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Foreword

Dear readers, please let me introduce the third issue of GeoScape journal which is devoted to a special event, which took its place at the Department of Geography, Jan Evangelista Purkyně University in Ústí nad Labem. The student conference, titled Geographical Underground, was aimed at students of bachelor, master and Ph.D. study programmes and was held under the patronage of vice-rector of the University for Study Affairs, dr. Alena Chvátalová and, head of the Department of Geography, assoc. prof. Milan Jeřábek. The main focuses of the conference were to offer an opportunity for presentation of student research topics and for discussion and building the new contacts among participants from different universities. Thanks to the attendance of students from VŠB-Technical University of Ostrava, Masaryk University in Brno, Charles University in Prague and J. E. Purkyně University in Ústí nad Labem, the conference offered a wide ranging spectrum of approaches to the study of the integral object of geographical science, the landscape. The programme, taking place in November 12th, was divided into several blocks, which loosely reflected the thematic scopes of contributions. Besides the conference itself (including all the inspiring professional as well as informal discussions) the present issue of the GeoScape journal is the second main outcome of the conference. Presenting 13 contributions, this issue covers the various problems of physico-geographic, socio-geographic, environmental as well as pedagogical problems recently solved in landscape studies. It's my pleasure to thank to all the participants as well as reviewers and other members of conference organizational committee and journal editorial board for their effort and I hope that the number of events offering such a platform to students will further increase.

Pavel Raška

Editor of this issue
(on behalf of editorial board)

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Slope deformations as a landscape heterogeneity factor

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Abstract

The paper presents results of diploma thesis defended this year at the Department of Geography UJEP. It processes the problems of slope deformations like distorting processes in landscape and its influence to landscape heterogeneity. It methodically stems from a complex physical-geographical research of territory, delimitation of complex geoecological units and resulting evaluation of these units with slopes deformation areas in workspace of GIS. Work reflects, enlarges and researches possibilities of further usage of geoecological information in solving objectives connected to environmental hazards and risks.

Keywords: slope deformations; geoecological units; physical-geographical research; GIS

1. Introduction

Natural disasters represent one of the most frequent environmental problems. They cause economic losses, threaten human lives and presents limits of landscape and urban development. The other problem is that production preventative measures and prognosis are influenced by their impossibility of total elimination of mechanism in a manner, limited suggestibility and incomplete research. These disturbance processes are slope movements, one of the most widespread (and with floats redoubtable) geodynamical events of local meaning.

Main work's aim was to analyze and evaluate the influence of slope deformations on landscape heterogeneity. Basic principle was to evaluate and measure the coincidence of borders of landscape units with areas of slope deformations in the workplace GIS. The sub-goals were: 1) analysis of geographical conditions in the territory – i.e. characterizing model territory (next MT); 2) synthetic bases and creation of te map of geoecological units as prefer criteria (typological regionalism); 3) comparison of borders of geoecological units with border areas of susceptibility to landslide and slope deformations and their coincidence.

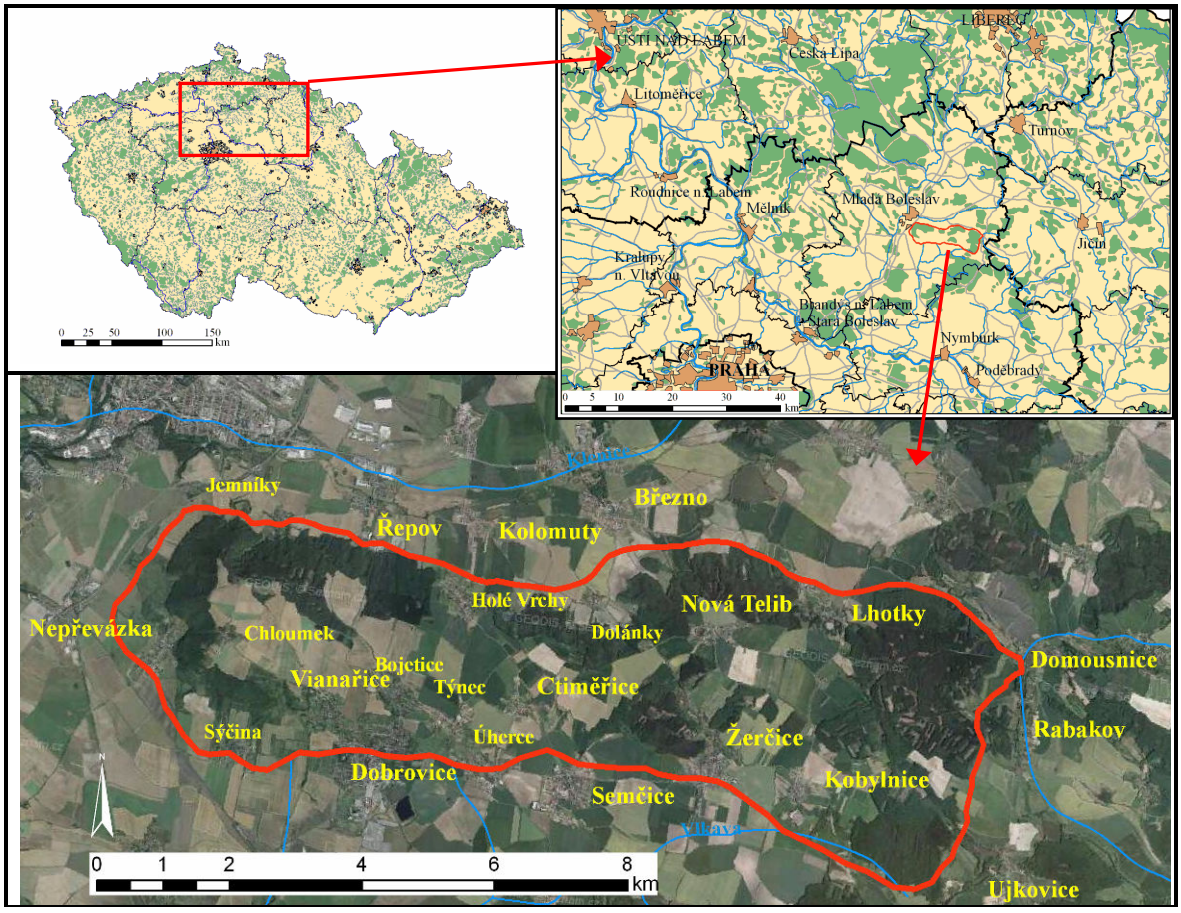
2. Methods and material

2.1 Study area

Influence of disturbation activity to landscape structure was researched in Chloumecký hřbet ridge, area 43, 95 km^2. It lies in axial part Česká křídová pánev basin built by Mesozoic sediments, layers of claystone and sandstone. This structure supports slope movements and with other types of different petrologic situations (sediments with volcanics) belongs to the most typical reasons for inception of landslide processes in Czechia.

These activities influenced natural and living conditions of MT for long time, what is documented with little elevation by base of slope. The first work was written by Záruba (1929), next e.g. Fencl, Zeman (1963), Krám (1984), Procházka (1984), Rybář et al. (2003). Today situation is represented maps on portal ČGS – Geofond. They published (10. 3. 2008, latest update) list of 108 slope deformations, with superiority of western part of the ridge from line Úherce - Dolánky. Dominant form slope movements are landslides. Engineering – geological maps of stability conditions and maps of landslide susceptibility was prepared in scale 1:10 000 by Rybář et al. (2003) for western part of MT.

Fig. 1: Delimitation of the area of interest (source: author using ArcView 9.2, data: ArcČR500, mapy.cz)



2.2 Methods

Broad-range of methods and approaches were used in the research. The main method was regional classification based on a segmentation of the area using chosen criterion(s) and formation of geoecological units. During defining them, the methodic, which included three steps and which was described by Minár et al. (2001) was used. At first collecting and

elaborating materials (period of preparation) – elaborating materials represent the process of overlaying the thematic maps, i.e. area borders of chosen extrapolation factors. Authors of this methodic are recommending two factors, land cover and relief, let us say elemental forms of relief – relatively homogeneous flat, defined by constant value of pointer (elevation of sea-level, angle, etc.), or changes in certain direction. These units are fulfilling the characteristics about other country components. For these work purposes were used following four factors: lithosphere (Geological map 1:50 000, CGS), relief (self made by hypsography ZM 10), soil (Soil map 1:50 000, AOPK CR) and land cover (ZM 10, CUZK). The result was a working map in the big scale 1: 50 000, that was about content unit with unique quality of each factor. Main purpose of second phase - terrain research - was verification and specifying border process of defined units. Terrain research was held in vegetation and non-vegetation season, when man can see the relief morphology much better. This is basic for recognition land cover and clustering some units together. Thirds – summary elaboration of these information (final step) – the result is typology geologic map of relatively homogenous region – geoecological units (further "GU"). Generalization of content lies in elimination flats which are smaller than 1 cm2 and merging lines, theirs distance is less than 1 mm so 25 m in real. The edge of characteristics, which each tie next one, (i.e.: fluvial deposits and fluvisoils), but they have a different process set by other qualities of bolstering (background material), will lead it strait by line, which is recognizable by higher exactness (bigger scale, own thematic map). The part of this step is defining to hierarchic typology of map unit structure.

The results of landscape synthesis imagine collection of information about landscape, which should be able to completely and complexly inform about their functioning and proprieties. Basic of synthesis is production, characteristic and classification homogenous space units. These units are recognizable by almost same geoecological (or landscape-ecologic) proprieties of landscape in their full flat.

3. Results

Border areas of susceptibility to landslide should coincide with GU in whole length. Measures of coincidence isn't absolute and evaluating results are possible only by particular GU, or their artificially created groups. Generalization of results to general rule is impossible.

Border areas of slope deformations should coincide with GU in whole length. Borders of slope deformations are coincidence with borders of GU mainly in separation edge and inferior border of accumulative part, in addition wider terrain depression, which margins define deformations in other parts too. Border's slope deformations are delimitated GU in their whole length. The level of coincidence is not hundred-per-cent.

Borders of GU delimitation based on two factors – relief and land cover are representative. Assessment of this hypothesis comes out from methodology of Minár et al. (2001) that advises construction complex landscape units on the basis these characteristics. With regard to results of previous hypothesis is obvious, that these units are deficient, on the other hand combination of these factors has higher predicative value. For usage of these imminent observable characteristics (so simply map), is possible to use execution preparatory maps by terrain mapping or modeling in workspace GIS.

Borders of geological basis aren't absolutely coincident with monitored borders. Higher correspondence embodies boundary between calcic claystone and marlite with interbeds calcic sandstone with loess and loess loam – but it's by virtue of terrain morphology (similar case is infilling valley bottoms fluvial sediments).

Morphographic - morphometrical units have absolutely higher predicative value, what is foreseeable information. Decisive characteristics is slope gradient in values 2° a 5° and margins concave form, there defined like valley bottom and the other slope depression.

Into the bargain edge convex forms (crest line) deserve attention.

Soil subtype records the lowest sequence. It's interesting, because it's factor, which is a result of lot of conditions and factors, and can point out quality, that wasn't counted in classification. Border of any stability region, so slope deformation, coincide with borders of soil subtype (type, group). Influence of water, which was available deduction from hydromorphic (soil-forming) process is in areas of susceptibility in category III (unstable area). Generalization of these results is very misguided.

Land cover – the most important is a forest line. Except the areas, where forests cover plain terrain (typical for luvisoils), and on the other hand, where are high quality soils exploited for agriculture on slope gradient above standard, the forest line has a close sequence to areas of susceptibility in category II and III (area, where is impossible except disturbance stability of slope and unstable area) and root areas. Similar situation is by the foothill, where determinates margins lower parties areas of susceptibility and areas of deposition. For guidance were compared borders of GU with leafy, mixed and coniferous forests. In result has this division sense, but is condition by morfometric changes, so original division was adequate.

4. Discussion

An initial methodic was a geoecological standardization by Minár et al. (2001). The results mentioned are not representative application in a sense of making the best of two leading factors (basic geomorphologic units and land cover, similar regionalism appears in a publication at the production of complex database and its usage for ecological fixity map's creation in a Tremboš's benefit [created in 1996]).

Some problems appeared while assembling sources. A measuring problem with a generalization is being solved in a number of publications. It came up to elimination of 1 cm2 units and lines consolidation whose distance was smaller than 1 mm (in a map). The next question is a land cover usage as the main cover factor while geoecological unit definition. Man's task, his products in a form of a different land use and the economic activity impacts associated with it, they involve actual processes in natural components of a landscape. Land cover has quite a high sequence for a natural proportion character, but not exhaustive. It has a limited time availability of units earmarking, why being engaged in mapping of up-to-date land cover, the formed had surely its foundation. The last remark to the incorporation base is now and then mentioned, an effort of creating a complex database in a GIS environment, which would afford the pieces of information needed for landscape and territorial planning.

5. Conclusions

In this work author reflects, enlarges and researches possibilities of further usage of geoecological information in solving objectives connected to environmental hazards and risks in landscape and urban planning, etc.

Using methodic of Minár et al. (2001) the work should bring possibility of investigation in this questions, but it needs the consecutive research. The continuation of a survey is offered to the future verification of results mentioned in other localities, which dispose of different natural character. Baba peak or Příhrazské skály would be suitable; a map of fault liability of slopes fixity was made by the same specialists. The usage of other instruments would be suitable, which GIS software afford and complete pieces of information mentioned before for example by exact distance evaluation in face of geoecological units boundaries and to help to generalize given problems, for example the scale in segmentation of GU.

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Roches moutonnées in the Osoblaha region

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Abstract

Roches moutonnées are typical erosional landforms of formerly glaciated areas. These landforms could be of great value for the palaeoglaciological reconstruction of former ice-sheets. This topic has not been in the spotlight of Czech scientists and there is just a few literature concerning this issue. The Osoblaha region was glaciated during the Middle Pleistocene and it is one of the areas in the Czech Republic, where the presence of roches moutonnées is supposed. This work was focused on mapping and morphometry of expected roches moutonnées in the Osoblaha region. Mapping of elevations and basic measurements of elongation, orientation of the slopes and inclination of stoss and lee-sides made a basic framework for confirmation or disproval of the allegation that the elevations in the Osoblaha region are roches moutonnées. This is very complicated because of the high age of potential roches moutonnées, medium geomorphologic value of Lower Carboniferous bedrock and high anthropogenic impact on the landscape character. More exact methodology is needed for thorough solution of this problem.

Keywords: Roches moutonnées; Pleistocene glaciation; the Osoblaha region

1. Introduction

1.1 Roches moutonnées

As mentioned in Macoun and Králík (1995) or Růžička (2004), the continental glaciation reached borders of the Czech Republic during the Middle Pleistocene and left there some imprints on relief. One of them could be roches moutonnées, what is very disputable problem and is not in the spotlight of Czech scientists.

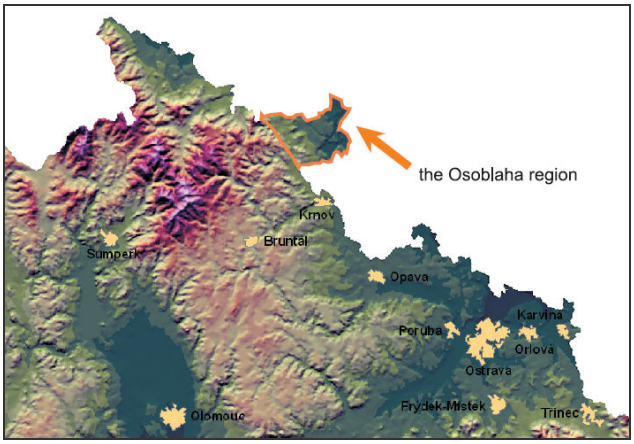
Roches moutonnées are convex, glacial erosional landforms. Mostly they are defined as partly steam-lined, asymmetric bedrock forms with abraded, gentle upflow slope and quarried, steeper downflow side. Most often they vary from 1 to 50 m in height, a few meters to kilometers in length, and tens to hundreds meters in width, but different authors vary in this parameter. See Benn and Evans (1998), Martini (2001) or Hugget (2003). Typical morphology can be modified by bedrock structure as described in Benn and Evans (1998). The morphology of roches moutonnées is a result of quarrying on the lee side and abrasion on the stoss side. Conditions and

effects of these processes are summarized in Benn and Evans (1998) or Rea (2007). These landforms could be also of great value for the palaeoglaciological reconstruction of former ice-sheets, but with some limitation. This problem was partly solved in Glasser and Bennett (2004).

1.2 The Osoblaha region

The Osoblaha region is situated in the North of Moravia **(see fig.1)**. It is one of the areas in the Czech Republic where the presence of roches moutonnées is supposed. Their presence is discussed in Jüttner (1912), Kroutilík (1961), Zapletal (1966) or Czudek (1997), but there is a lack of present researches focusing this issue.

Fig. 1 The Osoblaha region (author: N. Perečková, ArcCR500)



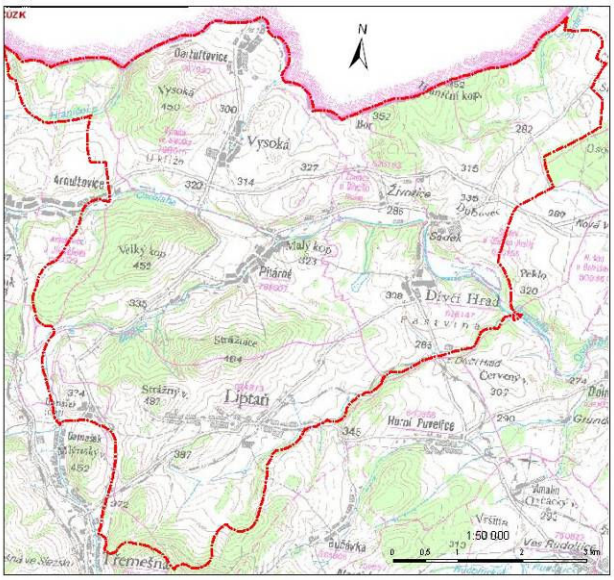
The most of knowledge about continental glaciation in this area came from remnants of glacial deposition (tills, other glacial sediments and erratics), but there are also visible imprints of glacial erosion (trogs or nunataks). Some of the authors mentioned above consider smaller elevations in the Osoblaha region to be roches moutonnées. In the opposition is Czudek (1997), who alleges that they are undulations of preglacial basal weathering level and there is no proof that these elevations were further shaped by glacier. But he also does not disprove it.

2. Methods and material

2.1 Area of study

The research was focused on mapping and morphometry of potential roches moutonnées in the Osoblaha region. Firstly was specified an area of study, which was laid on the borders of Osoblaha Lowland and Jindřichovická Hilly land **(see fig.2)**. There is higher possibility that some roches moutonnées could be visible than in the Osoblaha Lowland, where quite thick layers of glacial and postglacial sediments has been preserved.

Fig. 2 Specified area of research (author: N. Perečková, ČÚZK)



2.2 Morphometry

The main part of research was comprised of field survey and measurement of some morphometric characteristics of mapped elevations. The basic characteristics are direction of the elongation, relative and absolute height, approximately length of the elongation axis and the axis orthogonal to the first one and the inclination of oriented slopes.

The elevations were divided into five groups according to relative height: less than 5 m, 5–10 m, 10–15 m, 15–20 m and more than 20 m. There were done 5, 7, 10, 13 and 15 individual measurements to take into consideration also the size of the elevations.

Inclination of oriented slopes was measured with geological compass and on each slope was assessed as an average of individual measurements on oriented slopes. Then the inclination asymmetry coefficient and the elongation coefficient were computed. There was basic dataset of 152 selected elevations. For an evaluation was used a dataset of 82 elongated, asymmetrical elevations on which all measurements were done.

2.3 Evaluation of the dataset

The evaluation was based on typical morphological features of roches moutonnées which are useable in our conditions. Let's assume that a roche moutonnée like elevation is asymmetric, elongated in the direction of glacier flow and gentler slope is stoss side and steeper slope is lee side to the direction of glacier movement. It is also possible to determine the direction of glacier movement from NW-NE to SE-SW (see e.g. Růžička (2004), Geological Map 15-11 Zlaté Hory). When also some preglacial relief conditions are taken in consideration, it is maximum possible span of flow direction.

The Osoblaha region is an area of maximum horizontal extension of Pleistocene continental glaciation, so it is almost sure that not whole area was covered by glacier (known also from sediment and erratic remnants) and unevenness of relief most likely influenced the direction of glacier movement. The final dataset included just elongated and asymmetric elevations, so the main point was to evaluate orientation of gentler and steeper slope. Roches moutonnées like elevations in the Osoblaha region were supposed to have gentler slope oriented in angle NW-NE and steeper slope in angle SE-SW.

It was very essential to appraise elevations reservedly and from more points of view because of some factors, which could influence existence of roches moutonnées or present shape of elevations. That includes age of the elevations, geological structure and geomorphologic value of Lower Carboniferous bedrock, postglacial geomorphologic processes, vertical extension of glacier, structure of preglacial weathering front and also anthropogenic impact.

