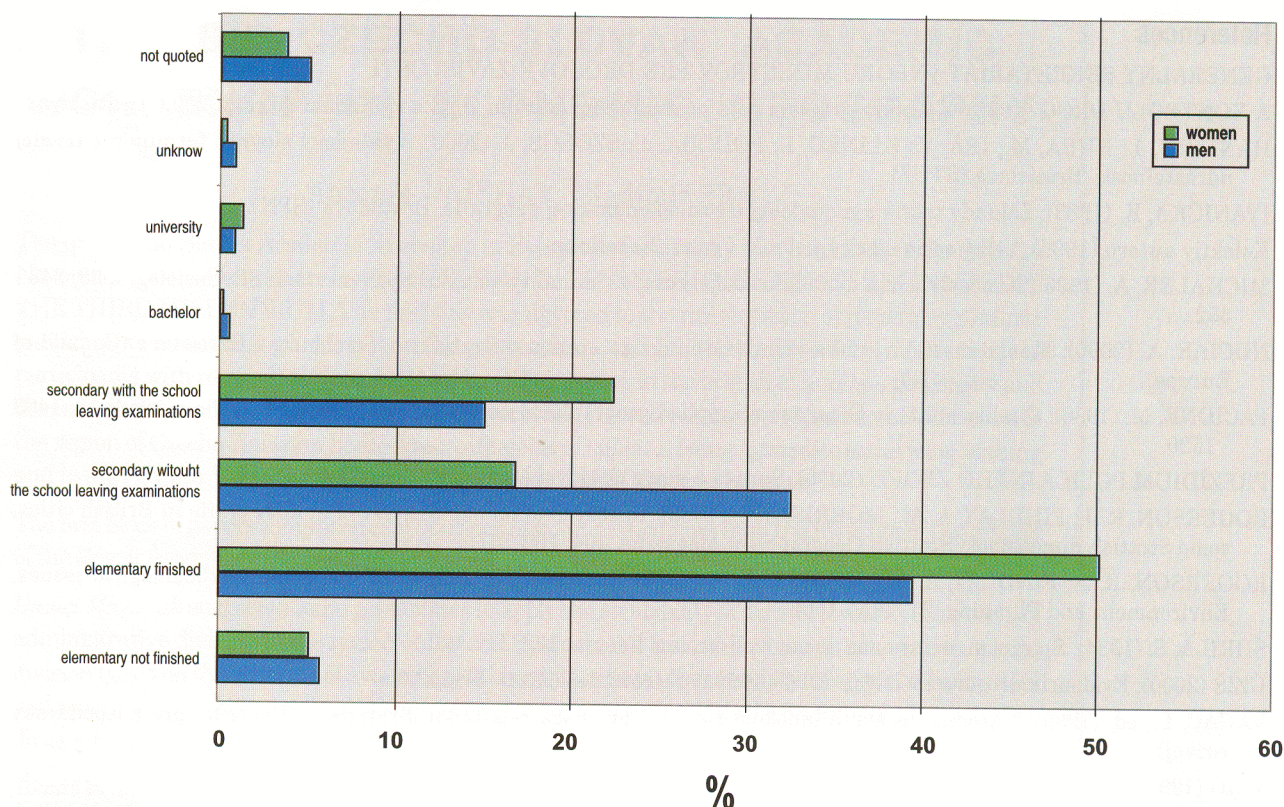


Fig. 7: Treated drug addicts in Slovakia by the highest concluded education and gender (1996 – 1999)

addiction in Slovakia, the development of which accelerated after 1989 is characterised by several specific features.