The elevations were evaluated from three points of view: 1. altitude of the elevation (maximum altitude of roches moutonnées existence, maximal vertical extension of glacier); 2. location of the elevations within the relief and the specified area of study (naturally clustering elevations connected with streams, summits of ridges, slopes of ridges and valleys, bottoms of valleys and plateaus in different parts of studied area); 3. geological conditions within the area (structure and type of bedrock, sediments).

3. Results

3.1 Elevations according to their altitude

Measured elevations were split according to their altitude into six groups with a step of 50 m. The orientation of gentler and steeper slope was considered in these groups. The orientation of gentler slope mostly fell under range NW-NE till the altitude 400 m. Reversal is in category 400-450 m. Gentler slopes were oriented mostly in S-E direction over the altitude 450 m. It is possible to determine maximum altitude of roches moutonnées presence as 400-450 m category.

3.2 Elevations according to their position within the terrain and the specified area of study

Four groups of elevations were defined according to their location within the relief. Each of them was splited into smaller groups according to their location within the specified area of study. For a map see Perečková (2008). Group 1 comprises elevations connected with steams. Group 2 is compound of elevations connected with slopes of ridges and valleys, bottoms of valleys and plateaus. Group 3 comprises elevations connected with summits of ridges and finally group 4 comprises not clustering elevations.

Elevations of group 1 were mostly influenced by postglacial fluvial processes or

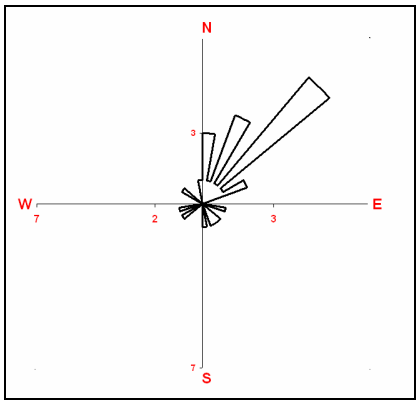
they alone could influence the stream network genesis after the glacier retreat. Also the ravine erosion could form the slopes of elevations. It is possible that some elevations from this group are former roches moutonnées, but there would be needed to ascertain the recess rate of streams and how exactly it could affect morphology of these elevations.

The most likely roches moutonnées are elevations from group 2. They are generally visibly elongated smaller elevations of bedrock covered with vegetation **(see fig.3 and fig.4)** or elevations covered with mould, but still keeping typical elongation. Gentler and steeper slope orientation is accordant with hypothesis mentioned in **section 2.3** in 66 percent of cases in group 2 **(see fig.5)**, mostly by vegetation covered elevations.

Fig. 3 Elevation of group 2 near Arnultovice, view from NW (author: N. Perečková, 22/3/2008)

Fig. 4 Elevation of group 2 near Liptaň, view from E (author: N. Perečková, 22/3/2008)

Fig. 5 Rose diagram of gentler slopes orientation by group 2 (author: N. Perečková)



Elongation of elevation from group 3 is generally associated with orientation of ridges they are connected to. It is also the group where the maximal altitude limit of roches moutonnées like elevation presence fell into. According to the results, this limit is proximately 430 m above the sea level in northern part of studied area and proximately 420 m above the sea level in southern part. As elevations from group 4, also majority of elevations from group 3 does not seem to be roches moutonnées.

3.3 Elevations according to the geological conditions

This was not the main point of research, but it is very important to mention the possible connection of elevations to the geological character of studied area. Geological structure of bedrock (foliation, lineaments) could influence the final morphology of elevations and their direction of elongation. Geological structure of Lower Carboniferous bedrock in the Osoblaha region surely effected preglacial relief, but it is not sure that effected also mapped elevations. There is also possibility that foliated structure of slates and greywackes could influence final morphology. There are only small remnants of glacial or other sediments in specified area.

4. Discussion and conclusions

There is a lack of literature concerning problem of roches moutonnées in the Osoblaha region, so it is difficult to compare with another authors. The problem of roches moutonnées was partly solved by Vídeňský, Nývlt and Štěpančíková (2007) in Černá Voda Hilly land, Žulová batholith. This study shown that granit elevation are low exfoliation domes (undulations of etchplain) and they have not been further shaped by glacier because of a regolith layer, which prevented the elevations from direct contact with moving glacier. Czudek (1997) presents partly similar hypothesis. He alleges that these elevations could by also undulations of preglacial basal weathering level and their asymmetry is climatically conditioned.

It is question, if also in Osoblaha region could ever been such a layer of regolith as a result of deep chemical weathering. On the other hand imprints of glacier erosion are clearly visible in Osoblaha region and also some remnants of glacial sediments and erratics were found in specified area (not in studied area in Černá Voda Hilly land). Climatically conditioned asymmetry is detectable on ridges in studied area, but it is disputable on smaller elevation as in group 2. Together with results of this research it seems that some elevation in the Osoblaha region can be denoted as roches moutonnées.

The Osoblaha region relief has polygenetic character. Landforms have undergone strong changes and it is difficult to determine such an old landforms as roches moutonnées would be (at least 250 ka BP in studied area). Also anthropogenic impact on the landforms in the Osoblaha region is visible and it is, together with high age, the main limit of the data validity, although this anthropogenic modification was taken into account during the research.

Maximal vertical limit of roches moutonnées presence fell into category 400-450m above the sea. It is proximately 430 m above the sea level in northern part of studied area and proximately 420 m above the sea level in southern part.

The most likely roches moutonnées are elevations from group 2. Smaller elevations are connected with slopes of ridges and valleys, bottoms of valleys and plateaus. Denudation of these elevations could have been steadier, so the typical shape of roches moutonnées could have been preserved.

It is necessary to diversify the methods by geological survey (orientation of foliation, sediments) for further research. Methodology standing only on the morphometry of elevation is too narrowly focused. It is also needed to extend the area of the research and compare the elevations in the Osoblaha region with these in non-glaciated surroundings.

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Block accumulation in the western part of Podyjí National Park

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Abstract

Block accumulations are the natural phenomena which can be situated both in the areas of mountains and in deep valleys of rivers. Bilateral National Park Podyjí in the southern Moravia is one of these areas where we can find these accumulations. The thesis of author deals with distribution, architecture and paleogeographical significance of the accumulations. One of the aims of the thesis is to create list of these accumulations and offer it to other scientists for further research (above all to the biologists who examine the fauna and flora of the accumulations). Presently, approximately 50 localities are mapped in the western part of the national park and some basic facts are analysed (agents of distributions, position, etc.). Obtained data can be used in the paleogeographical simulation of development of the valley of river Dyje in the area of national park and thesis as a whole can contribute to the protection of this unique ambient.

Keywords: block accumulation; preconditions of the distribution; valley of Dyje river Podyjí National Park

1. Introduction

The aim of this work is to present the natural phenomena of block accumulations in the western part of Podyjí National Park. The author wants to concentrate her attention on spatial distribution, architecture, causes of the distribution and paleogeographical development of these accumulations and compare it with others locations in Czech Republic. The importance of the block accumulations is in the possibility of paleogeographical research and interdisciplinarity. The results of this work can be used by other scientists, for example biologists who make a research of relicts of fauna and flora or geologists, sedimentologists and many others.

The block accumulations are mentioned in the context with periglacial and cryogenic modelation of relief. The most important authors in the Czech ambient are e.g. Demek (1991, 1996), Czudek (1957, 1961), the regional studies of the periglacial phenomena presents Kunský (1957), Demek (1957), Král (1966). The literature that refers to area of Podyjí is also very

rich, however there was no possibility of make research during the existence of the iron curtain. Later, Brzák (1996, 2000) did a complex geomorphic analysis of the area of Podyjí, Demek et al. (1991) measures the movements of slopes in some localities, Kirchner-Ivan (1993) focused on anthropogenic and other forms of relief.

2. Methods and material

2.1 Study area

The Podyjí is located on the south border of Moravia between the towns of Znojmo and Vranov nad Dyjí. The national park was declared in 1991, it has 63 km². In 2000, the Austrian part declared the national park Thayatal and the important bilateral area came into being. The axe of the national park is the valley of river Dyje which is the typical Centro European phenomena covered by natural forests. This area is the point where the influences of the hercyne fauna and flora meet with the fauna and flora that come from south (influences of Panonia area).

Geologically, there are three main units in the study area. The eastern part is created by the core of the Dyje fault, mainly of granite. The division between eastern and western part makes the Lukovská group with phylites and in the western part dominates gneiss type Bíteš. The most suitable rock for creation of the block accumulation is gneiss and granite.

The geomorphology of the area is very problematic, as mentioned above, the main form of relief is the Dyje valley with meanders, alluvial plains and others typical fluvial landforms. The important feature of relief is also cryogenic relief with forms like block accumulations **(see fig. 1)**, rock towers and others. Another features of the relief are the anthropogenic forms like old mills, water-gangs and others.

2.2 Methods

The methods that are used in this research can be divided in several groups: 1) studying of literature, the aerial photos, maps and other resources of information, 2) field research, 3) elaboration and interpretation of the field research and other obtained information.

As this research forms a part of the doctoral thesis of author, the studying of literature, the aerial photos, maps and other resources of information is finished. Especially, the author dedicated her attention to the analysis of the orthophotos and the position of some block accumulations was located. The main problem of the analysis of the orthophotos is that the part of the accumulation is hidden in the vegetation; this is one of the reasons why the detailed field research has to be done.

Now, the 50 localities are mapped and described. The information of the each block accumulation is registered in the special form where the exact location, morphographic and morphometric data, information about type, dimension and position of the source rock form, information about material of the block accumulation and eventually vegetation (this can serve as an indicator of the age or state of the accumulations and fragments that form the accumulations) are noted.

Fig. 1 Block accumulation n. 34 on the right side of river Dyje (source: author)

For the detection of the internal structure, the recent activity and the determination of the age of the block accumulations exist a lot of methods, which can be divided into two groups: absolute and relative methods. Among absolute

methods we can mention the measurement by radioactive carbon, measurement of the seismic refraction or resistor measurement, but some of them require the high financial sources. The examples of the relative methods are correlation between the accumulations and the river terraces of Dyje. Another way how to find out about the recent activity of the block accumulations is the information about the fall of rock that can be found in the archive of Znojmo and the castle Vranov (Šmerda, J. 1999).

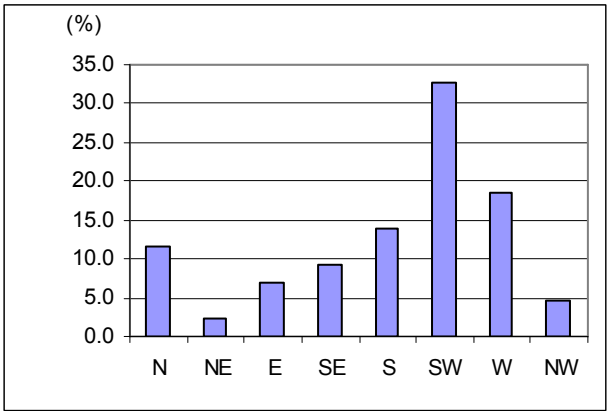
The elaboration and interpretation of the results that is be obtained by field research has several parts: the interpretation of the factors that influence the distribution of the accumulations (exposition, slope, position within the slope, presence of the source rock form, etc.), the classification of the accumulations and the intention of the explication of the development of the accumulations.

3. Results

Until now, 40 accumulations on the Czech side of the river Dyje were mapped and there are nearly all necessary data about them. The preliminary analysis of the distribution and architecture is done: the hypothesis was that the exposition and morphology of the slopes has the main influence on the distribution of the accumulations, but the analysis of the 50 mapped locations showed that the exposition doesn't play an important paper **(see fig. 2)** and the main effect on the distribution has the morphology of the slope (the favorable slopes where the accumulations are developed are those with the mayor inclination). The type of accumulations that dominate as regards to the ratios between the width and length of accumulation is the areal accumulation (77%), then the stream accumulation (18%) and the frontal accumulations are represented only by 5%.

Another results of the analysis shows the important paper of the dimensions an the state of the blocks that form the accumulations however identifying of these characteristics was very difficult and would demand the more detailed research: the dimension (the length of the longest axe of the fragment) is in the majority larger than 0,5 m that is the limit between the "stone" and "boulder" (Brzák, M. 2000).

Fig. 2 The distribution of the expositions of the slopes where the accumulations are situated (source: author)



The state of the fragments and its age is very hard to identify, but one of the possibility how to make it is the using of the vegetation, its type and its development. In the area the majority of the accumulations is covered with the vegetation (deciduous forest, gramineous phytocoenoses) – this type of accumulation forms the 91,5% of all the accumulations, the rest of the accumulations rests without vegetation or there are populations of the bryophytes and lichens, especially in the locality Ledové sluje **(see fig. 3).**

Fig. 3 The example of the block accumulation without vegetation. Accumulation n. 18 on the left side of Dyje, locality Ledové sluje (source: author)

4. Discussion

There are some results of the field work of the author and some basic analysis is done, especially preliminary analysis of the conditions of distribution and classification. The problems with field works was especially inaccessibility of some locations and the impossibility of decide exactly some of the characteristics as the dimension or orientation of the fragments. The block accumulations in this area, particularly in the western part of the Podyjí National Park have not been mapped yet, so the field work is pivotal for the continuing research.

Another methodological problem is the determination of the age of the accumulations; the insufficient financial resources don't allow the using of some absolute methods, so rather relative methods like the correlation between terraces and accumulations is possible to use. The problem is that the terraces in the studied area are very rare phenomena, the terraces that could be used for this purpose are located further along the stream.

Another problem is the classification of some properties of the accumulations, p. e. the dimensions of the fragments (even if there is a clear border between "stone" and "boulder"); within the one accumulation we can find a lot of types of fragments, so we can't decide if the accumulation should be called "stony" or "blocky".

Although the partial analysis of the orientation of the accumulations is done, it is supposed that after finishing the field work, the results will change slightly. Nevertheless, the author expects that the exposition doesn't play an important paper and that the morphology of the slopes is much more important agent of the distribution of the accumulations.

5. Conclusions

So far the basic field research and the analysis of some obtained information have been done. The author wants to continue in the in the field research, because there are probably over 100 localities in the area, and later in the partial analysis of the obtained information to clarify the regularities of the distribution of the accumulations. One of the outputs of this research will be the map of the locations, classification and exact location and characteristics of the block accumulations in the Podyjí National Park that can serve for another scientists (biologists, geologists) who are engaged in this themes. The research as a whole can contribute to the understanding of these unique forms and to the protection of this unique ambient.

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Morphological effects of woody debris in streams and rivers

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Abstract

This contribution is dedicated to the morphological interactions between dead woody vegetation in water courses and fluvial processes and forms. Generally it means that presented article is engaged in fluvial biogeomorphology. Woody debris (WD) in streams and rivers is very less known term in the Czech Republic from the natural sciences point of view. Through the numerous surveys all around the world was found out, that WD is an integral and important element of many river landscapes. Here are firstly described the basis of these problems and after that are shown selected results from the survey in the Czech Republic, which was made by Department of Geography in Brno. At this time we have the basic information about the WD structure from six Czech rivers. We also have the share of pieces with any morphological effect. It alters from 3 % to 40 % pieces. From the geomorphological point of view is, among others, very important influence on sediment grain size, bed-load stability, sediment transport and storage, pool-riffle sequence, bank erosion, and of course on habitat diversity. Czech river management practices can not operate with dead wood in river channels and it lead to its removal. These practices had and still have environmental impacts and consequences. Presented results should contribute to the river landscape better understanding.

Keywords: woody debris; biogeomorphology; river channel; fluvial forms

1. Introduction

1.1 WD as a river element

Dead wood, it means trees and its remnants, in rivers various sizes are in the research interest relatively for a short time. The first publications appeared at the end of sixties, but main boom started in the eighties. Very important is the fact, that this field was (and still little bit is) strongly regionally oriented. Main centre is north-western part of USA. Researches also run in Canada, Australia and Western Europe. It exist hundreds articles dedicated to this topic, but only some have geomorphological content. Globally are predominantly solved biological consequences. The evolution and subject matter of this scientific field is summarized in many works, for example

Montgomery and Piegay (2003) or in Czech language Máčka and Krejčí (2006, 2006), and so it is not necessary to mention it at this place. The view on the dead wood can differ. Generally it is possible to match with Grešková (2004), who see the morphological (erosional-depositional processes, influence on vertical alignment, cross-sectional area, bed-load running and storage, channel stability) biological (habitat and species diversity, food source, water oxidation), hydrological-hydraulic (channel roughness, flow resistance energy dissipation, flow direction) and matter-spiralization (matter circulation, food for organisms, transport and long term sediment storage).

In the Czech Republic is this theme very marginal. The first surveys were made after year 2000 and were purpose oriented. It was mainly the part of restoration projects and other wider project and so the environmental consequences were missing. Department of Geography in Brno deals with this topic since 2004 and research is mainly oriented to the structure and morphological effects of woody debris in middle size rivers. Our aims are to recognize input, transport and decay mechanisms. From the structure and dynamics we can predict the changes in amount and function of WD in the rivers of different geomorphological pattern. The object of our research is Large Woody Debris (LWD), which are the pieces of wood with more than 10 cm in diameter and longer than 1 m. Project is planned for four years and right now we are just at the beginning, because we started at 2008. This article brinks the summary of known WD morphological influences from the world literature and the first information about geomorphic effects of WD in the study areas.

1.2 WD as a morphological agent

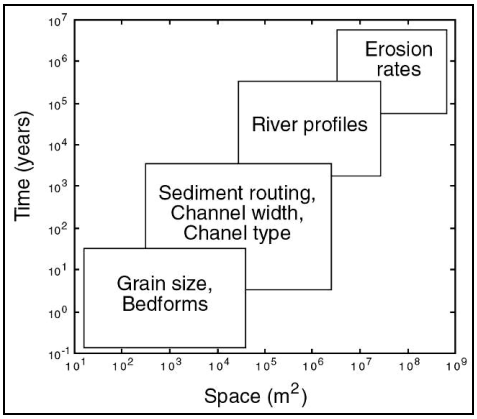
WD in the rivers improves channel stability through the presence of big hard material and by enlarging channel roughness. This way is the flow resistance growing and energy is dissipating. As mentioned in Bilby (1984), potential energy dissipation can reach 20 - 80 % on the mountain streams in the USA. It is the log steps formations consequence. Gerhard and Reich (2000) compared the regulated reach with restored reach, where was WD placed. The stability of restored reach enhanced after four years. The variance of depth and width was also higher. Other authors mean, that WD destabilizes (at least for some period) channel. Hachsenburger and Rice (2004) present, that WD supports bank erosion and channel widening and drifting. Dead wood is the barrier for the flow and it has to influence it. This problem has many variables and effects. The most common example is flow deceleration in front of or inside the wood structure and flow acceleration after WD. It is mentioned, that the bottom structure, fluvial forms variation or pool-riffle sequence is affected (Lassetre and Harris, 2001; Baillie and Davies, 2002). The most often the pool creation runs in front of the wood. It was evidenced, that after WD removal degreased the number and volume of pools.

Very intensively is studied the influence on bed-load and suspended load transport and storage. In the majority of cases the WD contribute to sediment (organic and mineral) storage (Assani and Petit, 1995; Smith et al., 1993). These findings are used in the artificial structures placing for sedimentation support. Comiti et al. (2008) mention, that the caught sediment amount due WD is in the third order streams in Andes 1000 m^3 per 1 km. When the WD was removed from the 250 m long reach, next flood was taken off about 5000 m^3 of sediments (Beschta, 1979). According to Bilby and Ward (1989) is in the channels with width to 7 meter 40 % of sedimentary forms connected with dead wood. In the channels 7-10 m wide is this share 30 % and in the rivers wider than 10 m it is 20 %.

Woody debris can influence big scale processes. It was described Abbe et al. (2003), that wood jams are very frequent factor causative the anabranching. Also it can speed up or slow down the meander development. The geomorphological effect of woody debris in dependence on space and time **(see fig. 1)** were described by Montgomery et al. (2003). Woody debris has several basic functions and the total or relative importance of these functions vary

according to stream size (stream order). Generally is possible to say, that WD is the most important agent in the middle size rivers. In small streams the wood very often lies above the bankfull level; in the big rivers has wood insignificant dimensions. Ascertained geomorphological and other findings are used in practice, above all in restoration projects. This problem is solved in Gerhard and Reich (2000).