Its occurrence is uneven: some regions represent distinct areas of drug problem concentration while other ones are hardly affected at all. The differences in the number of drug addicts are caused by several factors. These factors are connected with the offer (degree of organization of drug business and the resulting accessibility of drugs), socio-economic factors (controlling environment, rate of unemployment, overall economic situation of regions, degree of urbanisation, socio-demographic factors (age, sex and other). The region of Bratislava dominates with 43 % of the total number of drug addicts in Slovakia. Together with the region of Trnava, Bratislava forms a 58 % share of the problem at a national scale. On the other side of the spectre, there is the region of Prešov with only 2.8 %. The concentration is even more conspicuous at the level of districts where more than 50 % of drug addicts in the study period were concentrated in only eight districts, mostly the districts of Bratislava region (Bratislava I-V), districts of the region of Trnava (Galanta, Piešťany) and the district of Žilina. On the other side, the districts of Bytča, Turčianske Teplice, and Bardejov do not register a single drug addict in the period 1996 – 1999. In general, males prevail over females with the ratio being 3:1. The most exposed age category is that of 15-24 years. The share of this category in the total number of the registered drug addicts in the period 1996-1999 is 78 %. Mean age at the first use of drug is 19 years. The most frequently used drug is heroine (72.7%), mostly used in the regions of Bratislava and Trnava. Use of volatile

inhalants dominates in the region of Prešov. The study of the relationship between the level of education and drug addiction revealed that the number of drug addicts drops with the increasing education.

The control of drug misuse is one of the priorities in the advanced countries. The anti-drug policy in Slovakia is summarized in the National Program of Drug Control. It is a document, which contains the obligation of the Government to address the sanitary, mental, social and moral damage caused by drug addiction. Major measures have been prepared for the individual economic and governmental sectors in terms of prevention, propagation of drug addiction, provision for a comprehensive and continual attention to DA, elimination of production, transit and trafficking of drugs. The Slovak Republic adhered to all international obligations in the area of drug control. A success in the drug control is only achievable by the utilization of the knowledge of all scientific branches involved in the subject. It is the only way, how to improve this dimension of the life quality. The indispensable part of the interdisciplinary approach is the inclusion of geographic information and knowledge. Cognition of spatial aspects and relationships existing between the single characteristics of the population seems to be especially important.

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THE 6TH CZECHO-SLOVAK ACADEMIC WORKSHOP IN ECONOMIC GEOGRAPHY

Antonín VAISHAR, Vladimír IRA

The 6th Czecho-Slovak Academic Workshop in Economic Geography was held in Brno from 23-24 November 2001 its leitmotif being the CZECH AND SLOVAK REGIONS AT THE BEGINNING OF THE THIRD MILLENNIUM. The first day was devoted to the presentation of papers by seminar participants with an emphasis put on the presentation of doctorands, mutual acquaintance of participants with research projects resolved by either parties in the branch of humane geography and discussion about possible forms of further cooperation. The second day was spent on an excursion to the region of Czecho-Austrian borderland with general subjects being agriculture and wine making and to the Lednice-Valtice area which belongs in the UNESCO world heritage.

The first block of papers comprised contributions of guest participants from the Institute of Geography of the Slovak Academy of Sciences in Bratislava.

Daniel Michniak suggested some possibilities to apply the availability of district towns at the reform of administrative division in the region of Banská Bystrica and tried to develop an alternative spatial division based on the criterion of availability taking into account the principles of spatial effectiveness and spatial equity whose application was not paid enough attention at the last reform of administrative division in Slovakia.

Tomáš Bednárík devoted his paper to drug adiction as to a phenomenon of social pathology analyzing the regional aspects of its occurrence in Slovakia. From the geographical point of view, the issue has some specific features a great unevenness of incidence being one of them. One of goals was to demarcate the regions with the highest concentration of this negative phenomenon.

Anton Michálek discussed the identification of regions in Slovakia with the low age of the dying population and reasons to regional disparities in the population's life length.

František Podhorský presented a paper concerning the "Regions with maximum unemployment and voting preferences" with election results of all parliamentary political parties and movements of Slovakia, in which the rate of unemployment exceeded 20% due to the impaired economic situation. It is possible to make a general statement that the correlation between the share of votes for individual political parties and the rate of unemployment was minimum or zero.

Peter Mariot introduced the most important centres supporting political parties and coalitions, which won chairs in the National Council of the Slovak Republic after the autumn elections in 1998. He admitted that the order of Slovak towns, set up by absolute votes given to individual political entities was significantly affected by their location toward the central regions of their support.

Daniel Kollár explained the significance of the institution of euroregions and emphasized the geographical starting points for their formation. In this connexion, the author outlined the institutional and geographical pre-requisites for functioning of the Euroregion of Pomoraví (the Morava River basin), briefly analyzing some elements of spatial structure in the Slovak portion of the region. Concluding, he pointed out some pros and cons of the Slovak portion of the Pomoraví Euroregion, which play an important role in the development of trans-boundary cooperation.

Peter Podolák presented an analysis of the demographic and residential development in the north-eastern part of the Žilinská kotlina (Basin). The area contains 9 rural villages located in an immediate hinterland of the žilina Water Work. The analysis included a historico-demographical view of the development of seats and population, changes of its structure and factors influencing its growth or decline. The subject of assessment was also the impact of the construction of the žilina Water Work and other economic activities in the last few years on the population and residential development in the region.

Vladimír Ira informed of housing equipment as one of dimensions of life quality of the Slovak population. An analysis of territorial differentiation of individual variables (proportion of permanently occupied apartments equipped with central heating, bathroom or shower booth, automatic washing

machine, passenger car, computer and summer house or cottage) from the viewpoint of regional unevenness as well as the defined index of housing equipment quality was applied on the data from the 2001 census for districts of the Slovak Republic.

The paper presented by *Vladimír Székely* was to introduce the scientific and technological park as a growth stimulator of entrepreneurial activities connected with the development or application of progressive technologies, and as a supporter of the transfer of technologies between institutions of scientific research and industrial companies. Roles played by the Scientific and Technological Park in a certain region can potentially have a great influence on the local (regional) development.

Presentations of hosts from the Brno branch of the Institute of Geonics of the Academy of Sciences of the Czech Republic followed after the break.

Eva Kallabová spoke of housing quarters built of prefabricated panel blocks of flats whose regeneration or humanization represent one of main problems for the towns of today. Her paper was primarily devoted to the Ostrava region which is one of areas with their greatest concentration in the Czech Republic. A process of housing quarters regeneration, which pays attention both to an active conceptual technical activity and to the development of participation of all concerned parties including housing estates inhabitants themselves was launched in 2001 and has been controlled by the government and supported by law. A detailed complex research is carried out in twenty housing quarters (with more than 2500 apartments) of the Ostrava region, being focused on the developmental tendencies of housing estates within the transformation and on the general assessment of changes occurring in the dwelling environment of housing estates.



Barbora Kolibová suggested in her paper that the downscaling of mining activities in the Ostrava region induces among other also a question of the prospects of human potential which has been concentrated in this residential agglomeration for many tens of years. The downscaling of coal mining occurred mainly in 1993-1996 and was evoked by the need to accommodate to the conditions of developing market economy. Thanks to a thorough assessment of the situation and elaboration of initial strategic analysis with the name "Social programme of downscaling", the restructuring of coal industry in the region was implemented without any social shocks. The successful cooperation of OKD with employment bureaus in Ostrava, Karviná and Frýdek-Místek helped to prevent a pronounced increase of unemployment in the region. The curve of unemployment indices copied the development in the Czech Republic.

Oldřich Mikulík informed about the changes of landscape and environment in the Ostrava region which has been subjected to research by the Brno branch team of experts since 1970. The territory

was under the impact of industrialization processes from the first half of the 19th century main stimulus being the development of metallurgy and mining. The region got gradually filled with industries, developing seats and interwoven with an incrementally denser network of communications of all kinds. The landscape was used but also devastated with an ever growing intensity, the life style was changing and so were the social structure and environment in the region. Research results are summarized into stages of historical development before 1945, in the period 1945-1989, and after the year 1990.

The contribution of *Jana Zapletalová* dealt with negative impacts of air-pollution and traffic noise on environment presenting values of valid Czech norms for noise and air-pollutants including their changes. The norms were compared with those valid in the EU countries and elsewhere. The development of noise pollution and concentration of some harmful air-pollutants was illustrated on an example of some streets in the city of Brno.