Fig. 1 Scales of geomorphic influences of wood in world's rivers (source: Montgomery et al., 2003)



2. Methods and material

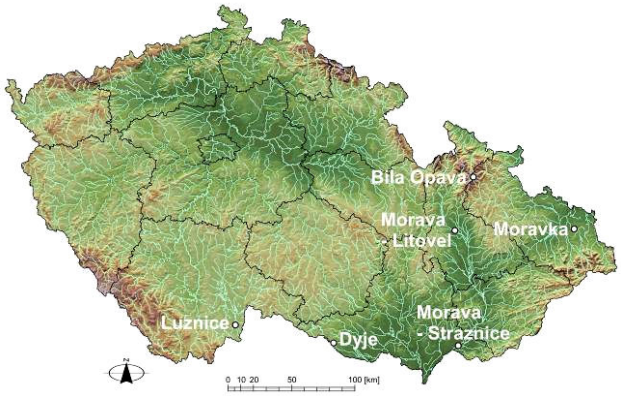
2.1 Study areas

We have explored six river reaches. Their list and relevant characteristics are shown in **tab. 1**. Distribution in the Czech province is on the **fig. 2**. It is possible to say, that by this selection, we catch almost all types of Czech rivers (from the small streams to the big alluvial rivers, including braided rivers).

Tab. 1 Characteristics of the rivers investigated

River	Reach length (km)	Altitude (m a. s. l.)	Basin area (km^2)	Bottom slope (‰)
Bila Opava	1,0	980	6,2	101,7
Moravka	3,2	372	132	8,8
Luznice	1,4	454	625	0,7
Morava - Litovel	3,0	226	2 245	0,8
Dyje	2,2	245	2 493	1,9
Morava - Straznice	3,0	165	9 150	0,3
Bottom material	**Floodplain width (m)**	**Channel width (m)**	**Channel countersink (m)**	**Mean discharge ($m^3.s^{-1}$)**
stones, boulders, rock	20	4,5	0,5	0,3
stones, gravel	420	20 - 120	1,3	3,7
sand, mud	550	16	4	5,2
gravel, sand	8000	20	4	20,8
boulders - sand	160	51	1,5	10,3
gravel, sand	3500	65	7	59,6

Fig. 2 Position of the river reaches investigated in the Czech area (source: ArcCR 500)



2.2 Methods

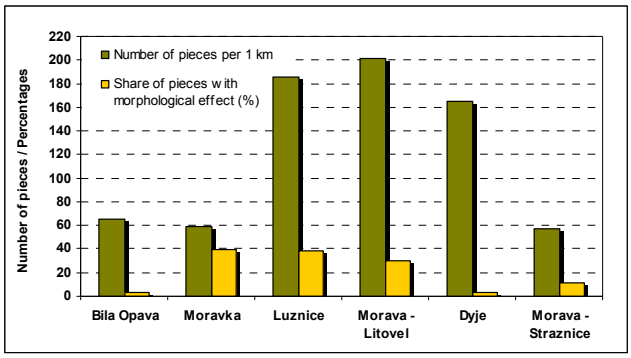
We have developed the comprehensive methodology based on parameters measuring and characteristics observation for large woody debris structure description. We measure diameter and length of each piece to find out the size structure and volume. Orientation and slope give us the information about the position. These indicators we replenish by other qualitative characteristics. After the parameters measurement we determine the input mechanism, position, stability, kind of fixation. The presence of root ball increase piece stability. For example we distinguish four root ball categories. The preservation (three categories) of each piece shows, how long are in the river or how strong are attacked by water or sediments. Woody debris is often called dead wood. We asses each piece vitality. Bark can indicate the processes on and inside the wood. We try to determine wood species. Determination of morphological effect is quite considerably subjective. We record only expressive morphological impact, the most often connected with erosion or accumulation. The subject of survey for more years is dynamics and mobility monitoring. We have distinctly marked at least 20 pieces in each reach for transport asses.

We finished this year's field works only in September 2008 and so we do not have processed the data. Therefore this article interprets only basic findings about geomorphological significance of LWD in studied river reaches.

3. Results

Firstly let's compare the number of LWD pieces per 1 km **(see fig. 3)**. It results, that the biggest amount is on the middle size rivers. Surprisingly big amount is in the Luznice River, where is not the forest, but mainly meadows and vegetative borders along the banks. It is due the small transport rate. As was mentioned earlier, generally the biggest influence has WD on the middle size rivers. This rule is valid also for our research, for the morphological effects.

Fig. 3 Number of LWD pieces per 1 km and share of pieces with morphological effect in the study reaches, April - September 2008



Bila Opava

Morphological effect of WD in this stream is quite limited. It is caused by the narrow channel, which is mostly spanned by the fallen tree. It means that minor part of pieces lies (partly or fully) inside the channel.

Fig. 4 One of the few pieces in the Bila Opava River with the morphological effect, July 2008

The second factor is the channel structure, because riverbed is formed of bedrock or boulders, rarely by stones. This kind of material can not be markedly influenced by wood. Also the formation of log steps is very rare.

Moravka

Almost 40 % pieces have any morphological effect. The Moravka River has wide braided channel with several branches. It is necessary to note, that we observed dead wood only along main branch and so the total amount of LWD is bigger. We will continue exploring this area in winter due better terrain patency. It is the river with very dynamics morphological processes, with very intensive bed-load movement. Gravel is caught around almost every stable piece, which lies in the channel. At the places, where is the stream situated to the only one branch, strong flow erodes the material around the stable WD pieces. WD and mainly destabilized riparian vegetation cause such flow changes, which make very deep pools. An average water depth at the low flows is up to 0,5 m. Pools can be deeper than 1,5 m. Unstable pieces do not have big morphological significance. The illustration of the topic difficultness shows **fig. 5**. There is one piece of wood, along which selectively run deposition (on the left and lower part) and erosion (on the right side).

Fig. 5 Illustration of the processes variability at the small place, Moravka River, February 2008

Luznice

The Luznice River bottom is created by sand or fine gravel. Caused by strong flow it is dynamic and quickly changing channel element. Also there are very high banks, and river path is rapidly moving. It means LWD is only durable solid body. In the Luznice River WD has the wide range of geomorphological effect. The most common are accumulation forms, less frequent is erosion. Erosional forms have also smaller extension. Accumulation can run at the normally less probable places like the meanders top **(see fig. 6)**. Big pieces (mainly fossil pieces lying on the interface between gravel and alluvial clays) form the significant steps. At these places is channel vertically, but also horizontally stable. Special importance has WD for biota, above all for macrophyts.

Fig. 6 Big sand bar formed along only one LWD piece at the top of the meander, Luznice River, August 2008

Morava - Litovel

The Morava River is the river with the highest amount (number and volume) of LWD. Riverbed is created by gravel and channel is deeply cut into the floodplain. It means that fluvial processes are very intensive. We suppose majority of erosional processes. Firstly is necessary to mention the all sizes pool creation **(see fig. 7)** and pool-riffle sequence keeping. The outer bank protection is very restricted, because banks are very high and the wood pieces are relatively small to protect it. Only wood jams can sporadically defend the bank. Geomorphic effects seen in the Litovelske Pomoravi are displayed on the **fig. 11**.

Fig. 7 Erosion under LWD piece situated to the central gravel bar, Morava River, August 2008

Just in this river we can observe the significant channel widening when the water bypasses the obstruction. Let's show one example on behalf all. We have the other study reach, where an average channel width is about 19 meters. There exists one accumulation and at this place, the channel width is more than 40 meters. This channel enlargement happened only in six years. This wood jam also accelerated the meander development by meander neck narrowing. Only really huge accumulations can cause avulsion and new channel formation.

Dyje

The number of pieces in this river reach is not final, because we did not finish the survey yet. Let's suppose share of pieces with morphological effect constant. This area specialty is the fact that only a small fraction of pieces lies directly in the channel. Moreover, the channel is situated to the bottom of deep valley and is very stable. River flow is very strong and in the wide channel remains only big or well anchored pieces and the pieces caught on the weirs. Also the sediment transport is limited, because not so far upstream is the dam situated. This is why the only few pieces have morphological effect. These morphological effects are situated mainly to the riparian zone and consist of fine material sedimentation. Erosion is very rare and proceeds under the wood jams. Wood transport is very intensive and

it mirrors in many accumulations creation, which are mainly stable formations. This way shape new floodplain (riparian zone) forms.

Fig. 8 Big wood jam in the riparian zone, Dyje River, May 2007

Morava - Straznice

The Morava River in studied area is in the Czech conditions quite big river surrounded mainly agricultural forests.

Fig. 9 Outer part of River Morava bank, where the sediment accumulation proceeds and water is shelter

Relatively small trees in big river drift easily and can not influence the channel in the big scale. WD is situated only (except few cases) along the banks. The banks are not protected by wood, but WD changes the concave bank (partly also bottom) profile. The highest depth is not directly under the bank, but there is several meters long platform created of material, which was stored between many LWD pieces. At the places such this are situated majority pieces, because there is the biggest WD input. In-channel sedimentation, like the central bar formation, was not recorded. Wood jam formation is not developed. The significance of woody debris for plants is also limited.

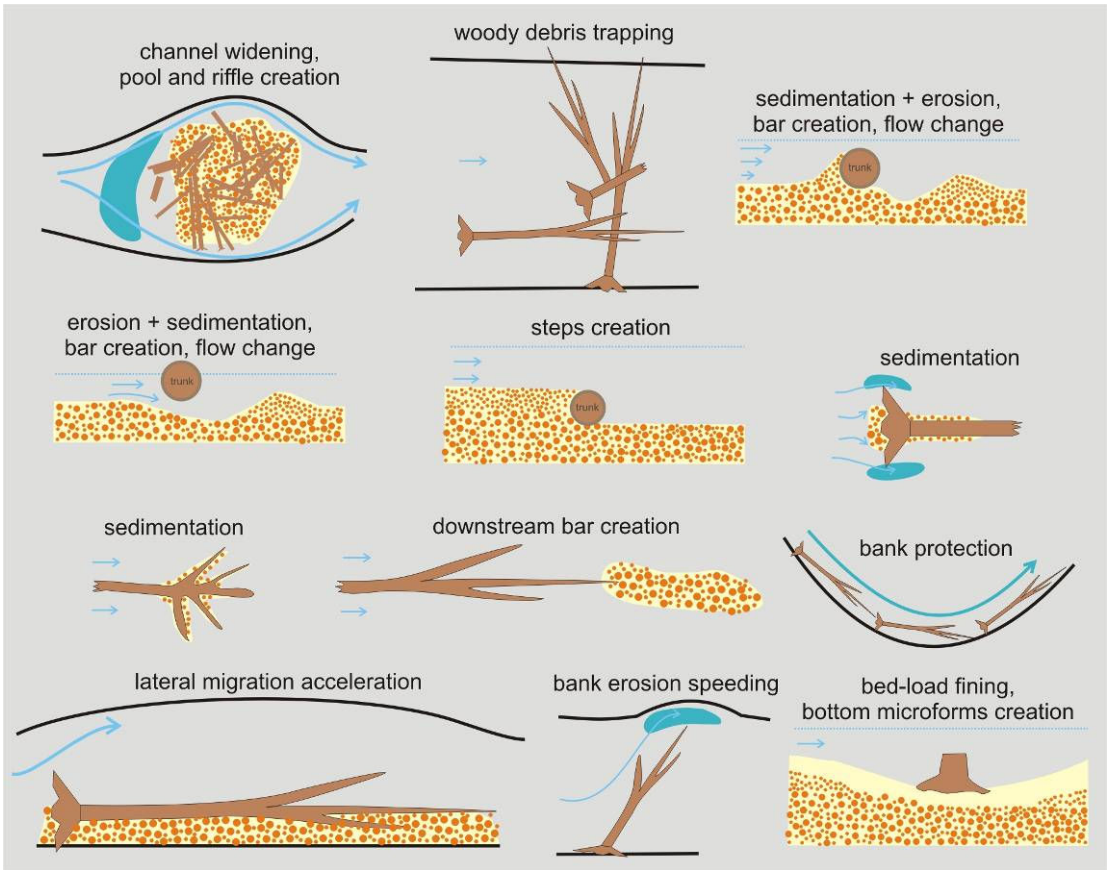
4. Discussion

Surveys like this do not exist in the Czech Republic, and so we can not to compare with any work. Worldwide it exist many works dedicated to this problem, but not many of them deals with morphological effects. Publications mainly contain the data about the WD amount and distribution. We solve more parameters and characteristics than any other work all around the world. Other problem is that many authors dissemble exact methodology. It is necessary to mention, that the field survey of woody debris is quite physical difficult. When is many pieces situated to one place, or when there is an accumulation, or the water is deep, the situation is complicated **(see fig. 10)**. Our methodology developed in last three years seems to be sufficient. We have to tune and adjust some indicators. It would be useful to carry out other survey on the other rivers in the Europe to make this methodology universal.

Only Baillie and Davies (2002) examined the morphological effect of woody debris. They dedicated to comparison of agricultural pine forest with natural forest. There were in average 33 pieces per 100 m in agricultural forest and only 22 % of pieces had morphological effect. The average for pristine forest was only 20 pieces per 100 m, but 46 % of pieces had the morphological effect. They claim the influence on sediment storage; the WD changed the hydraulics and caught other WD in the pristine forest river reach. About 50 % pool creation was connected with WD presence.

Fig. 10 Complicated bottom morphology together with new in-channel habitats caused by woody debris, Luznice River, August 2008

Fig. 11 Morphological effect of large woody debris in the Morava River described in the Protected landscape area Litovelské Pomoraví between 2004 - 2006



5. Conclusions

We implemented the basic research of woody debris on the selected Czech rivers. This article deals only with interim results. Final results will be available during next three years. Except structure we will solve also dynamics and transport. Our research is wider, because we

cooperate with the laboratory of dendrochronology and with phytocoenologists.

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Mapping of the effects of spring flood in the floodplain of the Dyje River (NP Podyjí)

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Abstract

Mapping of the effects of the large woody debris in the Dyje canyon is a new theme. However it is very important and useful for the headquarters of Podyjí national park. Problems which appeared after the floods in 2006 are in charge of Water management office Povodí Moravy. Lots of woody debris stayed in Znojmo water reservoir and this woody debris is the apple of discord between Podyjí NP headquarters and water management office Povodí Moravy.

The present research is focused on the wood which can be potentially washed away by a river. We mapped this wood, counted the volume of the wood and measured the proportion of logs and woody debris accumulation. This quantification of woody debris could lead to better understanding of geomorphological process in the river.

Keywords: biogeomorphology; woody debris; riverbed morphology; Podyjí National Park

1. Introduction

Woody debris plays very important role in ecology and morphology of streams. Fish and water insect can find a lot of kind of living space with another oxygen and sedimentary conditions TFW Monitoring Program (1999). Woody debris is advantageous for water enrichment by nutrients and for variability of watercourse. It can make more stable banks and work against water erosion. These common facts are definitely valid in Dyje river too. This issue (question) is in Czech geomorphology and science relatively new. It is mentioned in Šindlar (2003); Kožený and Simon (2006); Máčka and Krejčí (2006), but the beginning of research was abroad in the USA in 1960s. There is centre of nowadays research. The methods of measurement and classification of wood accumulation came from the USA too. The most important scientists are for example A. Thevenet, T.B. Abbe or D.R. Montgomery Thevenet, Citterio and Piégay (1998); Abbe and Montgomery (2003). Later biogeomorphology started to develop in Europe in Alps region in research done by Thevenet, Citterio and Piégay (1998) and in south of England Piégay and Gurnell (1997).

After big spring floods in 2006 with flow rate 485 m3/s many pieces of woody debris got into Znojmo water reservoir. The aim of my work was count the amount of dead trees, classify them and evaluate the volume of woody

debris. Another aim of my work was mapped the erosion and accumulation shapes which were formed by spring floods in 2006. The General purpose was the contribution to discussion. The issue of woody debris is the core of problems between natural protection and water management. These two opinion groups are in Podyjí national park represented by water management office Povodí Moravy and Podyjí NP headquarters.

2. Methods and material

2.1 Research area

The research was done (set) in Podyjí national park with the start near weir Nad papírnou and with the finish at the beginning of backwater Znojmo water reservoir. The River Dyje is in this place situated in deep granite canyon and the width of river floodplain isn't so developed. The distance between start and finish of the sector was 3,4 km on the right side and 3,5 km on the other side. This distance was split into 34, or more precisely 35, smaller sections which are 100 m long each.

2.2 Methods of mapping and evaluating the dead wood

In these sections were examined the locations of LWD (large woody debris) and their position in the river system was drawn in the map. Every piece of wood had noted specific characteristics. It is its length, diameter, amount of leaves, rhytidome, branches, root system condition, position on the barrier, inclination, orientation compared with river bank, cause of entry to river system (cutting, breaking off or blowdown). Pieces of wood were counted only if they were at least 1 meter long and 10 centimeters on diameter. It is also the definition of the LWD. Smaller pieces of wood are called fine woody debris (FWD). These objects were not examined.

Another type of woody debris in the river system are woody accumulations. These objects have irreplaceable role in river geomorphology. The classification and evaluation of volume of wood in accumulation were worked out by Abbe and Montgomery (2003), Thevenet, Citterio and Piegay (1998). In this research three types of woody accumulation are used They are accumulation made only by LWD or FWD. The third type of accumulation is the mixed one. For the calculation of woody debris in volume of accumulation were used Huber´s formula.

$$V = g_{1/2} * l = \pi/4 * d^2_{1/2} * l$$

V … volume of trunk [m^3]

$g_{1/2}$ … circle surface in half of trunk length [m^2]

$d_{1/2}$ … trunk thickness in the half of length [m]

l … trunk length [m]

In case the trunk had conserved root system is necessary to add 12 % of cubature of the trunk. Volume of the LWD pieces were interpreted for 100 meters section.

For measurement were used type measure and protractor. Another characteristics were observed. Almost all accumulation and only important pieces of wood were taken a photo.

2.3 Methods of mapping erosion and accumulation shapes

Changes in the Dyje river system are not so dynamic and intensive. River banks are very stable because sediments on the bed are very big and coarse. Due to this proportions and similarity of both banks in their full length was chosen only representative sample on alluvial plain (20 x 30 m) near the place Lazárkova louka. Sand accumulations were mapped only if they were 10 cm above level of surroundings. They were marked to the map and measured (width, length and depth).

3. Results

3.1 Result of the LWD mapping

In my section 1 120 pieces of LWD on the both banks were mapped . On the right bank are 524 LWD and on the left bank are 582 LWD. After the data processing was found that the difference between both banks is not significant. The log´s length and diameter is nearly equal. The most frequent diameter is 0,18 – 0,20 m and length is 4,2 - 5 m. Another characteristics are in the **tab. 1**. The most

common pieces are also small pieces. They are represented by pieces which are not longer than 5 m and with diameter up to 20 cm **(fig. 1, 2)**.

Tab. 1 Size characteristics of LWD and their statistical evaluation (source: Braun 2008)

		Arithmetic mean [m]	Median [m]	Modus [m]	Standard deviation [m]
Right bank	diameter	0,18	0,15	0,1	0,1
	length	4,2	2,60	1	4,3
Left bank	diameter	0,20	0,17	0,1	0,1
	length	5,0	2,96	2	4,9

Fig. 1 Number of LWD with certain length (source: Braun 2008)

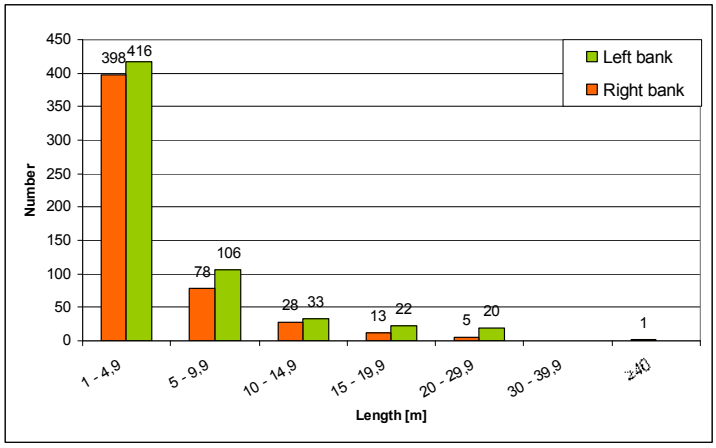
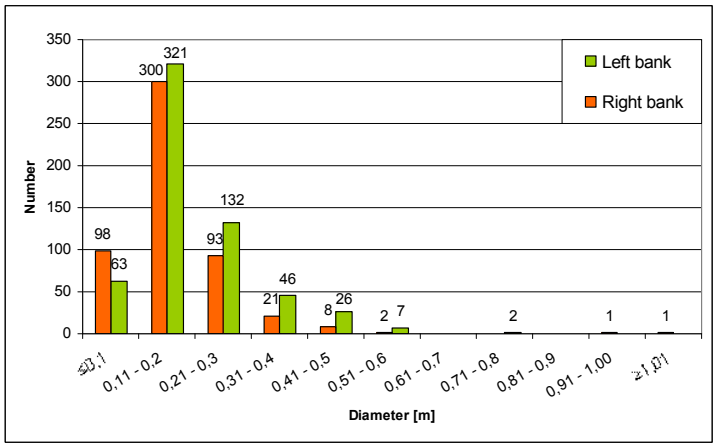


Fig. 2 Number of LWD with certain diameter (source: Braun 2008)



We know tree ways of the input LWD to the river system. Most frequent is natural way of input. One third are trees that are cut by man. Very important fact is the major amount of blowdown on the left bank (right bank 13 %, left bank 20 %). There are more concave parts (undercut-slope bank) than on the other bank.

The most of the LWD pieces was allochthonous mostly they were transported by flow (63 %). But is very difficult to decide how far they were drift. It depend on vegetation density, age of trees, flow velocity and stability of bank. Some pieces were man-made but the nearest buildings and inhabitants are in distance 20 km in Hardegg.

For Znojmo water reservoir it is very important blocking factor. It affects how many trees is flow down to reservoir. The blocking factor is composed of vegetation or boulders and of the position in the river system (water,

bank, river alluvial plain). Only 36 % of LWD is blocked by stones or vegetation but the number of dangerous pieces of LWD is not so high. The Dangerous pieces are pieces which are in water or on the bank and that are not blocked too. The number of dangerous LWD is relatively small (118), these are only marked on the air photo map because 1 120 trunks would not be very transparent (see Braun 2008). Cubature of these pieces is 51,727 m3. The subsidiary function for blocking factor had the root system. There were mapped 3 types of good state of root system **(tab. 2)**. There is more blowdown on the left bank and that is why there is more trunks with root system.

Another factor of LWD mobility is the amount of branches, levels and degree of decay. Most of LWD were only log without branches (88 %), another type of trees were with big branches (6 %), completely green trees (3 %), small branches (2 %) and treetop (1 %) Rhytidome characteristics and amount of leaves are in the **tab. 3**.

Flow causes changes in log orientation in compare with the river bank. The most frequent pieces are situated on the square and in a parallel way. The inclination of almost all LWD (94 %) is up to 30°.

The most LWD pieces which were identified were alder (78 piece), salix (39 pieces), locust (29 pieces) and lime (21 pieces).

3.2 Result of the accumulation mapping

Differences in accumulation amount between left and right bank are big. There were 40 accumulation on the right bank and 79 on the left bank. In this case the role of an undercut-slope bank is very significant. On the right bank is bigger amount of accumulation only near weir Nad papírnou. On the other bank is uniform distribution in its whole length.

The most common type is mixed accumulation (45 %), log accumulation (31 %) and at least is found FWD accumulation (24 %).

3.3 Cubature of woody debris

The accumulation is the most important in cubature of woody debris. Absolutely biggest cubature was in section 1 on the right bank where is situated the old mill-race and the major part of 1st section is therefore represented by island. There were biggest cubatures in section 23 and 35 on the left bank where are concave parts. Complete information about distribution in separate sections is in **tab. 4**.

Tab. 2 Good state of root system and number of pieces (source: Braun 2008)

Good state of root system	Complete [pieces / %]	Fragment [pieces / %]	No root system [pieces / %]
Right bank	22 / 4	39 / 7	460 / 89
Left bank	59 / 10	41 / 7	480 / 83
Both banks	81 / 7	80 / 7	940 / 86

Tab. 3 Characteristics about rhytidome and amount of leaves (source: Braun 2008)

Bank	Rhytidome			Leaves	
	Yes (>30%)	Fragments	No	Yes	No
	Absolutely / relatively [%]				
Right bank	195 / 37	65 / 12	262 / 50	17 / 3	500 / 97
Left bank	244 / 41	34 / 6	318 / 53	52 / 9	542 / 91

Tab. 4 Woody debris cubature in sections (source: Braun 2008)

Number of section	Right bank			Left bank		
	Log´s cubature [m^3]	Accumulation's cubature [m^3]	Sum [m^3]	Log´s cubature [m^3]	Accumulation's cubature [m^3]	Sum [m^3]
1	8,167	112,118	120,285	1,307	8,905	10,212
2	0,554	4,695	5,249	6,907	0,591	7,498
3	3,082	3,346	6,428	4,824	0,740	5,565
4	0,999		0,999	1,204	1,491	2,695
5	0,847	3,067	3,914	4,746	1,766	6,512
6	3,596	3,694	7,290	10,880	31,879	42,759
7	3,868	9,407	13,275	6,400	4,821	11,221
8	2,780	29,126	31,906	5,275	3,182	8,457
9	0,271		0,271	2,277	3,995	6,272
10	1,622		1,622	1,011	6,215	7,227
11	0,124		0,124	1,757		1,757
12	0,922		0,922	5,209		5,209
13	1,066	0,420	1,486	1,026	3,016	4,042
14	2,151	0,887	3,038	1,458	10,204	11,662
15	1,707	1,859	3,566	2,889	13,939	16,828
16	1,822	5,056	6,878	0,474		0,474
17	2,813	0,623	3,436	0,774	1,852	2,626
18	1,878	4,858	6,736	0,887	0,519	1,405
19	0,623		0,623	0,842	0,707	1,548
20	0,316		0,316	5,714		5,714
21	0,766		0,766	6,019	0,560	6,579
22	0,681		0,681	6,479		6,479
23	0,782		0,782	5,369	18,702	24,072
24	0,205		0,205	8,473	59,335	67,808
25	2,389	26,273	28,662	11,476		11,476
26	1,217		1,217	4,840	11,573	16,412
27	1,434		1,434	4,898	6,751	11,649
28	0,929	1,771	2,700	12,517		12,517
29	0,684		0,684	1,988	0,405	2,393
30	2,356	4,905	7,261	0,647	1,441	2,089
31	4,072	31,297	35,369	2,948	3,145	6,093
32	0,402		0,402	1,880	47,289	49,169
33	3,991		3,991	1,767	18,250	20,017
34	1,514		1,514	1,774	21,316	23,089
35				1,794	18,590	20,384

3.4 Result of the erosion and accumulation shapes mapping

There were not so much accumulation shapes. They were located only at the top of meander on the convex bank. The bank erosion doesn´t run in so fixed watercourse. Sometimes it is possible to see flood channels. Another way of erosion is root system washing. In the whole section is only one bank scour in section 28 on the left bank. There are a lot of blowdowns and naturally the undercut-slope bank too.

In the reference place near Lazárkova louka ed erosion and accumulation shapes were mapped. A small scheme of them was made. Typical flood shapes are sedimentation shadows behind the vegetation. In this case behind the trees.

4. Discussion

Influence of woody debris on the river and flow is inconsiderable. Impact is a change of velocity and flow direction. A change of erosion and sedimentation processes are connected with them.

There are 1 120 LWD pieces on both of banks. The most common proportion of log is smaller piece (0,1 x 1 m and 0,1 x 2 m). It is obvious because smaller woody debris is more mobile than the whole tree. Pavel

Kožený has similar result too. His measurement says about logs up to 2 meters in length (Kožený and Simon 2006).

Total cubature of LWD and accumulation on the right bank is 304,032 m^3, on the left bank rests 439,911 m^3. There is 743,942 m^3 of woody debris on the both banks. One tenth of it presents dangerous pieces (51,727 m^3) which is practically 12 % of woody debris in studied section.

The most mobile trunks are in the water or on the bank, they are without branches and are not on barrier. Logs in the floodplain are more stable. Problem is that water management office cut the long pieces of wood to smaller. They cause problems because they are more flexible. The reason could be easier woody getting out in the Znojmo dam. Kožený in his study (Kožený and Simon 2006) alerts to small amount of blowdowns in Znojmo water reservoir (only 1 %) whereas cut trees picture 49 %, 17 % are breaking off and 33 % are not bright. It points out that cut log are very dangerous and blowdown criticized by water management office are the most secure type of woody debris in the river system. Position in the floodplain is term of wood stability also the best for small pieces as well as for large blowdown. The most common place for woody debris is in the concave part of meanders with steep slope. There is bigger force of stream and erosion. With them the bigger occur of blowdowns is connected. Sedimentation is by contrast situated in convex parts of meanders where it is possible to occur aggradation, sedimentation in vegetation shadows or behind the stones.

5. Conclusions

There are well-preserved forests in the Podyjí national park. Trees aren´t monoculture with equal age. That´s why the input of trees to river is not instable and fluctuating. But trees most often go to the river while big floods. Due to Vranov nad Dyjí water reservoir is situation for floods contrarious. Flow rate is also regulated. Dyje doesn´t desiccate even in hot summer. Trees are along banks and they are not disturbed. There is more woody debris on concave banks (mostly left bank) and more sand sedimentation on convex banks (mostly right bank). Bank erosion has influence on the amount of blowdown trees but the width of riparian zone doesn´t play significant role.

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Invasive plant species in riverbank vegetation of water courses in the basin of the Ploučnice River

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Abstract

Introduced species of plants can be a great danger for our nature. Just an imperceptible part of alien plant species get successfully to the phase of invasion when their spread in landscape is very rapid. But also this small number of them can be the cause of considerably ecologic and economic damages. These species are able to create large overgrowth during very short time. The eventuality is the limitation of the native species. Anthropogenic activities are of cardinal importance at the spread of these species in the landscape. The highest concentration of invasive plant species is along communications and along water courses. An important influence on bank vegetation is introduced by the disturbance regime of floods. The aim of this paper is to present the results of mapping which was focused on the incidence of invasive plant species in the riverbank vegetation. The off-road mapping of the incidence of selected invasive plant species took place in the basin of the Ploučnice River where 172 km of riverbank vegetation of various rivers were mapped. The field research was realized during August and September in the year 2007. The most principal invasive plants in this area were evaluated *Impatiens parviflora*, *Impatines glandulifera*, *Solidago sp.* and *Reynoutria sp*.

Keywords: invasion; vegetation; riverbank; mapping

1. Introduction

Human activities amend nature significantly from the Neolithic. One of the consequences is the introduction of plant species. Categories of introduced plants are stated in Richardson (2000). The plant species introduced before 1492 are called archeophytes. After the discovery of Amerika in 1492 came expansion of overseas trips and thus the introduction of exotic plant species which are called neophytes. The introduction of plants can be intentional or accidental. The species are further divided into categories according to the ability to survive and spread in the new environment: casual alien plants, naturalized plants and invasive plants. The invasive plants are able to spread to a considerable distance in quite short time, they penetrate the disturbed and natural habitats and expel native species. The invasive potential is achieved by high

fertility of the plants, good seed germination or rapidly growing system of rhizomes. These plants grow quickly, produce large quantities of biomass and are resistant to adverse conditions. The growths are often large and dense. The main negative result for the vegetation contaminated by an invasive plant species is the reduction of biodiversity in the habitat. Other characteristics and effects of invasive plant species are listed in detail in Pyšek, Tichý (2001). The presence of the invasive plant species is bound on disturbed habitats. Prach, Pyšek (1997) mention as the most frequent place of occurrence of the invasive plants seats and shores of watercourses.

2. Methods and material

2.1 Interest territory

The mapping of the incidence of selected invasive neophytes took place in the basin of the Ploučnice River in North Bohemia. Nine selected watercourses were monitored where in total 172 km of bank vegetation were mapped. The watercourses were selected so that they represent different environmental conditions. Some of them are situated mainly in forest environment where impact of humans is low. The ecological stability should be there higher. Other watercourses are influenced by seats and communications which are found on their banks.

2.2 Methodology of mapping

The principle of the methodology for mapping lies in the monitoring of bank vegetation on the segments of watercourses which are long about 500 meters. As the bank vegetation is considered a belt of vegetation between the water-level and the bank edge. Each bank is mapped separately. In the bank vegetation are noticed 22 dangerous invasive plant species listed in the **tab. 1** (closer to the selection of species in Matějček 2008). It is reported estimated number of individuals of each of the controlled species in the segments. Those numbers are recorded using intervals which are made by logarithmic scale (1 = 1-9 individuals; 2 = 10-99 individuals; 3 = 100-999 individuals etc.). The index of total invasive neophytes load was then calculated for each segment by the formula I = PT + log PJ (PT = the number of recorded species in the segment; PJ = the total number of individuals of all species monitored in the segment; the number of individuals of the species is taken as a mean value of the recorded interval).

Tab. 1 Monitored species (source Matějček 2008)

Heracleum mantegazzianum
Quercus rubra
Acer negundo
Reynoutria sp.
(R. japonica, R. sachalinensis, R. bohemica)
Lycium barbarum
Parthenocissus sp.
(P. quinquefolia, P. inserta)
Impatiens parviflora
Impatiens glandulifera
Ailanthus altissima
Galinsoga sp.
(G. parviflora, G. ciliata)
Helianthus tuberosus
Robinia pseudacacia
Rudbeckia laciniata
Erigeron annuus
Conyza canadensis
Lupinus polyphyllus
Solidago sp.
(S. canadensis, S. gigantea)

3. Results

There were found only 11 of the 17 plant species on the selected watercourses in the basin of the Ploučnice River. There wasn´t recorded incidence of these species: *Heracleum mantegazzianum, Acer negundo, Lycium barbarum, Ailanthus altissima, Rudbeckia laciniata* and *Lupinus polyphyllus.*

As the most frequent species was evaluated *Impatiens parviflora* which was recorded on 71 % of all monitored segments. Representation of some other species was also

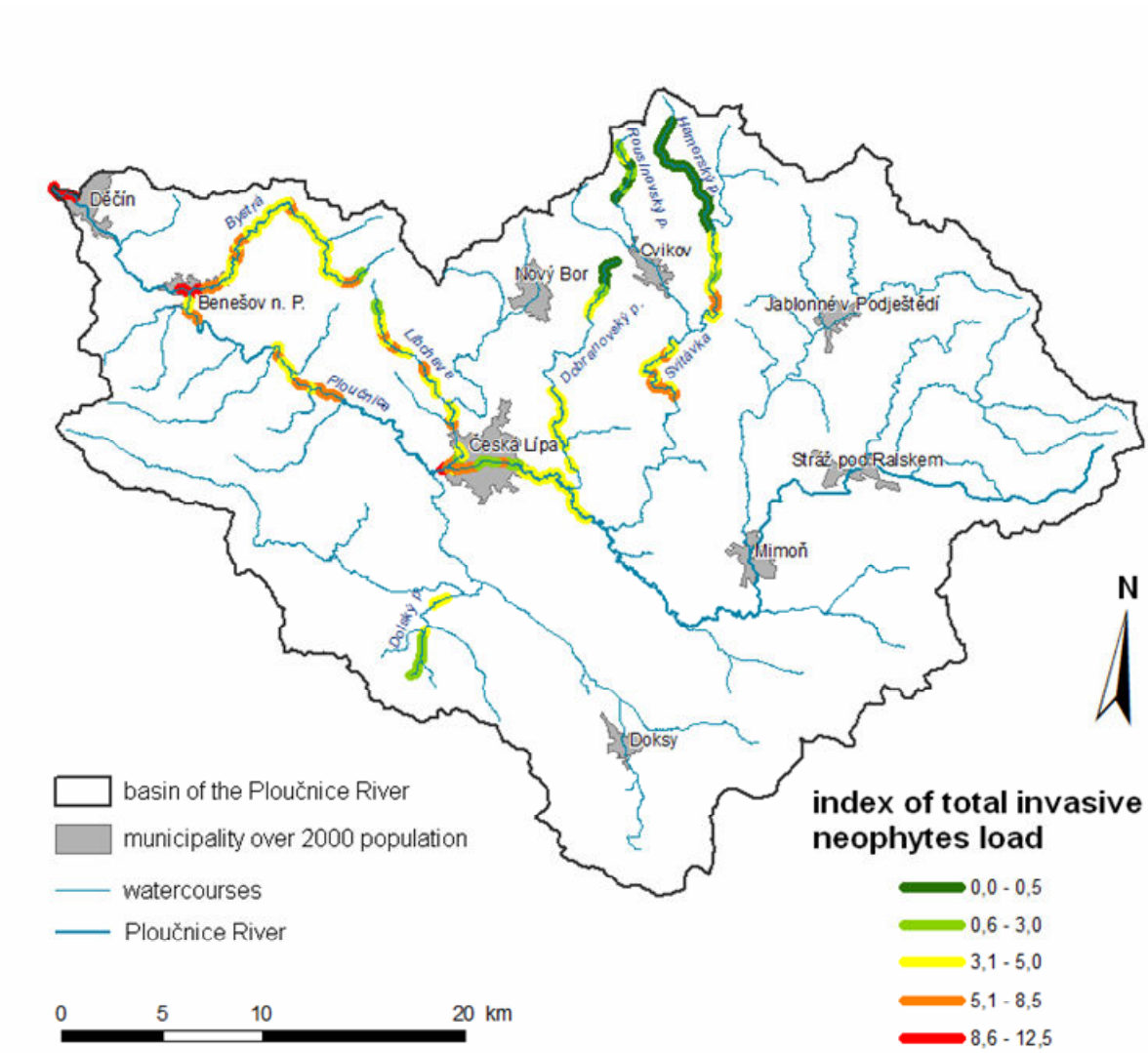
significant: *Impatiens glandulifera* – 44 % of the segments; *Solidago sp.* – 17 % and *Reynoutria sp.* – 15 %. The other species were present rather exceptionally. Representation of all found species is stated in the **tab. 2**.

The average index of total invasive neophytes load of all monitored segments has a value of 3,56. As the most loaded water flow was evaluated the Ploučnice River (I = 4,63), further the Svitavka River (I = 4,24), the Sporka River (I = 4,33) and the Bystrá River (I = 4,14). These watercourses are located in seats or in their vicinity or in the vicinity of communications. On the contrary the lowest value of the index is reached in the Hamerský Stream (I = 0,00) where no invasive plants were reported. Just one species (*Impatiens parviflora*) was recorded in the Rousínovský Stream (I = 0,89). These low-loaded streams are mainly situated in forest environment in a protected landscape area. The values of all watercourses are stated in the **tab. 3**. The values of the index of the segments are shown in the **fig. 1**.

The average number of individuals in the segment in which it was found is highest for *Impatiens glandulifera* (206), *Impatiens parviflora* (198), *Helianthus tuberosus* (165) and *Reynoutria sp.* (150). The other species were reported in stands of a few individuals or most of tens of pieces.

More detailed research results are listed in Šenová (2008).

Fig. 1 The values of the index of total invasive neophytes load (source: author)



Tab. 2 Representation of the found species on the monitored water sources in % (source: author)

	Bystrá	Dobranovský	Dolský	Hamerský	Libchava	Ploučnice	Rousínovský	Sporka	Svitavka	All watercourses
Quercus rubra	0	0	0	0	0	1	0	0	0	**0,3**
Reynoutria sp.	12	15	0	0	38	18	0	0	30	**15**
Parthenocissus sp.	0	0	0	0	0	6	0	0	0	**2**
Impatiens parviflora	100	82	100	0	100	51	37,5	86	93	**71**
Impatiens glandulifera	35	6	0	0	8	95	0	50	55	**44**
Galinsoga sp.	1	3	0	0	0	4	0	0	7	**3**
Helianthus tuberosus	0	0	0	0	0	7	0	29	0	**3**
Robinia pseudacacia	7	0	0	0	0	13	0	0	5	**6**
Erigeron annuus	0	0	0	0	0	9	0	0	0	**3**
Conyza canadensis	10	0	0	0	0	6	0	7	0	**4**
Solidago sp.	19	6	6	0	21	26	0	21	18	**17**
At least one species	**100**	**82**	**100**	**0**	**100**	**98**	**37,5**	**93**	**100**	**85**

Tab. 3 Characteristics of monitored watercourses (source: author)

Watercourse	Number of segments	Total number of recorded species	Average			Share of segments without invasive species (in %)
			index of total invasive neophytes load	number of species	number of individuals	
				in a segment		
Bystrá	68	7	4,14	1,85	302,43	0
Dobranovský	34	5	3,14	1,12	331,18	18
Dolský	16	2	2,70	1,06	174,06	0
Hamerský	32	0	0,00	0,00	0,00	100
Libchava	24	4	3,67	1,67	165,83	0
Ploučnice	96	11	4,63	2,36	371,82	2
Rousínovský	16	1	0,89	0,38	63,75	62,5
Sporka	14	5	4,33	1,93	459,64	7
Svitavka	44	6	4,24	2,07	278,30	0
In total	**344**	**11**	**3,56**	**1,66**	**273,21**	**15**

4. Discussion

In the context of a larger research there were mapped about 800 km of bank vegetation on different watercourses in the Czech Republic (closer in Matějček 2007). The index of total invasive neophytes load for the basin of the Ploučnice River (I = 3,56) is average compared to the situation on all reported rivers (I = 3,90). On the 800 km of reported rivers was evaluated as the most frequent species *Impatiens parviflora* which was represented on 45 % of segments. Its occurrence is in the basin of the Ploučnice River much higher (71 % of segments). The representation of *Impatiens glandulifera* is identical in both of the groups (43 % x 44 %), as well the occurrence of *Reynoutria sp.* (15 % x 15 %). The other species occur in the basin of the Ploučnice River less than in the group of the 800 km of rivers.