Antonín Vaishar focused his presentation on the theoretical and methodological issue of geography of small areas documenting the development of environmentally geographical research of small areas at the former Institute of Geography of the Czechoslovak Academy of Sciences and an increasing attention paid to this subject of research in the Brno branch of the Institute of Geonics on examples. At the present time, the research is implemented in rural and particularly in borderland regions within the model areas of the Morava River basin at studying consequences of floods occurring in 1997 or in small Moravian towns.

The 6th Czecho-Slovak Academic Workshop in Economic Geography opened the second series of these events, in which the two workplaces will focus their efforts on seeking possibilities for the realization of a concrete joint project or projects which would help to resolve the regional issue on the new state border. Apart from the scientific knowledge the projects would facilitate also the exchange of methodological experience and the reinforcement of interpersonal contacts between experts from the two institutions.

The 7th Slovak-Czech Academic Workshop in Economic Geography is prepared and will be held by the Slovak party in 2002. New forms are sought which would enable the intensification of contacts. Provided that the proposal of a joint grant project is prepared by that time, it will become a central point of the next international meeting of scientists.

SEMINAR OVER THE PROJECT "INFLUENCE OF UNDERGROUND MINING DAMP-DOWN ON PROCESSES IN LITOSPHERE AND ENVIRONMENT"

Petr MARTINEC, Oldřich MIKULÍK

A workshop was organized by the Institute of Geonics AS CR in Ostrava on 6 December 2001 to discuss the task of the Programme of targeted research of the Academy of Sciences of the Czech Republic No. S3086005: "Influence of underground mining damp-down on processes in in lithosphere and environment" in the years 2000 and 2001. The Seminar was devoted both to the hitherto project results and to the coordination of further project works in 2002. The project is shared by the Institute of Geonics AS CR (ÚGN) in Ostrava and Brno, and by the Institute of Rock Structure and Mechanics AS CR (ÚSMH) in Prague; its chief researcher is *Petr Martinec* (ÚGN Ostrava).

The project solution is focused on some regions in the Czech Republic, which are affected by deep mining of ores and coal in different geological conditions. Ore mining regions include the steep vein deposits of uranium and polymetallic ores extracted by methods of deep mining near Příbram and the pitching stringer uranium deposit of Rožná. Coal deposits include the flat deposit of bituminous coal near Kladno, the Ostrava-Karviná district with both shut down and continuing deep coal mining in complicated geological conditions, and the shallow flat deposit of lignite with a simple geological structure in the south-Moravian lignite district. The subject of work is an analysis of the impact of geological and technical conditions of mining on the rock massif and surface, changes of environment and socio-economic changes induced by the end of coal extraction on the deposit in question.

In such an extensive coal basin as the Ostrava-Karviná District (OKR) three model areas were chosen for a deep analysis due to the complex geological structure of the whole district and due to the time for which the coal mining was run there. The three areas characterize basic types of geological conditions occurring in the district and to them related methods of mining and different stages of their surface impact due to the existing or closed down mining.

Mining in the Paskov-Staříč model area was launched in 1967 and ended in the Paskov working field panel part in 1993; the Staříč working field panel part is still being mined. Surficial deposits are formed of Badenian sediments and thrusts of the West Carpathians. The area in question is represented by two parts of one working field panel with the relatively identical geological conditions but with a different impact of downscaling and hitherto mining on the surface. The mining takes place in coal seams whose workable thickness in the Ostrava layers ranges from 0.6 to 1.5 m.

The second model area is the working field panel of the ČSM Mine. It is a rather new coal mine in which mining was launched in 1967 and is still very intensive. Surface impact is considerable being conditioned by mining of coal seams whose workable thickness in the Karviná layers reaches several meters. The surficial deposit is formed of Badenian sediments.

Collection of data for the third model area will be launched in 2002. Mining at this locality with seams in steep development has been already closed down (Mine Lazy-Žofie) and surface impacts are expected to be largely influenced by its geological structure.

The localities of model areas will serve as examples to present characteristic circumstances relating to the reclamation of damaged regions, to the present condition and prognosis of developing surface falls after the end of mining and to some socio-geographical aspects.