A significant difference is represented by the number of individuals in the segment in which it was found. For *Helianthus tuberosus* is this value in the group of 800 km of rivers much higher (2488) than the value for the basin of the Ploučnice River (just 165). As well the stands of *Reynoutria sp.* are larger in the bigger group of rivers (1310) than in the basin of the Ploučnice River (150). Similar situation is in the case of *Impatiens glandulifera* and *Solidago sp.* On the contrary the size stands of *Impatiens parviflora* are similar for both of the groups (273 x 198).

5. Conclusions

The basin of the Ploučnice River is loaded by invasive neophytes quite average compared with the situation in the Czech Republic. The occurrence of the invasive plant species is comparable but size stands of them is significantly lower in the basin of the Ploučnice River.

The lowest load was monitored on banks of watercourses located in forest environment where is the impact of man quite low. The higher load on the other rivers was probably due to human activities in their vicinity. The highest load on these rivers was observed in cities and behind them on banks where are made no adjustments of bank vegetation.

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Environmental influence to variability of isolated wood vegetation

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Abstract

This article outlines the basic possibilities of research of biogeographical regularities in cultural landscape of Českomoravská vrchovina highlands. Surveyed problem is a study of variability of isolated wood vegetation and its relation to landscape structure and land use. Theme of isolated wood vegetation has been studied especially in Belgium, Germany, Poland and Great Britain, studies upon this theme in Czech Republic are missing yet. This paper is based on phytocoenological recording in isolated wood vegetation, analysis of surrounding topography and land use. Explication of biogeographical regularities in environment of disturbing anthropogenic influence is the aim of the research.

Keywords: vegetation; forest fragment; landscape; eutrophication

1. Introduction

The forest vegetation in cultural landscape is very important for preservation of biodiversity. Fragmented forests often forms a refuge for herb layer plant species, in markedly fragmented cultural landscape, formed of an agricultural land, woods (especially with derived tree species) and seats. Many foreign authors have been engaged in the research of the vegetation of forest fragments, by Dzwonko and Loster (1992), Mikk and Mander (1995) and Thomas et al. (1997) this vegetation is influenced by land use history, degree of habitat isolation and fragmentation. The influence of **land use history** on species richness of forest vascular plants has been studied by Brunet (1993), Hermy et al. (1993), Thomas et al. (1997), Wulf (1997) and Lawesson et al. (1998). **The edge effect** has been studied by e.g. De Schrijver et al., 1998.

Eutrophication is one of the most important factors (e.g. Brunet, 1993; Thimonier et al., 1994; Brunet et al., 1997).

Outline of patterns a structure of the vegetation of the forest fragments depending on explicit geographical factors: segmentation of the relief, exposition, geological subsoil, soil substrate granulity, land use in surrounding landscapes and history of exploitation especially, is aim of this article. Preliminary findings, which precede the data evaluation

collecting by field survey are presented in this article. Study of biodiversity of the habitats is important to understanding to dynamism of the individual plant species not only, population and vegetation, but at the same time serve as instrument to nature conservation. Findings from the Czech Republic are missing yet.

2. Methods and material

2.1 Interest area

The interest area covers Českomoravská vrchovina highlands and neighbouring part of Třeboňská pánev basin. Minimal variability of the climatic characteristics, similar relief and mainly crystalline acid subsoil is presumption. The interest localities are situated at intervals altitude 450 – 620 m and pertains 3rd oak-beech and 4th beech vegetation belt (Zlatník 1976). Mostly studied localities are situated in the surrounding of Býšovec village and in the surrounding of Kunžak village. Both surveyed areas it is possible characterize as agricultural-wood landscapes with wood complex that are forms especially derived spruce monoculture with common spruce (*Picea abies).* Agricultural soil is represented by fields, mainly poorer eutrophic meadows and pastures with small species richness. Forest fragments together with line green vegetation, balk and grass fragments forms harmonic character of these landscapes.

2.2 Selection of the localities

Minimal variability of relief, small slope, acid to neutral subsoil (gneiss, migmatite, granite), nature close deciduous and mixed stands, normal moisture regime, i.e. without waterloogged soil places, are presumptions of study of forest fragments. Next requirement was to choose the forest fragments of the various size and with round form for minimization edge effect. Forest fragment was defined as isolated part of forest, minimally size of one vegetation survey 15 x 15 m, with tree species covering higher than 50%.

2.3 Field survey

Fieldwork included visit of the localities founded out from orthophoto maps. The list of all vascular plant species was drawn by vegetation survey, i.e. basic characteristics of environment like altitude, slope, exposition, salient rock cover, soil depth, drawn species of tree layer, shrub layer and herb layer with valuation of their cover were written in forest fragment, what answer all engaged criterion. Such a vegetation survey was done on whole forest fragment especially on area 15 x 15 m, in the middle of the forest fragment eventually on south and north part by edge too in accordance with size of the forest fragment. The individual lists were made for edge of the forest fragment too and they were complete by vegetation survey size 2 x 2 m on southern and northern part of the forest edge. Mixed sample of soil substrate to determination pH was taken from each area where the vegetation survey was done.

Fig. 1 Herb layer plant species and their presence in studied forest fragments (source: author)

herb layer plant species	presence	relation to edge
Anemone nemorosa	f	
Asarum europaeum	f	
Avenella flexuosa	f	
Campanula perscifolia	f	
Carex muricata agg.	f	
Convallaria majalis	f	
Corydalis intermedia	f	
Dryopteris carthusiana	f	
Dryopteris filix-mas	f	
Galeobdolon montanum	f	
Geranium robertianum	f	
Geum urbanum	f	
Grossularia uva-crispa	f	
Hedera helix	f	
Hieracium laevigatum	f	
Hieracium lachenalii	f	
Hieracium murorum	f	
Hieracium sabaudum	f	
Chelidonium majus	f	
Impatiens parviflora	f	
Juniperus communis	f	
Luzula luzulloides	f	
Maianthemum bifolium	f	
Mercurialis perennis	f	
Moehringia trinervia	f	
Mycelis muralis	f	
Paris quadrifolia	f	
Polygonatum multiflorum	f	
Polypodium vulgare	f	
Rubus idaeus	f	
Scrophullaria nodosa	f	
Senecio ovatus	f	
Stachys sylvatica	f	
Vaccinium myrtillus	f	

Viola rechenbachiana	f	
Viola riviniana	f	
Calamagrostis epigejos	f, e	n
Fallopia convolvulus	f, e	i
Fragaria moschata	f, e	i
Fragaria vesca	f, e	i
Galeopsis pubescens	f, e	i
Poa nemoralis	f, e	n
Solidago virgaurea	f, e	i
Veronica officinalis	f, e	s
Aegopodium podagraria	e	n
Agrostis capillaris	e	i
Achillea milefolium agg.	e	s
Alchemilla sp.	e	n
Allium oleraceum	e	s
Angelica sylvestris	e	n
Anthoxanthum odoratum	e	i
Anthriscus sylvestris	e	n
Apera spica-venti	e	i
Arrhenatherum elatius	e	i
Artemisia vulgaris	e	n
Astragallus glycyphyllos	e	i
Atriplex patula	e	n
Ballota nigra	e	n
Briza media	e	s
Calluna vulgaris	e	s
Campanula rotndifolia	e	s
Capsella bursa-pastoris	e	i
Carlina aculis	e	s
Centaurea cyanus	e	i
Centaurea jacea	e	s
Cerastium arvense	e	s
Cerastium holosteoides	e	i
Cirsium arvense	e	n
Clinopodium vulgare	e	i
Convolvulus arvensis	e	i
Conyza canadensis	e	i
Cytisus nigricans	e	_
Dactylis glomerata	e	n
Dianthus carthusianorum	e	s
Dianthus deltoides	e	s
Elytrigia repens	e	i
Epilobium angustifolium	e	_
Epilobium montanum	e	_
Euphorbia esula	e	i
Euphorbia peplus	e	i
Falcaria vulgaris	e	s
Festuca rubra	e	i
Festuca rupicola	e	i
Filipendula ulmaria	e	_
Fragaria viridis	e	i
Galinsoga quadriradiata	e	i
Galium album	e	i
Galium aparine	e	n
Galium verum	e	s
Genista germanica	e	_
Genista tinctoria	e	s
Glechoma hederacea	e	n
Gnaphalium sylvaticum	e	s
Helianthemum grandiflorum	e	s
Heracleum sphondylium	e	n
Hieracium pilosella	e	s
Holcus mollis	e	i
Hylotelephium maximum	e	s
Hypericum perforatum	e	s
Chaerophyllum aromaticum	e	_
Chenopodium album agg.	e	i
Jovibarba globifera	e	_
Knautia arvensis	e	i
Lactuca serriola	e	_
Lamium album	e	n
Lapsana communis	e	n
Leontodon hispidus	e	i
Leucosynapis albus	e	_
Lichnis viscaria	e	s
Linaria vulgaris	e	s
Lotus corniculatus	e	s
Lupinus polyphyllus	e	_
Luzula campestris	e	s
Lysimachia vulgaris	e	_
Malva neglecta	e	_
Myosotis arvensis	e	n
Nardus stricta	e	_
Oentohera sp.	e	_
Origanum vulgare	e	s
Persicaria maculosa	e	_
Phleum pratense	e	n
Pimpinella saxifraga	e	s
Plantago lanceolata	e	s
Plantago major	e	i
Poa angustifolia	e	i
Poa compressa	e	s
Potentilla anserina	e	_
Potentilla argentea	e	s
Potentilla erecta	e	_
Potentilla tabernaemontanii	e	s
Ranunculus acris	e	_
Ranunculus repens	e	_
Rosa canina agg.	e	i
Rubus caesius	e	i
Rubus fruticosus	e	i
Rumex acetosella	e	s
Rumex crispus	e	n
Rumex obtusifolius	e	n
Sanguisorba officinalis	e	_
Sarothamnus scoparius	e	_
Scleranthus annuus	e	_
Secale cereale	e	_
Securigera varia	e	s
Sedum sexangulare	e	s
Silerne alba	e	n
Solanum nigrum	e	_
Stellaria graminea	e	_
Stellaria media	e	_
Stellaria nemorum	e	_
Taraxacum Sect. Ruderalia	e	n
Thlaspi arvense	e	i
Thymus pulegioides	e	s
Trifolium medium	e	_
Trifolium pratense	e	i
Trifolium repens	e	i
Triticum aestivum	e	_
Urtica dioica	e	n
Verbascum chaixii ssp. austriacum	e	s
Verbascum thapsus	e	_
Veronica chamaedrys	e	n
Vicia cracca	e	i
Vicia hirsuta	e	_
Vicia sepium	e	_
Vicia tetrasperma	e	_
Viola arvensis	e	n
Viola canina	e	_
Viola odorata	e	_

Presence: e=forest edge; f=forest. Relation to edge: n=northern edge; s=southern edge;_=under 10 records; i=indifferent presence.

3. Results

25 forest fragments was worked as a whole, 17 – 70 m diameter size (most to 25 m). Dominant forest-tree species are hornbeam (*Carpinus betulus*), beech (*Fagus sylvatica*),

small-leaf linden (*Tilia cordata*), broadleaved linden (*Tilia platyphyllos*), namely, add gean (*Prunus avium*), sycamore maple (*Acer pseudoplatanus*), European ash (*Fraxinus excelsior*), common spruce (*Picea abies*), oaks (Quercus petraea, Q. robur), common birch (*Betula pendula*) and aspen (*Populus tremula*). Dominant forest-tree species are beech, hornbeam or lindens, most often within the context of the historical management. Age structure of tree layer is individual for each forest fragment or near groups of forest fragments. The oldest individuals achieve age about 200 years and they indicate long continuum of forest environment relatively, what affect migration of forest plants. Mainly hornbeam forest fragments are relict of grown out of 50 – 70 years leave sprout forests. It is probable that some forest fragments were partly deforested for point of time at the least. Persistence of the forest plant species was enabled by specific conditions of environment. Among those conditions pertain: shrubs on salient rocks and on amassed stones; tree solitaire; stone line – environment with different moisture regime, biotope of nitrophytes (e.g. *Mercurialis perennis*); existence of dump biotope – place of persistence of forest plant species (e.g. *Anemone nemorosa*) near forest fragment. There were noted 167 herb layer plant species in all forest fragments (Fig. 1). 36 species were noted inside forest, 8 species inside and in the edge of the forest fragments and mostly – 123 species – in the edge.

3.1 Vegetation and its affinity to environment factors

Environment factor like **relief variability** rises with size of forest fragment. Small quarry or stone heap e.g. raised relief heterogeneity among studied mostly smaller forest fragments. Some pteridophyte ferns (*Dryopteris filix-mas* and *Polypodoium vulgare*) shown significance affinity to these elements. **Exposition** is relatively important factor for edge vegetation especially. The difference between northern and southern part of the forest fragment is patent of most of vegetation surveys. Whereas northern side is smaller species richness in general with ruderal plants, nitrophytes (e.g. *Urtica dioica, Galium aparine, Geranium robertianum, Dactylis glomerata, Cirsium arvense, Anthriscus sylvestris*), southern side has often higher species richness with heliophilous and subxerophilous plants species (e.g. *Genista tinctoria, Festuca rupicola, Hylotelephium maximum, Lichnis viscaria, Silene vulgaris, Campanula rotundifolia, Dianthus deltoides, Briza media, Melampyrum nemorosum*). The difference of plant species composition results from different insolation of cardinal points. North is less arid, the nutrients are more available for plant somewhat. South has enough sun shine, it is arid, competitive advantage of ruderals and nitrophyts is small. **Geological subsoil** and **soil granulity** are very important environment factors. The type of rock work quantity of soil nutrients and granulity of soil then ability of soil to absorb moisture. Special interest forest fragments are often situated on acid rocks. Acidity and absence of the nutrients is wiped away by eutrophication from surrounding agricultural areas. **Eutrphication** is the biggest in the edge vegetation of forest fragments, it is smaller on coarse-grained rocks and convex form of the relief due to ability of soil to become dry. **Land use** is one of the most important factors. Agricultural eutrophication influences surrounding vegetation, edge of neighbouring vegetation types especially. Eutrophication is emphasize in the middle and lower parts of slopes because of fertilizer runoff.

4. Discussion

Many herb layer plant species are marked as ancient woodland indicators (Wulf, 1997) which illustrate forest environment continuum. Some plant species abound in another vegetation growth (line vegetation, shrub) too, those are not studied in terms of forest fragments. Another problem is small number of herb layer plant species which are perennial and they survive unfavourable conditions for a long time. Their predicative value is misrepresented.

5. Conclusions

Vegetation is always reflection of the environment conditions. Although physiography conditions are constant, the changes of vegetation due to another important factors like

capacity of nutrients in environment or disturbance of vegetation may happen. Human activities often exceed abiotic environment influence. Study of vegetation in small forest fragments may imply the answers to the questions about population plant ecology, dispersal ability and biotope conservation in terms of small-area reservations.

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The landscape development of the former sappers technical barrages in NP Šumava

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Abstract

Any changes in landscape are always the result of effect of many factors. Realities, which can look in certain time as negative, can be in context with other influences and in different time effect positive. Typical example is the Czech side of the Bohemian Forest. "Iron Curtain" – barbed enclosure of Communism - it was the reason of displacement of many inhabitans and destruction of many villages. Partially restricted economy activities and prohibited border parts for public, contributed to the nature conservation. A lot of (frequently valuable) biotopes were disrupted and on the other side many important localities for nature protection came into existence - specific conditions enable rise of succession areas, on which many rare species are fixed by its occurrence. This dissertation thesis deals with detailed botanical, phytocenological and ecological investigation of these communities and concurs to methodics of survey in these areas in my diploma work. Information about the spatial and species structure and the other proportions are provided with the evaluation of the phytocenological relevés. Also the historical dimension of the local landscape is pointed out, using existing landscape character assessments, which are applied on studies area.

Keywords: landscape changes; military area; initial vegetation; succession; Iron Curtain

1. Introduction

Searching for any unknown landscape with virgin nature is one of the human feature from time out of mind. Terra incognitague prohibitae – unknown and forbidden land, we can find not only in the far tropics and on the houseless islands, but also direct in the heart of middle Europe, in the marginal area of Šumava mountain. It's a landscape, which was already settled in history, but abandoned for forty years. After the World Word II strong changes came into landscape management in the large area of Šumava mountain. From the end of forty to fifty of 20th century military areas (Boletice, Dobrá Voda) was build up and also the bounded zone (called Iron curtain) was limited by the 1990. Because of political system all of German and also Czech inhabitans had to abandon their villages, which were given to devastation. Forty years the landscape was left in a self development and was interrupted only in the

areas, which were used as military (Jílek, Jílková 2002). The long - term absence of traditional landscape management caused a local degradation many meadow associations and forest invasion. On the other hand natural and rare ecosystems were conserved. Due to these extraordinary circumstances there is an impress culture landscape with nature valuable complex of forest and nonforest associations (Bartoš, Těšitel, Kušová 1998), where we can see exemplary succession of vegetation.

The scope of this article is result of the research, which was target the study of landscape development, especially vegetation and succession.

2. Methods and material

Research of an actual vegetation in the study area appear of previous mapping (in my diploma work). It`s based on ortophotos 1:5 000 and maps 1:25 000. Actual vegetation in the paths after barrages was note down to ortophotos with codes that define the type of vegetation association (similar like mapping NATURA 2000) and its sheating, level of forestation a dominant tree species and also rare plants. Types of vegetation associations were determined on grounds of results from previous survey in the area. Dominant species, physiognomy of overgrowths and site surroundings, they were taken into account. The legend of actual vegetation was made on these results and all data field were digitized with programme GIS ARC-INFO on the background of actual ortophotos. Map units were differentiated with colour and also crosshatching. For vegetation mapping in the military area was used methodics of NATURA 2000 (Chytrý, Kučera, Kočí 2001).

The big value have initial stages of vegetation, which were able to developed due to a mechanical erosion in this area and they are considerable because of many rare plant species. Also other importance factors, which have an influence on vegetation character, were noted down during research, as areas with drainage melioration, the areas affected with jogging and tourist areas (Kučera, Guth 1998). For the study of vegetation variability – in the ecological context (variable surrounding) and also geographical context (combination of species) – a satisfactory number of phytocenological surveys is very important. Surveys have been collect with methodics of Zurych – Montpellier school (Braun-Blanquet 1964) and than they will be process and analyze in the programmes JUICE, TWINSPAN and also using Ellenberg indicating valuations.

Fig. 1 Map units (source: author)

<table>
<tr><th>Herb layer E1</th><th>Code</th><th>Association</th><th>Tree layer E2</th><th>Dominant E2</th></tr>
<tr><td rowspan="3">1(to 30%)</td><td>Vr</td><td>initial stages of high moor</td><td rowspan="3">1 (to 50%)</td><td rowspan="2">SM (spruce)</td></tr>
<tr><td>CX</td><td>association of sedge and peat meadows</td></tr>
<tr><td rowspan="2">CA
CAi</td><td>wetland formations
un. Calthion
initial stages</td><td rowspan="2">BŘ (birch)</td></tr>
<tr><td rowspan="2">2(to 50%)</td><td rowspan="2">M
Mi</td><td rowspan="2">association of medium humid meadows
initial stages</td><td rowspan="2">2 (50 - 80%)</td></tr>
<tr><td rowspan="2">BO (pine)</td></tr>
<tr><td rowspan="5">3(50 - 80%)</td><td rowspan="5">V
Vs
Vir
Vi</td><td rowspan="5">association of short – stemmed meadows
un. Violion
association of nard meadows
peat Violion
initial stages</td><td rowspan="5">3 (over 80%)</td><td rowspan="4">V (salix)</td></tr>
<tr><td rowspan="3">O (others)</td></tr>
<tr><td rowspan="3">4 (over 80%)</td></tr>
<tr><td rowspan="2">tree in E1 without code</td></tr>
<tr><td>R</td><td>ruderal vegetation</td></tr>
</table>

3. Results

3.1 Localization

Building of so-called sappers technical barrages together with large military areas was begun in 50th years of 20th century along the borders between former Czechoslovakia and neighboring capitalistic countries. There are two (here and there even three) noticeable and characteristic forest corridors that came into being in consequence of shifting the barrages in the direction of inland in 70s (Jílek, Jílková 2002). The barrages were made-up of two parallel wire walls which enclosed approximately four or five wide zone (the zone was extra conditioned by herbicides very often). The corridor was also widen from both sides, so that vehicles could access it throughout all its length.

For observing of landscape development and succession of vegetation, the area in west Šumava (register Prášily) was chosen in the area of previous military area Dobrá Voda. The corridor of new barrages went through Prášily, in the direction of Velký Bor, Oblík, and through Javoří Pila to Modrava. The oldest barrages are still noticeable in the area of Modrava transition bogs. This area spread in the altitude 900 – 1200 (1300) m, which include 6th vegetation spruce-fir-beech belt and 7th vegetation spruce belt involving natural acidophil mountain beech wood, under the altitude 1100 – 1200 m there is mountain climax spruce forest (Culek 1996). But natural forest overgrowth were replaced for the most part by spruce monocultures.