The research in localities of deep ore mines in Příbram and Rožná was discussed in the contribution presented by *Milan Brož* (ÚSMH Prague) who demonstrated some processed statistic data on mining in Příbram, which are incorporated into the catalogue of map documentation. The character of this documentation is that of metainformation system including graphical layers and numerical data. The database used was Microsoft SQL.

Karel Hortvík (ÚGN Ostrava) discussed in his paper the issue of slump basin rise and development in the conditions of ore deposits of the Moravian branch of the Moldanubian - the locality of Rožná, and the prognosing of surface movement after the end of uranium ore exploitation. Based on the long-term geodetic observations a new concept was described at the ÚGN Ostrava, which explains the mechanism of slump basin rise above the Rožná deposit and which served as groundworks to work out a geomechanical model of the situation on the deposit that makes it possible -with the use of mathematic modelling of surface falls development- to predict the development of the slump basin both at the stage of deposit mining and in the period after the end of mining works. Linking up with the further actual geodetic study into the development of the slump basin, the further research of the issue is focused on the verification of this newly conceived mechanism of the rise and further development of sinking surface above the uranium deposit (in order to further verify the extent and measure of its validity). The research is expected to contribute in general to the methodology of assessment of surface movements after the end of mining for ore vein deposits with deep exploitation in similar conditions.

Roman Živor (ÚSMH Prague) informed about the research of deep coal mining localities in the Kladno district, presenting finalized graphical outputs for long-term impacts of mining in the territory of the Kladno Mine elaborated by mine surveyors. The acquisition of geodetical and statistic data on mining activities for this coal mining district will continue.

An information block on research works in the Ostrava-Karviná District (OKR) was opened by *Petr Martinec* who informed participants of the Seminar about a set of basic 1:50 000 maps of the Czech portion of the Upper-Silesian Basin to the issue of mining impacts on the surface and environment. The maps were prepared in cooperation with OKD a.s. (Ostrava-Karviná Coal Mines, Inc.) and IMGE o.z. (a special-purpose OKD facility for engineering, surveying, geology and ecology) Ostrava (*Milan Krůl*) and represent basic documentation maps for a cumulative presentation of task results when it is necessary to observe both the geometry of mining spaces, prognostic territories, and the remaining geographical factography in the way it is presented in the maps. Calculations or presentations of hectare loads of the landscape due to mining will be made by using the land areas of mining spaces, prognostic areas and deposits which are the subject of research. The following maps were introduced at this stage of project solution:

- Map of mining spaces, deposits outside the mining spaces and prognostic areas in the Czech portion of the Upper-Silesian Basin;
- Map of mining spaces, deposits outside the mining spaces and prognostic areas in the Czech portion of the Upper-Silesian Basin with drill holes from the ground surface;
- Map of mining spaces, deposits outside the mining spaces and prognostic areas in the Czech portion of the Upper-Silesian Basin with the course of tectonic structures;
- Map of Carboniferous mountain ridge cover thickness;
- Map of Carboniferous paleorelief;
- Map of mining spaces, deposits outside the mining spaces and prognostic areas in the Czech portion of the Upper-Silesian Basin with actual ground surface falls in 1961-1989;
- Map of mining spaces, deposits outside the mining spaces and prognostic areas in the Czech portion of the Upper-Silesian Basin with actual surface falls in 1961-1999;
- Map of ground surface reclamation measures made before the year 2000 and after the year 2001.

Geology and features of mountain massif in some OKR model areas were discussed by *Martin Vavro* (ÚGN Ostrava) who informed about work procedure and results at the solution of model areas of the shut-down Paskov Mine and operating Staříč Mine, ČSM Mine and the considered third area in a steep depositing. Jointly with *Karel Hortvík* he informed about possibilities of mathematic modelling of basin development with the process being influenced by the different geological structure of the Carboniferous cover. *Božena Schejbalová* (ÚGN Ostrava) discussed the methodology of data logging and problems related to the balance of masses extracted in the OKR district in the period 1900-2000, i.e. water, coal, rock and gas (coal seam methane); the evaluation of data files will be accomplished in 2002. *Zdeněk Kaláb* (ÚGN Ostrava) informed about the impacts of seismic phenomena induced by mining on the ground facilities in the period of coal mining and about their prospects after the end of

mining; the solution of this issue is in process. The procedure and results from the assessment of the secondary succession and recultivation on waste banks in Chlebovice and Řepišť were discussed by students from the Ostrava University *Eva Hettenbergerová* and *Samuel Lvončík*.