3.2 Actual vegetation in the paths

Heterogeneous overgrowths of **initial stages of high moor** (previous ombrotrophic moorland) is one of the most distinguished association, because of occurrence of many rare plant species – typical are dominant species of high moor as *Vaccinium vitis – idae*, *Trichophorum cespitosum*, *Eriophorum vaginatum, Oxyccocus palustris, Andromeda polifolia, Carex pauciflora, Carex limosa*. With regard to the open overgrowth and also the attendance of any moorland areas, also *Drosera rotundifolia* has its occurrence here.

Association of **sedge and peat meadows** mostly relate to saturated depression, relatively often in the paths passing over nonforest areas, but also for example in waterlogged spruce forests. Typical species for minerotrophic moorland are dominant here with their occurrence, as *Carex nigra*, *Carex canescens*, *Carex rostrata*, *Carex acuta*, *Juncus filiformis*, *Agrostis canina*, *Agrostis capillaris*, *Epilobium balustre*, *Juncus effusus* etc. More precious are some threatened taxons - *Scorzonera humilis*, *Trifolium spadiceum*, *Dactylorhiza majalis*, *Pedicularis sylvatica, Pinguicula vulgaris*.

Wetland formations of Calthion unit are typical for wet depression and waterlogged steep lands with underground waters fleet under surface, also near by spring areas; mostly within the frame of nonforest areas. Association is formed by long-stemmed grasses, as *Deschampsia caespitosa*, *Molinia coerulea*, *Calamagrostis villosa*, *Festuca rubra* and also *Juncus effusus*. Other species from *Calthion* unit are also sit in - *Juncus filiformis*, *Juncus articulatus*, *Cirsium balustre*, *Cirsium heterophyllum*. Initial stages are characterized by marked occurrence of *Juncus effusus*.

Vegetative close unit of **peat Violion** occurs on the edge of moorland, sometimes as degrade stadium after drainage melioration, but also in waterlogged depression with oligotrophic substrate. Species from sedge and peat meadows affect, as *Carex nigra*, *Carex echinata*) and also species from nard meadows, as *Nardus stricta*, *Avenella flexuosa*, *Carex pilulifera*, *Festuca rubra*, *Galium saxatile*. It`s mostly very species abundant association with occurrence of rare plants, for example *Pedicularis sylvatica*, *Pinguicula vulgaris*.

In non-waterlogged steep lands and also in humid equal ground appear **association of medium humid meadows**, mostly within the frame of nonforest areas; in forest areas with quite high degree of coverage of pioneer species. It`s long-stemmed vegetation with dominant grass species as *Alopecurus pragensia*, *Agrostis capillaris*, *Dactylis glomerata*, *Deschampsia cespitosa*, *Avenella flexuosa*; in forest areas are

dominant species of forest boundaries as *Calamagrostis villosa* and *Luzula luzuloides*. Herb species of medium humid and humid meadows appear in closed stands, typical are *Bistorta major*, *Cirsium balustre*, *Senecio sp*.) etc. Initial stages are also typical for these associations.

Association of short-stemmed meadows and nard meadows relates to non-waterlogged lands, often sunny habitat. Species poor types with *Nardus stricta* or *Avenella flexuosa* and other species from nard grasses as *Hieracium pillosela*, *Arnica montana*, *Veronica officinalis*, *Anthoxanthum odoratum*, *Solidago virgauea*, *Galium saxatile* are typical for upper locations. Also endangered and rare species appear, especially *Lycopodium clavatum*, *Diphasiastrum*. For lower locations are typical species rich overgrowth with higher part of herb species, for example *Polygala vulgarit*, *Thymus pulegiodes*, *Campanula rotundifolia*. Initial stages are very often.

3.3 Actual vegetation in the military areas

Large nonforest area in the previous military area Dobrá Voda (extinct settlement Stodůlky) is situated on the southwest slope of the mountain Křemelná. Due to abandonment of traditional management authentic meadow associations were degraded, along with occur reduction of many weed plant species, as *Papaver rhoeas*, *Centaurea cyanos*, *Agrostemma githago*). Many nitrogen or ruderal locations with run wild species (*Hesperis matronalis, Levisticum officinale*) from neighbouring gardens disappeared. After previous settlement to presents there are found only low stone walls, that separated manager grounds. There are various associations of **mountain flowers meadows** – unit *Polygono-Trisetion*, which are among with subxerophyt associations of **nard grazing land** – unit *Violion caninae* and poor associations – unit *Nardion* with *Arnica montana*. Along the stone walls and also forest boundaries there is typical overgrowths with *Vaccinium myrtillus*. Despite of drainage melioration there are developed **peat sedge meadows** – unit *Caricion fuscae,* also **thistle, meadow-sweet** and also **hair-grass meadows** – unit *Calthion*. Along the Křemelná river there are alluvial meadows with dominant *Carex brizoides*. Peat communities treat many rare taxons, for example *Drosera rotundifolia*, *Pinguicula vulgarit*, *Pedicularis sylvatica*, *P. palustris*, *Willemetia stipitata*, *Dactylorhiza fuchsii subsp. Fuchsii*, *D. majalis subsp. Majalis*, *Oxycoccus palustris*) etc. Numerous areas of initial vegetation stages were achieved by reason of antecedent military activity. We can found many threatened species in this enclave, for example *Botrychium lunaria*. In addition to introduced species, there are typical many plants of wetland meadows - *Salix rosmarinifolia*, *Willemetia stipitata*, *Dactylorhiza fuchsii subsp. Fuchsii*, *D. majalis subsp. Majalis*, *Epilobium balustre*, *Tephroseris crispa*, *Valeriana dioica* and also marginal threatened *Moneses uniflora*. In a forest border has its occurrence *Scorzonera humilis* or threatened *Arnica montana*.

3.4 Preforest stages – succesion of wood plants

Succesion of wood plants is in progress especially in the areas of non-humid habitat, which concur with sequential forest complexes, so in the types of medium humid meadows and short-stemmed (nard) meadows. Typical are spruce, pine, birch and salix, which sporadically reach 80 % degree of coverage in the shrub layer or already tree layer. Succesion of wood plants is mostly blocked (especially in the higher location in the areas of Šumava plains and Modrava transition bogs) with extreme climatic conditions, high level of ground water and also with oligotrophic relatives. Abundance of pioneer species is very low in the humid habitat, which are beyond situated in the frost pocket

4. Discussion and Conclusion

During the forty years military activity in Šumava landscape, there were made up specific non-stocked forest areas, where the vegetation was disturbed, disappeared many localities of significant plant in Šumava (for example *Gentiana pannonica, Ligusticum mutellina, Hesperis matronalis* etc.), but also many species had been able to spread, because of their low

competition ability (Procházka, Štech 2002), especially in initial development stages. Despite of noticeable continual reforestation, thanks to specific conditions, initial stages of development keep up with large species diversity. Some localities has the role as refuges for plants, which can disappear in engaged vegetation (in particular *Diphasiastrum sp., Lycopodiella inundata, Botrychium lunaria etc.*). This marginal area is a specific culture landscape fated with unusual circumstances, is the area with wide spectrum of site factors, where is possible to observe landscape changes during the last fifty years with response of vegetation part.

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The expansion of urban areas on the maps

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Abstract

The essay topic deals with the expansion of urban areas. The principal aim of the study is the achievement of the historical illustration and to obtain a forecasting ability of the urban areas´ expansion. The monitoring is enabled through the studying of the historical maps and statistical data. The study is mainly focused on the city of Ústí nad Labem and its urban area. The study is based on the comparative, cartographical and statistical methods. Historical cartographic materials, statistical bulletins and the essays and books by Karel Kuča and Eva Semotanová are the most important data sources. There are placed several samples of images and graphs for better visual illustration. The object of next researches can be focused on each town or village in the Czech republic. Results of these researches can be disposed in land use activities, construction activities, local development, nature protection, etc.

Keywords: historical geography; urban area; cartographic material; statistical data

1. Introduction

It was once said that the knowledge of history makes it possible to understand present. This statement is valid for the urban culture research too. The remarkable massive urban development in the Czech countries has started before more than one hundred and fifty year and today we are the witnesses of the consequences and continuing of this process. The study object of this phenomenal process belongs to historical geography and its kindred branches of science. The research results could be able to answer the questions: Why the urban areas look like this? How might the urban areas have looked like in the future?

Historical geography is the individual, but interdepartmental branch of science, which is able to connect the time with space and natural science with social science. Historical geography is focused on the level, development, changes, causes, consequences and patterns that are influencing the geographic areas. Historical geography reconstructs the former areas and compares them with the today's status. The research of the expansion of urban areas belongs to historical geography of inhabitants and seats

(Semotanová, 1998). The study aim is the illustration of the urban area expansion of the Czech republic's towns. It is enabled through analyses of historical and present materials (maps, aerial photos, postcards, etc.) and through interpretation of statistical data (population censuses, cadastral survey, etc.). This will be widely discussed in **section 2**. The chronological range of this study includes era since 20´s of 19th century to present.

The former research occupied with the towns of Ústí nad Labem, Most, Nový Jičín and Nymburk. The research was realized only on the basis of vertical view (maps and aerial photos). This study brings new element – postcards and photos, which make it possible horizontal view.

The team of scientists of The Historical institute of Academy of Sciences of Czech republic deals with this questions in its *"Historický atlas měst České republiky"* (1995 - ?). Eighteen volumes have been published till this time. The leading authority of historical geography is Eva Semotanová and her scientific results. Probably the greatest piece of the Czech historical geography of inhabitants and seats is the encyclopedia "Města a městečka v Čechách, na Moravě a ve Slezsku" (1996 - ?) by Karel Kuča. Six volumes have been published till this time.

2. Methods and material

Following chapters describe methods and material, which are used during the research. Semotanová (1998) also describes methods and material, but in detail.

2.1 Methods

The historical-geographic research is established on historical-geographic method. If historical geography is interdepartmental branch of science, than historical-geographic method is the complex of many others branches of science's methods (Semotanová, 1998).

Historical method is very important for comprehension of context between a surveyed phenomenon and historical events. Simultaneously it brings a possibility of a critical view on historical resources.

Each phenomenon does not occur only in time level, but in space too. Geographic method solves this fact. Semotanová (1998) also adds typological and comparative methods to geographic method. Typological method assigns characteristic signs to each phenomenon. It causes a recognition of phenomena by these signs. By the help of comparative method we can compare former changes in landscape with present status. Semotanová (1998) mentions two more methods – retrospective and retrogressive methods. Retrospective method sees a present status of phenomenon like a result of the historical progress. Retrogressive method reconstructs a former landscape through its extant elements in present landscape.

Cartographical method is the fundamental method for historical-geographic research and it has a close connection to historical cartography too. This method makes possible analytic and synthetic visualization of historical phenomena and than can be created a visual model of a former landscape through the maps. The results of this method are historical maps, atlases, etc. (Semotanová, 1998).

Statistical method processes statistical data. The interpretation of research results is enabled through numbers, graphs and tables **(see fig. 3 and 4)**. The outputs of the Czech statistical office are the general resources for this method.

2.2 Material

2.2.1 Maps and aerial photos

Cartographic materials are the primary sources of historical-geographic studies. According to Semotanová (1998) a map is the miniaturized, generalized image of the Earth's surface or cosmic objects. It is created on the basis of mathematical regularities called cartographic projection. The usage of cartographic material is very different. The maps created till 18th century are almost useless, because of their bad technical and visual quality. These maps are an artwork for the most part, but

not a practical instrument. Probably the first significant work is the Müller´s map of the Bohemia and Moravia from 1716 and 1720. We can also mention The Stationary land register, which was been making between years 1824 – 1843, and The Military surveys. Especially on the basis of The Third military surveys (1874 – 1880) there have been made a lot of cartographic materials in the 20th century. Present maps are the results of the modern technology and pieces of knowledge. Detailed analysis of the cartographic materials performed Semotanová (1994; 1998).

Era of aerial photography has been started in the 30´s of 20th century and its real boom has continued since 50´s. This revolutionary method has brought a new point of view to the cartography. The usage of aerial photography makes the creation of maps very easier. Above all there they are the satellite photos that bring a possibility of many different points of view – from a house to a whole continent **(see fig. 1)**.

The general resources of these materials are the archives. For the research we should visit the archival institutions at the urban and district level. The Czech land register and land survey office owns the valuable collection of useful maps too. Semotanová and Šimůnek (2000) compiled the complex summary of the map´s collections in Czech republic. The detailed analysis of the important map´s collections in Czech Republic performed Semotanová (1994).

2.2.2 Pictures, postcards and photos

Maps and aerial photos provide the vertical view of the Earth´s surface only, but pictures, postcards and photos bring the horizontal point of view. If we compare the old picture or photo with the present one, we can catch a lot of chronological phenomenon's changes in the cultural landscape **(see fig. 2)**.

The oldest pictures of the Czech towns was created in the 15th century (Semotanová, 1998). The graphics of the urban landscape can be found on the map´s frame or on the plasters of many important historical buildings. Many of these artworks are very useful in the historical-geographic research.

In 1861 John P. Charlton from Philadelphia patented the first postcard. Nine years later European countries have started a production of own postcards too (Wikipedia, the free encyclopedia [online]). Today the postcards are the very significant source for the historical-geographic research, because many of them depict a former or present urban landscape. Because of the collector passion there have been set together a lot of publications e.g. Chvojka (2000).

Semotanová (1998) declares that the invention of photography in the 19th century has became equivalent to pictures. Today the general advantage of photos consist in its easy taking. We can also compare the photo with the another material immediately. Semotanová (1998) says that the usage of photos is so far on the edge of the historical-geographic research.

2.2.3 Written documents

The range of usage of the written documents is very wide. This material can be classified into two groups. The first group contains descriptive documents and the second group contains statistical documents.

Into the first group we can sort the official documents (foundation charters, grant of the urban rights, etc.) and the narrative documents (chronicles, annals, books of travels, etc.). These documents often mention the historical events, that are very important for historical-geography research (plaque and number of dead people during it; fire and the number of burnt houses; the foundation of religious building, etc.).

It is necessary to classify the stastic documents into two groups according to time of their origin. The documents in the first group was been created in so-called prestatistical era, it means the era till half of the 18th century. The documents of this kind are not too exact or complete, so we can just estimate on the basis of them. The second group contains the documents of the statistical era. Especially the documents

that have been created since the 1850´s, are very exact and useful (statistical bulletins, population censuses, etc.). It is possible to create tables or graphs through the study of this material **(see fig. 3 and 4)**.

The work sites of The Czech statistical office and the archives on the every hierarchal level are the general resources of the materials. The detailed analysis of the written documents performed Semotanová (1998).

Fig. 1 The magic of aerial photography – UJEP buildings/Ústí nad Labem/Czech republic (source: MAPY.CZ [online])

Fig. 2 Ústí nad Labem. Tržní náměstí square on the postcard from 1906/the same square one hundred years later (source: Miloš Miličevič, private collection)

Fig. 3 Nový Jičín. The evolution of the town´s population. The red arrow shows the consequence of the expulsion of Germans from the Czech countries (source: author according to The Czech statistical office's data and MLEZIVA, KUČA (2006)

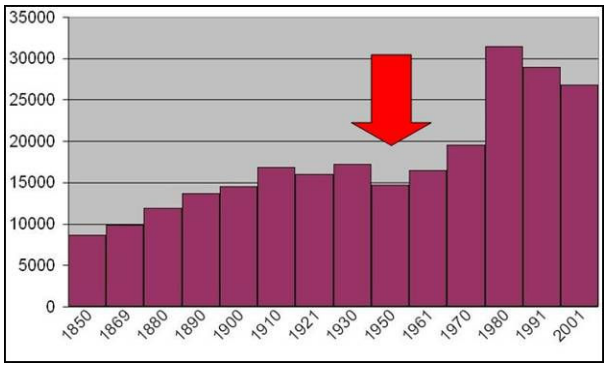
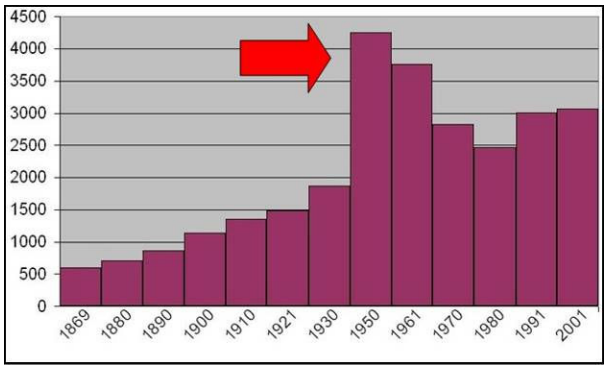


Fig. 4 Most. The evolution of buildings´ quantity. The red arrow shows the massive integration of the seats and their following liquidation during the coal-mining (source: author according to The Czech statistical office's data and MLEZIVA, KUČA (2006)



3. Results

From the vertical point of view the Czech towns weren't growing too much during the era of their fortification. The situation has changed since the industrial revolution in Czech countries, it means since 1840´s (Semotanová, 1998). That´s why this study begins by analysis of The Stationary land register maps. The Stationary land register is the unique cartographic material, because it has still illustrated the Czech countries on the end of the preindustrial era. For that reason The Imperial imprints were used like a initial point for this study. The usage of another maps has been objected to the critical methods. Many of the important chronological changes in the urban landscape have been noticed through the

retroscpective and comparative methods. There are exposed the general results of the study:

1) The massive urban expansion is the consequence of the industrial revolution. The industrial revolution has given the new possibilities and functions to the towns. The economic potential has prevailed over the administrative functions. The inequality between administrative and economic powerful towns have shown itself soon and new economic powerful towns have taken over the administrative function. Some towns have grown very swiftly, but some not **(see fig. 5)**.

2) When the towns took down their fortification, they have started to absorb their outskirts. Than the expansion have continued by the several possibly ways. The first way is the construction of the new buildings, which have borders with the town itself. The second way is characterized by the construction of the important building (most often a factory), which has not common borders with built-up area. The often phenomenon is the construction of another buildings around this important building **(see fig. 6)**. The third way is the integration of another independent seat into the town **(see fig. 7)**. The combination of described ways is the filling non-built-up areas by buildings. The areas can be created by the construction of the important building or integration of another independent seat **(see fig. 6 and 7)**.

3) Statistical data of the population censuses reflect the influencing historical events. E.g. the expulsion of Germans from the Czech countries is well utterable in the graphs **(see fig. 3)**. The integration and desintegration or the destroying of the seats is well utterable too **(see fig. 4)**.

4) In the archives there have been found a several of the historical municipal plans. These materials are the predecessors of the present municipal plans and they prove the vision how could the town look like **(see fig. 8)**.

4. Discussion

Many problems have occurred during the research. At first it is the absence of the modern technology. Through the GIS technology, large scanners, etc. we could vanish the barriers such a different scale or format of the maps. It was impossible to reconstruct the urban expansion by the digital way, in the unified scale and format **(see fig. 9)**. That´s the reason why the study results have been just stopped at visual and theoretic level. There has been the short selection of the maps because of these problems (mainly the maps that have been created since the half of 20th century). The methods and aspects of these problems solved Nožka (2005).

The problems with the pictures, postcards or photos may result from the usage of them. The determination of the location and angle of the pictured object may be very difficult. A help of a witness is the optimal solution. A witness is usually able to determinate the pictured object and to compare with the present status.

It is necessary to keep in mind the integrated and disintegrated seats during the studying the statistical bulletins by The Federal statistical office (1978) and The Czech statistical office (2006). Mleziva and Kuča (2006) simplified this problem by the publication of the years of the seat integration or desintegration.

Fig. 5 The built-up area of the random towns (in hectares) in 1850 (blue) and 2001 (red) (source: author according to The Czech statistical office´s data)

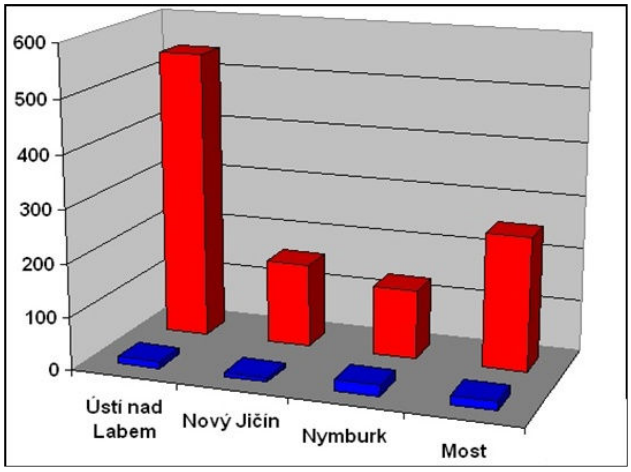


Fig. 6 Nymburk. The Railroad colony unattached to the town (1870´s)/the compact built-up area (1944) (source: The Archive of the Nymburk´s region)

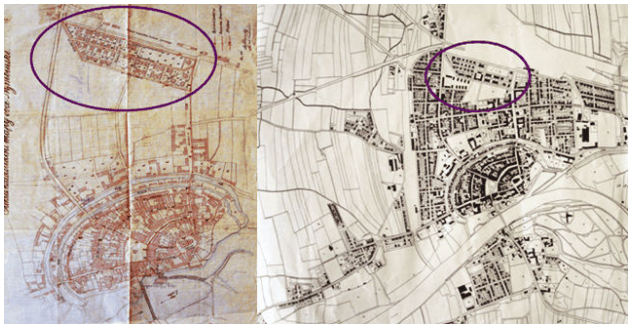
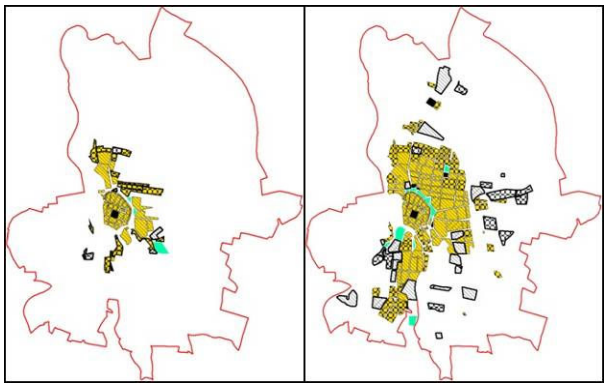


Fig. 7 Ústí nad Labem. Klíše integrated with the town (1901)/the compact built-up area (1945) (source: The Archive of Ústí nad Labem and the Ústí nad Labem´s region)

Fig. 8 Ústí nad Labem-Klíše. The abandoned plan of construction (1927) (source: The Archive of Ústí nad Labem and the Ústí nad Labem´s region)

Fig. 9 An example of the GIS technology – unified scale and format. České Budějovice 1827/1911. (source: Maier 2005)



5. Conclusions

The study supports the fact, that the urban area´s expansion is a continuous permanent process with its own patterns and phases. Through the studies of this kind we can forecast, plan and control the process. This fact supports the elaboration of local plans. The digital unification of scales and formats makes possible to create a reconstruction of former urban landscapes and to create a better prediction of next expansion. It is possible to create digital models through the GIS technology. So we can estimate and solve the impact on the environment.

The study is closed by the words of Semotanová (1998, pp. 170): „The analysis of the residential structures since the half of the 19th century, with the association to the landscape changes, is one of the "white pages" in a historical-geography research. ... The analysis of the historical-geographic associations could help to the knowledge, that the process of massive urbanization, which has started since 1850´, has been the elementary stimulation for the creation of the present so-called urban civilization."

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Round villages

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Abstract

The subject of the contribution is the insight to Czech countryside landscape, where many different kinds of villages are to be found. Typical feature of Czech country landscape are villages with a round basis place, Czech called „okrouhlice“. Archaeology and Residential Geography are science which study this subject. Archaeology study villages mainly in light of genesis. Archaeologists disagree term „okrouhlice“, they give different names to round villages, just because of genetic point of view. Residential geography studies settlement in present, so this science use term „okrouhlice“. The point of my lecture is to present to audience real shape round villages, their appearance and history. The present research is based on field methods, and of course the indoor data collection, which were the old maps and relevant literature sources.

Keywords: round village; curvature; intrusive buildings

1. Introduction

Main aim is to introduce basic types of villages in Czechia according to their structure, and concentrate on villages with a round basis place, called *okrouhlice* in Czech, so in English „round village“. Each geographer in Czechia knows what the term *okrouhlice* means. Problem was with particular location of these villages, because one may hardly see any mention about them. Thus, first question for thw research was: „Where are they?“ When we found them on the air maps, we had got next question: „How they really look? From surface.“ The last question was rather philosophical: „Why do they exist?“ So we wanted to try to request on these three question.

2. Methods and material

This work use two methods: indoor and outdoor. First indoor method was searching villages on air maps. It was first meeting with round villages. Next was collecting photos of every village which I found on the maps and selection the best ones. After selection came traveling and visiting the best round villages. It

was a little shocking because when you drive into the village you saw any round square! Only normal houses, trees, roads – nothing special! You had to go to certain angle an you could see *curvature*. Sometimes it is hard to believe one is in a round village! During my visitation I went over the square and observe local architecture, monuments, old trees and people. Sometimes I asked them if they know what the term *okrouhlice* mean. The majority of them did´n know. Only one woman – chronicler – knew, but only generally. She didn´t know her village is also round village!

Other indoor method was comparison new and old maps of villages. This part of my work was very interesting because I could travel in the time and see changes in built-up-area, but mostly were villages conserved against most of the towns. Last method was reading books about villages generally or about factual villages.

3. Villages (case studies)

3.1 Slatina

This round village is situated in Region of Ústí nad Labem (ca 40 kms southern from Ústí n.L.). First mention is from 1057, so this is very old settlement. Square is large and clear – without *intrusive building* in square.

Fig. 1 Map of round village Slatina 1843 (source: *historickemapy.cz*)

3.2 Lhota pod Radčem

This village is situated in Region of Plzeň (cca 50 kms northeast from Plzeň). Lhota is curious round village because it hasn't round square but long oval. It´s cause by slope terrain.

Fig. 2 Map of round village Lhota pod Radčem 2002 (source: *mapy.cz*)

3.3 Lipnice and Struhaře

Both of these villages are situated again in Region of Plzeň but now cca 40 kms southeast, and cca 7 kms from each other. **Lipnice** its the biggest round village in Czechia and it was reason why it is defended village. Although this village is big, there is a problem, because you can't see *curvature* from surface. It is caused by *intrusive buildings* on the large square. Against **Struhaře** is small village without invasion and you could see curvature very well!

Fig. 3 Map of round village Lipnice 1838 (source: *historickemapy.cz*)

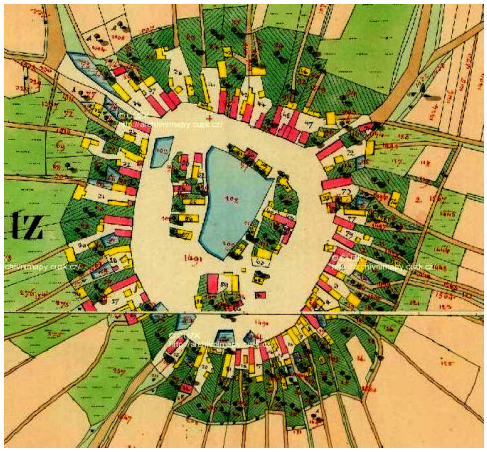


Fig. 4 Square in Struhaře 2007 (source: author)

3.4 Olešník

Village is situated in Region of Southern Bohemia, cca 20 kms north from České Budějovice. Olešník has large square without invasion. Buildings are constructed in the style of rustic baroque (end of 18th and first half of 19th century). Radioactive lagoons from former uranium manipulation factory in near Mydlovary is big problem of this village.

Fig. 5 Map of round village Olešník cca 2002 (source: *mapy.cz*)

3.5 Lukavec

Lukavec is located in Vysočina region, cca 50 kms northwest from Jihlava. It is the biggest round-village according number of inhabitants – cca 1000 in census 2001. Even isn't village but market-town with Square of St. Wenceslas. In the middle of the square is the church and the school.

Fig. 6 Map of round village Lukavec cca 1838 (source: *historickemapy.cz*)

3.6 Round villages of earl Špork – Byšičky and Vápensko

These two villages are unique. They were found by earl František Antonín Špork in his earldom Lysá nad Labem (cca 30 kms northeast from Praha) in the 1720´s. So we've got evidence about idea of round village in baroque times. These villages were frame like a components of a large baroque cultural landscape.

Fig. 7 Map of round village Byšičky 1842 (source: *historickemapy.cz*)

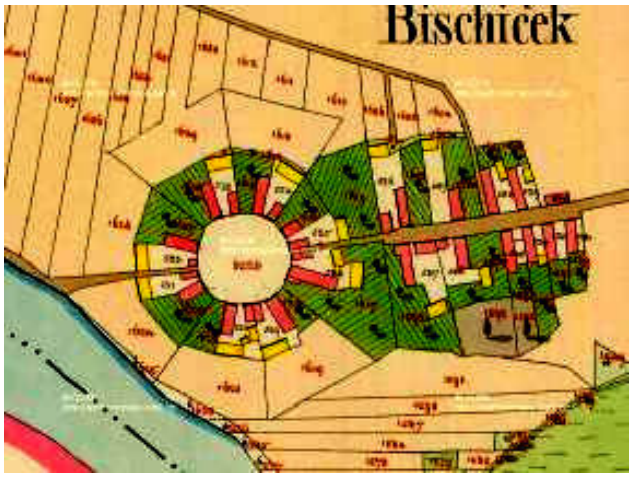


Fig. 8 Map of round village Vápensko 1842 (source: *historickemapy.cz*)

4. Results

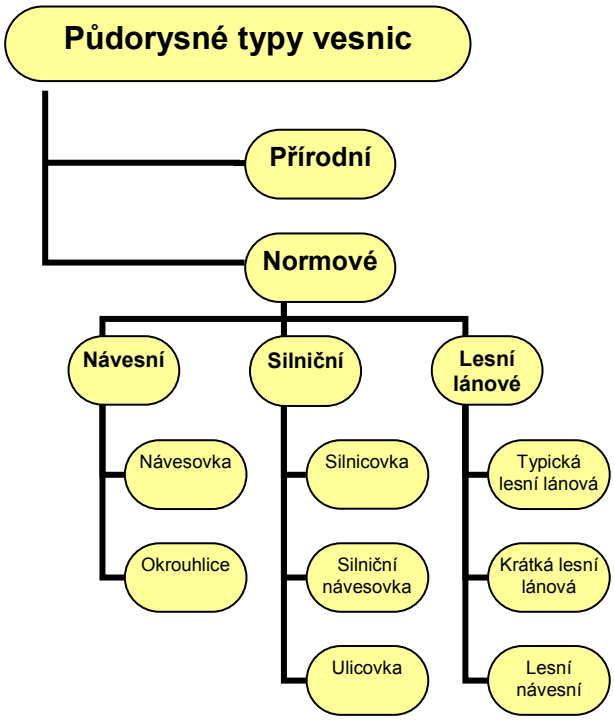
Main result is discovering of round village in Czech landscape. There are big difference between Bohemia and Moravia. Moravia has minimal amount of this type villages. There are three large areas with higher number of round villages: West Bohemia (around Mariánské Lázně and Tachov), Podbrdsko / Area under Brdy mountain (e.g. Lipnice, Lhota p.R., …) and Vysočina region (e.g. Lukavec, Zubří…). Except this Northern and Southern Bohemia. So why are there? The simplest explanation is appearance Slavonic people which wanted be together is small „fortress."

5. Conclusion

Studying rural settlement in Czechia isn't simple, because there are no uniform typology. I used typology from Černý (1979), who dividend villages to two groups according the date of their rise in middle-age. Villages are divided to natural and norm, and the norm are divided to square village, road village and forest village. And village with round square are part of square village and forest village. The term „okrouhlice" isn´t acceptable for archaeologist, but even for residential geography, they use terms derived from around fields – „lesní návesní ves" (forest round square village). According archaeologist the right round village has only one exit!

Results of this study should help villages to understand their uniqueness and to help them to create condition for development of tourism.

Diagram 1: Division of villages *(source: Černý, 1979)*



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The French Immigration Policy: What do we learn?

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Abstract

The paper involves in actual theme of immigration and integration policy and of its analysis in the country, which has – among the Europeans countries – the longest experience with immigrants. Europeans countries could be actually characterized by favourable economic situation, which attract the immigrants from poorer and less developed countries, but also by aging of the "original" population. So, current studies are trying to find the role which the migration could play in scale-down of this aging and how to manage it best. The results can be useful not only to the theoretical debate of finding the best model of cohabitation of different populations, but also as a sort of "lesson", what is good to be taken from French immigration policy for the construction of Czech immigration and integration policy.

Keywords: migration policy; integration of immigrants; assimilation; France

1. Introduction

Population migration is influenced by many factors. Economic reasons are so far the most important motif of migration processes in the world. Migration is defined as a subtype of spatial migration of inhabitants to satisfy various needs. Based on the return rate and regularity of this movement, we differentiate between migration, regular movement of inhabitants and irregular movement of inhabitants. Each of these movements can take place by crossing of any type of borders, which is one of the criteria, according to which we differentiate between types of migration. Other criteria could be for example time or the number of actors (Drbohlav 1998).

The basic criterion for immigrant differentiation is legality of their stay in the host country. Legal migrants could be divided for example by the main reason for their stay in the foreign country into *work* and *other*. Work immigrants can then be divided further into *economic* and *highly qualified*. The most usual types of immigrants for other reasons are *asylum seekers (refugees)*, *family migrants*, *seasonal* (*temporary) migrants* and *others*. This

classification describes the reasons for immigrants' stay in the destination country relatively well; however, unfortunately it combines temporary and permanent immigrants (Drbohlav 1999). The share of the individual groups within the framework of all migrants in Europe varies.

The total number of foreigners living in European countries reached 24.6 million (4.5 % of European population) in 2003. Vast majority of foreigners (23.5 million) lived in the Western Europe, where the share of foreigners was 5.5 % of the total population. In 2003, there were 10.1 million foreign workers registered in Western Europe, which is an increase by 38 % from 1995 (7.3 million). In 2002, 63 % (6.2 million) of them were concentrated in four countries: Germany, France, Italy and the United Kingdom. Between the Central and Eastern Europeans countries, the foreigners was significantly represented in Czech Republic (279 thousands), Estonia (270 thousands) and Hungary (130 thousands) (Salt 2005).

2. Methodology

2.1 Theoretical background

Due to complexity of the current migration streams and problems with the definition of migration itself, there has not been an "all-explaining" theory of migration formed (Drbohlav 2001). It can be rightly expected that it will not be formulated in the future either, because it would have to contain answers to a great number of questions, which are posed in studies of migrational movements: Who moves? Why do they move? Why do they stay at the new location? Or, why do they come back? Where do they migrate? How? When? What are the consequences of the migration for the migrants themselves, the relevant places and their population? It is much easier to explain answers to just one or two of the above questions and, therefore, there is a number of theories of migration, which can be divided into groups according to approaches (Massey et al. 1993). The main international migration theories are those:

- ***Neoclassical economics theory***: Its basis is the so-called *push-pull model*, where migration is a consequence of socioeconomic imbalance between regions, where certain factors act primarily as a *push* and others as a *pull*. International migration of labour is, according to this theory, caused by the difference of wages between countries;

- ***New (household) economics of migration***, according to which decisions on migration are done within the whole family – households try to diversify their sources of income for unexpected situations;

- ***Dual labour market theory*** says that international migration follows from the constant demand for immigrant labour, which is embedded in the structural nature of developed economies. Immigrants then occupy jobs in the so-called secondary sector – the less attractive jobs with lower average wages, higher instability of employment and low chances for promotion;

- ***Network theory*** builds on the fact that migration networks, which are formed by a number of interpersonal ties, make both migration and adaptation to life in the destination country's community easier;

- ***Institutional theory*** explores the influence of the various institutions established for migrants on the duration of international migration.

2.2 Migration policy

Migration (or immigration) policy of a country results always from a political consensus, which comes out from actual demographic and economic situation. It has two

big parts: first of all, it establishes the rules for entering the country and the types of documents which are necessary for doing so (visa) and the conditions of obtaining them. Secondly, it determines the rules for stay in the country (short or long), but also the conditions for entering the labour market, acquiring the nationality or for the right to vote at local elections. This second part is usually called "integration policy". According to the conditions and possibilities which are given to immigrants while staying in the "new" country and to be fully accepted in the society, we can distinguish three classical models:

- ***Multicultural*** gives to immigrants all the rights and promotes their cultural differentness, which is considered to be a treasure. This model was applied for ex. in Sweden or in Canada;

- In ***Differential exclusion*** model the immigrants are very quickly integrated to a selected domain (usually labour market), but they're denied from access to another one – usually from acquire of citizenship. This strategy was used for ex. in Germany or in Austria;

- ***Assimilation***, applied in France, gives to immigrants all the rights very quickly, but in exchange it's expected that they will give up their cultural particularities and that they will in sort "forget" from where they come

(Seidlová, Urban 2008).

The common point of all mentioned strategies is indeed non-problematic cohabitation of "local" and immigrant population. Unfortunately, the history has shown that none of the above mentioned models is really working without any difficulties, so nowadays the countries are trying to find another, new, best way of integration of immigrants. Actually, the concept of so-called "civic integration", which combines assimilation and multiculturalism, seems to be the most perspective (Lachmanová 2006).

So, detailed study of migration policy in the country which has between the Europeans ones the longest experience with acceptation of immigrants, could give us a sort of "lesson". This could be then useful not only in this debate about finding the best model, but also for all the newly established immigration countries – Czech Republic being one of them.

2.3 Research questions and hypotheses

On the basis of the acquired theoretical knowledge the following was formulated:

- Research questions:

1) Which factors and under which conditions causes the change of migration and integration policy?

2) Which of French migration and integration instruments and disposals could be applied in Czech conditions?

- Hypotheses:

1) Most important factors are the economic situation and the accent given to the theme by political leaders.

2) Most of the French migration and integration instruments and disposals could be applied in Czech conditions.

2.4. Method

Due to the nature of selected theme, detailed analysis of secondary resources was chosen as most suitable. The obtained knowledge was then adjusted in guided interviews with 15 professionals of French migration policy.

3. The evolution of French immigration policy

3.1. From the beginning till the Second World War

First of all, in the middle of 19th century, there were no laws which would regulate the foreign presence at the territory. Even if in 1851 were counted 400 thousands of foreigners, there wasn't any exact definition of them. The immigration to the country was not regulated, because the industry needed lot of labour force – the industrialization of the country was starting and progressing. At the very beginning, there were only some restrictions which concerned the everyday life of foreigners: they couldn't vote, lead the newspapers or be employed in public administration. New act from 1867 was on the contrary very favourable: it gave to new holders of French citizenship the same rights as to "French from born" and an attractive advantage – they were rid of military service, so dangerous at time (Schor 1996). In 1881 there were already 1 million of foreigners in the country and first citizenship act from 1889 established the principles which are used till our days. *Ius soli,* which applies to children of foreigners, give the French citizenship to every person born in the country at the age of 18 (if the person doesn't refuse it explicitly before) and *ius sanguinis*, which applies to the children of French citizens.

First foreigners were the inhabitants of neighbouring countries: Belgians at the north working in industry, Spaniards in the countryside on the south-west, Italians in the countryside on the south-east, Germans and Swiss being craftsmen or servants in Paris (Schor 1996). As there were no restrictions for labour migration, the foreign presence started already to cause social and political problems. Foreigners were considered as stealing the labour in the factories and first xenophobic moods emerged in the society.

In 1911, the foreigners represented about 3 % of inhabitants (1.2 million) and were originated mainly from Italy (36 %), Belgium (25 %) and Spain (9 %). After the First World War, the country needed labour force for reconstruction of the country (and also to positively affect the demographic change due to the war loss). The attitude to immigrants changed: the country signed bilateral accords (for example) with Poland and Czechoslovakia which supposed to accept labour force from these countries. In order to improve the hiring of employees, this task was given under the responsibility of private agencies (as *Société Générale d´Immigration* founded in 1924). Consequently, the number and the share of foreigners doubled between 1911 and 1931: in 1931, the foreigners were 3 millions and represented 6.9 % of total population. The proportions of Italians (28 %), Poles (18 %) and Spaniards (12 %) were the highest. As France was one of the rare countries which accepted asylum seekers in the period, the demand of labour force was also successfully satisfied from this source – wars and revolutions brought in 2 millions of Russians, 500 thousands of Spaniards (only in 1936) as well as lot of Italians (Blanc-Chaléard 2003).

However, the economic crisis of 1930´s didn´t sustains this favourable atmosphere. Together with the economic crisis came the crisis of identity of the nation and the foreigners began to be seen as the "fifth column". The anti-Semitism was rising and first detention camps for foreigners were built. All finished by the installation of government of Vichy within the Second World War which openly collaborated with Germany on the final solution of Jewish question (Seidlová, Urban 2006).