Oldřich Mikulík informed of the issue resolved at the ÚGN branch in Brno where the research is focused on the geographical assessment of region-specific features of coal-mining landscape and environment development. Data were gathered for the characteristics of natural and socio-economic environments, a structured bibliography database was compiled and model areas of Staříč-Paskov and ČSM Mine subjected to research. *Karel Kirchner* informed the Seminar participants about a proposed legend of relief types from the area of the Podbeskydská pahorkatina (Hilly Land) and a part of the Moravská brána (Moravian Gate). The legend is built open with a possibility of other relief types from other areas to be added and is also going to include anthropogenic geomorphological landforms. *Jan Lacina* and *Šárka Strátežská* informed of having set up the legend for a map of biotope types and its modification based on the field research in the model areas of the ČSM Mine and Paskov-Staříč and in the narrower monitored area of the Rožná deposit. According to their opinion, even a devastated landscape can offer a number of environmentally relatively important localities, particularly at places where the landscape severely altered by anthropic impacts was left to natural spontaneous development. *Jan Munzar* informed about the documentation of air pollution from the viewpoint of environmental history along with the monitoring of its present condition. The investigations indicate that no concrete quantitative data on atmosphere quality existed before the year 1945. The first records originate from the period 1948-1949 and concern dust fallout; the methodology of measurement is however not known. Systematic measurements originate from the 1960s. Unfortunately, the methods of measurement were changing in the course of the last 40 years. *Stanislav Ondráček* informed about the solution of the water management issue, which is led in three parallel streams of problems. The first one includes waste waters, their production, discharge into water courses, development of discharged pollution and pollution sources. The second one deals with the pollution of water course and the third one concerns the impacts of mining onto water management.

Antonín Vaishar informed about the demographic development of the territory under study and about the formation of settlement in the last 150 years under the influence of coal mining, metallurgy and other industries. Partial problems are resolved of restructuring the core of the Ostrava agglomeration, new functions are sought for the meso-scale towns as well as a possibility to revitalize the original cores of settlement structure in the region of interest. *Eva Kallabová* reviewed the issue of the present condition of large neighbourhoods of prefabricated blocks of flats putting an emphasis on the assessment of the period after the political changes of 1989. Here the attention is focused on a selection of the most pressing problems of prefab housing estates in the Ostrava region and their reasons, monitoring of conditions and changes leading to the improvement of the present situation, and the process of humanization and regeneration of these housing units. *Barbora Kolibová* informed about the monitoring of vertical and horizontal labour force mobility, unemployment, life style, standard of living, life quality and health condition of the population in the studied region for traditional occupations of miners, metallurgists and chemists. *Jana Zapletalová* presented an assessment of changes in the local railway network of mine works railways in the Ostrava-Karviná coal mining district from 1856 until present, which traced both the spatial development of mine works railway and property relations.

The end of the workshop was devoted to the discussion of issues connected with the plan of task solution procedure in the year 2002, with possible forms of current presentation of partial results or with the preparation of final report which would complete in a suitable form this research into the issue of impacts of downscaling deep mining in the Czech Republic.



View of a housing estate built in 1980–1990 (Brno–Vinohrady).

Photo: E. Kallabová, 2001



Complex home building (Frýdek-Místek, housing estate Slezská)

Photo: E. Kallabová, 2001



Untidy front door of a panel apartment house (Frýdek-Místek, housing estate Slezská)

Photo: E. Kallabová, 2001



Front door of a panel apartment house after successful reconstruction (Havířov, housing estate Šumbark)

Photo: E. Kallabová, 2001



Children playground in disrepair (Slovakia, Bratislava, housing estate Petržalka)

Photo: E. Kallabová, 2001



Children playground after humanization (Brno, estate in Černá Pole)

Photo: E. Kallabová, 2001

Illustration to the paper of E. Kallabová