3.2. From Second World War till 1975

Within the Second World War and as a result of contradictory migration movements (like return of approx. 300 thousands of Spaniards into their home country), we found in 1946 in France only 59 % of foreigners before the war – 1.7 million, most of them being from Italy (26 %), Poland (24 %) and Spain (17 %). For France, as for the rest of the Europe, starts period of economic growth in bad demographic conditions – this means that the need for foreign labour force is high again. In 1945 comes in force *Code of French Nationality*[1] and *Order no.*

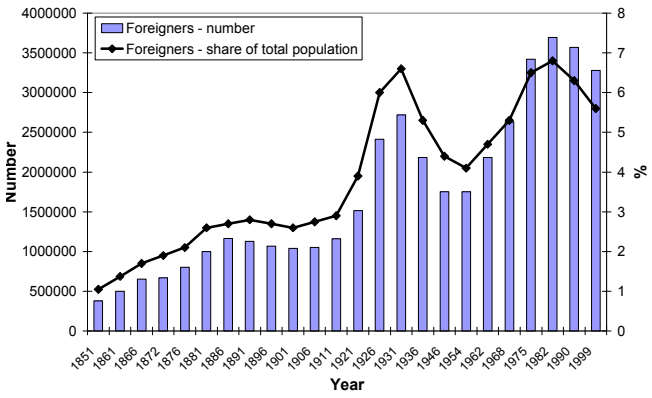
[1] *Code de la nationalité française* (19.10.1945)

45/2658[2] governing enter and stay of foreigners at the territory and founding *National Immigration Office*. Foreigners have to have an identity card, visa if necessary and documents concerning the purpose of stay. These principles are valid till 2008. Most important is the immigration from southern Europe: still from Italy, but also from Spain and Portugal, which replaced Poland. Anyway, the biggest change is another: the share of immigrants from the countries of Maghreb (Morocco, Tunis, Algeria) rise ten times between 1946 and 1975, from 3 % to 35 %, as well as their numbers (22times – from 54 thousand to 1.2 million). From a total of 3.4 million of foreigners in 1975, 22 % are from Portugal, 21 % from Algeria and 14 % from Spain as well as from Italy, which means that 71 % of immigrants come from one of these 4 countries (Schor, 1996; INSEE, 2006; Seidlová, Urban 2006).

3.3. From 1975 till 1999

As the growth of economy cannot usually last at infinitum, another economic crisis touches Europe at the 1970´s. As the goal was consequently suspend the economic immigration, immigration for economic reasons was prohibited by new act adopted in 1973. But, very contradictorily, in 1975 is adopted another act, giving to the immigrants the right to unify with their families. As the economic situation is beginning to be worse and as the rate of unemployment groves, the government solution is the destructuralization of industry – but that means even more unemployed persons. The foreigners are perceived as principals of this evolution, even if they're first to be released (Blanc-Chaléard 2003). So the government tries to send them back to their country of origin and offers them the so-called "Stoler´s Million", 10 000 FRF which are supposed to help them with reinstallation in their home country (act adopted in 1977). From 1980 it's also possible to expatriate illegal immigrants, from 1986 the visas are required from people from non-EU countries and the automatic acquisition of citizenship is replaced by voluntary choice. The so-called Pasqua´s acts from 1993 aimed to totally stop the immigration – for example, the children of immigrants had to clearly declare that they want to be French citizens between age of 16 and 21, the citizenship could be acquired after 2 years from marriage (instead of 6 months) and the police started to have right to control anybody on the street without any objective reason. These severe rules were moderated a little bit by act adopted in 1997, when also about 100 thousand of people were regularized (Čižinský 2005).

Fig. 1: Evolution of number of foreigners and their share on total population in France (1851-1999) (Source: Schor, 1996; Blanc-Chaléard, 2003; INSEE, 2006)



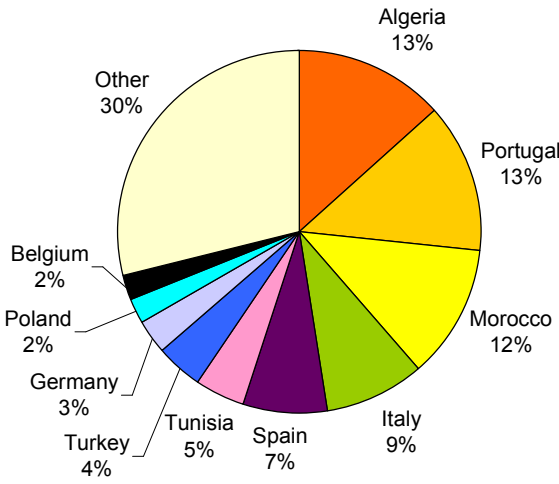
In despite of all these strict laws, the reality showed itself to be more complex. Initial migrant strategies were modified according to newly established rules: in stead of going to France for 3-4 years and returning home (and then, after some time, returning back to France), the immigrants chose to stay and to invite their families to join them – which gave an amount of 20-40 thousands of family members arriving every year in average. The political problems in former colonies exiled 145 thousands of people from Vietnam and Cambodia to France. The result was then not only an increase of effectives of immigrants **(see fig. 1)**, but also their continuous inflow. The number of labour force increased continuously also as the children were attempting the age of 18 and as children of reunified family (husband and wife) were born

[2] *Ordonnance relative aux conditions d´entrée et de séjour des étrangers en France* (2.11.1945)

in France instead of being born in the country of origin.

So, from 1975 to 1999, the number of immigrants increased from 3.9 million to 4.3 million, most of immigrants being in 1999 from Algeria (13 %), Portugal (13 %), Morocco (12 %), Italy (9 %) and Spain (7 %) **(see fig. 2)** (Seidlová, Urban 2006).

Fig. 2: The most represented origins of immigrants in France in 1999 (to in France mi v textu bohužel vypadlo) (Source: INSEE, 2006)



3.4. The actual situation

In 2003, the actual minister of Interior, N. Sarkozy, proposed new version of Immigration act[3], even stricter, which was finally adopted and shown how the immigration policy will be managed in following years. This one was than completed in 2006 by Integration act[4]. The changes were then in 2006 included in the Code from 1945[5] **(see chapter 3.2)** and created new code of law, codifying the entry and the stay of foreigners, the so-called CESEDA[6].

Those acts are the basis of actual control of immigration. Due to their number and complexity of changes their brought, it's impossible to speak about all of them. The common point, the shared attitude, is unfortunately that a foreigner has to be regarded implicitly as a bluffer, criminal and unintegrable being (Danielová, 2003). For example, those coming to France in order to reunify with their families didn't get no longer permanent residency permit but only a temporary permit. The deadline for embassies for giving decision about non-/ obtaining a visa is now 1 year, and the request can be refused both for more reasons and without any declared reason. If the police catch an illegal dweller, they can give him into a detention centre for 32 days – instead of 12. Also from 1st January 2007 the newly arriving immigrants have to sign an Integration contract[7] by which they engaged themselves to respect the democratic values of their new home – and if they will not respect them, their residency permit could not be renew. The only categories for which the stay is less complicated are the students and researchers, which obtain a visa for 4 years instead of 1 year.

As N. Sarkozy was elected French president on 6th May 2007, his propositions were more likely to enter into force and this year can be then considered as the year of biggest changes since 1945. First of all, he founded on 1st June 2007 new *Ministry of immigration, integration, national identity and co-development* and he nominated Brice Hortefeux to be the responsible minister. The previous administration (under Chirac presidency) has started the creation of *National museum of history of immigration,* which was supposed to be opened in June 2007. Due to the use of "national identity" term in the name of new ministry, 8 from 12 members of preparing committee resigned from their functions and the museum was then open without big interest of politicians on 10th October. On 20th November was adopted another act[8], which modified the

[3] No. 2003-1119, *Loi relative à la maîtrise de l'immigration, au séjour des étrangers en France et à la nationalité*

[4] No. 2006-911, *Loi relative à l'immigration et à l'intégration*

[5] This code is still applicable – in modified version.

[6] *Code de l'entrée et du séjour des étrangers et du droit d'asile* – created by *Ordonnance no. 2004-1248* in 2004, entred in the force in 2005, the prescriptive part entering in force on 15th November 2006.

[7] *Contrat d´Accueil et d´Intégration*

[8] No. 2007-1631, *Loi relative à la maîtrise de l'immigration, à l'intégration et à l'asile*

above mentioned CESEDA and who tempted to make ethnic statistics. This point was finally considered as unconstitutional by Constitutional council, while the disposal about DNA tests for those who requires family reunification stayed.

The main characteristic of actual immigration policy is its motto: "*immigration choisie, non subie*" (chosen but not suffered immigration) and the main question is how to choose the suitable immigrants and if even is something like choice of immigrants possible.

Fig. 3: National demonstration against the new immigration policy (5th April 2008 in Paris) (source: M. Seidlová)

Note: Translation of notice: "No to the racist policy of Sarkozy and Hortefeux – Solidarity between French and Immigrants"

The main signs of year 2008 are then, at the national level, demonstrations against this new policy (the biggest one on 5th April, **see Fig. 3**) and strike of irregular workers (from April till August). In the intention of co-development, accords with some African countries (Mali for ex.) were signed – the countries will receive an important amount of money like "development aid", but at the same time they have to accept the irregular immigrants which will be sent back to their country. The declared amount of such expulsions is established at 28 000 for year 2008. And, as from 1st July to 31st December is the turn of France at European Union presidency, this kind of demonstration in France takes also the European level: big mobilization against the so-called Return Directive[9] (adopted by European Parliament on 18th June) and against the new European Pact on Immigration and Asylum[10] (adopted on 15th and 16th October) **(see fig. 4)**. Both mean that the French vision of managing migration was successfully proposed to all countries of EU.

Fig. 4: From the conference about (and against) new immigration pact (17th October 2008 in Paris) (source: M. Seidlová)

Note: Translation of notice: *"Presidency of (European) Union – Presidency of expulsions?"*

4. Conclusions and recommendations

As we have seen, France was always seeking to solve the problem according to actual economic and demographic situation. However, the non-coherency of migration policy in the long term caused in result the rise of number of immigrants instead of decrease (1970´s). From this, we could summarize that more rigidity creates only more irregular stayers, but doesn't stop the flow. We could not also expected that people will definitely stop to move between countries one day because everybody is trying to find the best life and has the right to do it. On the contrary, we have also seen that when the country is open (1920-1930), the inflow is relatively high but in fact doesn't get over some

[9] Unifying the rules for expatriation of irregular workers which can be – for example – since detain for 18 months in detention centre (in stead of 6).

[10] This pact seeks to integrate and complement the efforts made by the EU institutions to shape a common European approach to both legal and illegal migration; it proposes for example more effective border control.

level – there have never been more than 7 % of immigrant population in France. The evolution on the case of France also confirmed the established theories as well as the hypotheses. The only thing that has not been really tried up to the present day is the impact of development aid on migration flows. It would be also interesting to see the regional implications of national policy – if there are any differences and in which sense.

Acknowledgements

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Environmental justice: What does it mean?

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Abstract

Environmental justice is one of many concepts of the relation between society and environment, focusing on a relationship between different social groups and the quality of their environment. In many cases, population with low social status (due to poverty and/or racial discrimination) lives in environment of poorer quality than population of higher social status. Environment of lower quality can be a barrier for integration in the society, what is seen as environmental injustice. Environmental injustice in this way contributes to the reproduction of existing social injustices. In this paper, environmental justice research is introduced. Some possibilities of cooperation between different sub-disciplines of geography are suggested.

Keywords: environmental justice; social justice; human – environment relations; sustainability

1. Introduction

Searching for greater unity and the "core" of geography is one of important themes of debate within the discipline (e.g. Matlovič 2006, Matthews, Herbert 2004).

The study of nature-society relations is at the core of geography (Peet 1998). During the history, different paradigms created their own ways of dealing with this question. The variety of paradigms in modern geography enables to approach nature-society relations in many different ways. Such diversity is often seen as negative for the unity of geography, due to separation of physical and human geography one from the other (Hampl 2006).

In this paper, I argue that the concept of environmental justice that addresses the nature-society relation has a major potential to integrate physical and social geography research and reconstitute the core of geographical inquiry.

Environmental justice research is focused on the quality of environment which is used by different social groups. People disadvantaged by their lower income, race or nationality live in environment with poorer quality then the wealthy or members of dominating racial or national group.

In the following section, I first introduce the concept of justice and environment in greater

detail. In the third part of this paper I show how environmental justice research is connected to other topics and concepts in geography.

2. Social and environmental justice

The term environmental justice integrates two very broad and general concepts: environment and justice. Each of these concepts requires brief scrutiny.

In many geographical studies, environment is understood narrowly as "natural environment", referring to soils, water, air and living organisms etc. However, society has changed the "natural" parts of the environment and, more importantly, created new environment, e.g. built environment in towns and villages, communications etc, which is called to be "second nature" (Smith 1990). For environmental justice research (e.g. Lucas et al. 2004) environment includes both "natural" as well as socially created environment.

The concept of justice in general refers to a claim for certain distribution of benefits in society (Velký sociologický slovník 1996) and certain ways of achieving such distribution. Therefore, distributive justice and procedural justice are distinguished.

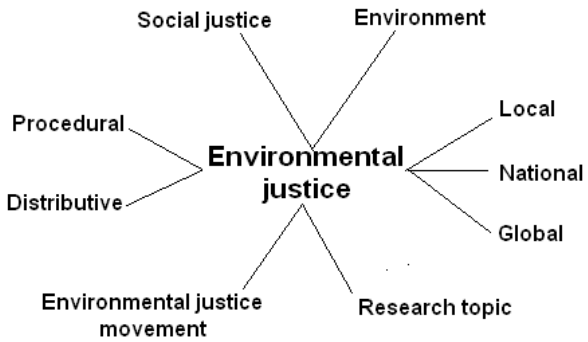
Neither human population and society, nor the environment is homogeneous (Hampl 1998). However, some differences undermine the possibilities of disadvantaged people or groups to participate in society. Such differences are perceived negatively and are called injustice. Distributive justice means that distribution of benefits and burdens meets agreed standards in a society (e.g. everybody has a reasonable minimum standard of living, or nobody is excluded from certain resources like health care).

On the other hand, distribution of benefits and burdens is a result of many processes. These processes can be studied from procedural justice point of view. A result is seen as procedurally just if it has been achieved fairly, with respect to the rights of all effected people.

There is no agreement, however, according to which rules the distribution and procedural aspects should be assessed. Some theories (e.g. libertarianism) emphasize procedural aspects. If the distribution is a result of just processes, based on free decisions of people operating on free market, so the inequality of created distribution is not important for libertarians. On the other hand, egalitarians perceive equality as the most just distribution and are not as much interested in ways how equality is achieved (see Smith 1994 for detailed discussion). Utilitarianism prioritizes the benefits of whole society over benefits of a particular member of society. To improve living conditions of a large group, conditions of an individual can worsen, and it is still seen as just for utilitarians.

None of these principles is fully applied in the real world. As Kruize (2007) documented, sometimes free market is the way how benefits are distributed (and unequal result is not seen negatively). However, minimal standards for other benefits and burdens (e.g. limits of environmental pollution) ensure relatively equal distribution among whole population. In some cases, the need to enable some activities important for the whole society, these minimal standards can be relaxed (e.g. higher level of noise is tolerated in proximity of an airport).

Fig. 1 Approaches to environmental justice (source: Roman Matoušek)



3. Environmental justice research

The diversity in definitions of environment and justice contributes to the fact

that environmental justice research has not a single paradigm (Liu 2000).

First environmental justice studies appeared in the USA in the early 1970s. In the 1980s, "environmental justice movement" (Bullard et. al. 2007), a social movement claiming the right of minorities in the USA for a safe environment, started to get wider support and initiated further environmental justice research and governmental policies focused on improvement of the environment in communities where mostly minorities live.

Two basic types of environmental justice studies can be distinguished: "quantitative" and "historical" studies (Hollifield 2001). "Quantitative" studies are based on census data about racial and economic structure of population and on evidence of polluted and contaminated localities (e.g. toxic waste sites). Statistical methods and GIS are used to find a correlation between race or income and proximity to a source of environmental risk. Many studies document that Afro-Americans and poor live closer to toxic waste sites than other social groups (e.g. Bullard 2007). These studies are criticized because they reduce environmental quality to just one indicator and do not discuss causes of such distribution (Bowen 2002).

"Historical" studies on the other hand side focus on processes of changes in environmental quality and racial or social structure of population, trying to find mechanism responsible for environmental injustice (e.g. Pulido 2000, Steger 2007).

The definition of environmental justice used by U.S. Environmental Protection Agency use both procedural and distributive approach to justice: "Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work (www.epa.gov)"

Environmental justice should not be understood as a claim for redistribution of benefits and burdens. In recent year, environmental justice movement and other environmentalists started to cooperate. The concept of "just sustainability" is used to frame such cooperation (Agyeman, Evans 2004). Environmental justice activist start to focus more on prevention of pollution instead of simple "redistributing" of risk. On the other hand side, mainstream environmental movements starts to focus closely on who is jeopardized by negative environmental changes.

In modern society, needs and personal desires of people vary significantly. Therefore the importance of some environmental features should be evaluated according to needs (and hierarchy of needs) of their users. Some qualities of environment are important for all people. e.g. everybody needs air which is not heavily polluted. However, some people are more sensitive to some kinds of pollution. On the other hand side, proximity of playgrounds for children is relatively important for young families, but is almost irrelevant for people without children.

However, in the differentiated environment its rare to have only positive aspects of environment in one place. Recently the case of relocation of Roma community in Vsetín attracted public attention. From environmental justice point of view, put away other important aspects of the case (Matoušek 2008), the Roma community was transferred from an old house in danger of physical collapse in a very busy locality near the center of the town (and therefore in proximity to all services etc.) to a newly constructed houses of higher standard, but in a peripheral segregated location near the sewage water treatment plant, railway and industrial zone, without any shops or services nearby.

Some issues are regarded as important in society and are therefore enforced by law. For example, there are standards for levels of noise, air and water pollution as well as mechanisms which should ensure that these levels will not be

exceeded. However, there are no standards for many environmental qualities (since there cannot be standards for everything) which might be very important for some groups of population (e.g. the proximity of shops or public transport for those who have problems with their mobility).

On the other hand side, the reinforcement of guaranteed qualities of environment is sometimes very difficult. In some parts of Prague, in particular near so called "North – South highway", the level of noise pollution is higher than legal limits allow. Some environmental NGOs are struggling for the right of citizens living close to this highway for not-too-noisy environment. Despite several court judgments their right was not implemented yet. Right for decent quality of environment is in conflict with the capacity need of urban transport system of the capital city of Prague and high costs of measures needed to decrease the level of noise around a highway in densely built-up area.

Interest in environmental justice originated on local level. However, with processes of globalization and global environmental changes, the issue of environmental justice is becoming discussed on national as well as global scales. Developed countries are seen to be mostly responsible for man-caused global warming as well as for most pollution of the environment. However, predominantly poor inhabitants of developing countries are exposed to environmental burdens created to satisfy the needs of developed world (Adeola 2000). Global environmental changes are studies mostly by physical geographers. Impact of these changes on different societies is a field for human geographers. Environmental justice is a concept that binds together these two geographical sub-disciplines.

4. Conclusions

The discussion above shows complexities of environmental justice in terms of theoretical conceptualization as well as in real world decision making. Possible approaches to environmental justice are summarized in fig. 1.

Geography has a great potential to integrate many different aspects of the problems. Environmental justice research is linked to some concepts which are in the very core of geography, like environment or scale.

In this paper, I tried to show the importance of environmental justice as a research field in academia as well as an issue influencing everyday life of many people. I discussed opportunities for geography to play a key role in environmental justice research.

Many research topics in Czech geography are closely related to environmental justice, e.g. geography of health (Dzúrová 1993) and studies of environmental stress and environmental quality (Mikulík, Vaishar 1996). Environmental justice might be a field of cooperation within geography as well as a field of cooperation between geography and other disciplines. I see environmental justice research as a major challenge for contemporary geography.

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Project training in landscape research at Institute of Geography, Brno

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Abstract

The main goal of our article is to present unusual ways of geographical teaching at universities (with case study from Institute of Geography). The discourses is led in the example of two semestral courses - Sustainability and Urban & rural studies. Both courses are mainly maintained by A. Hynek. The aim of each course lies in teaching students how to recognize spatial patterns and possible environmental, social, economical, political, cultural and other threads/structures of landscape by studying the research area from its internal base. The whole training cycle could be considered as project and its output is presented in the relationship to local communities (with respect to shareholders, stakeholders, decision-makers, experts (outside and inside), actors/actants etc.). Studied area of the project training varies in each semester depends on current research project. All projects are situated in South Moravia. This article also refers to some existing projects. The latest research is being done in rural area (covering parts situated in North from Brno), where three villages (Lipůvka, Lažany, Újezd) have been selected for farther studying. Recent outputs from this research would be presented as a case study at the final part of our paper.

Keywords: sustainability; urban; rural; project training; cultural landscape; South Moravia

1. Introduction

In the following article we would like to present model project training in landscape research from the student's point of view, realized by author's team under A. Hynek and B. Svozil at the Institute of Geography. Subjects Sustainability and Urban & rural studies empower students to reach experiences under factual projects. Projects are based on strict application of sustainable development (in the mean of sustainability) and environmental security in particular areas (regions). Project training reposes harder requirements to students and teachers. However it exceeds the doctrine of information memorizing (learning terms) deeply ingrained in the Czech education at all levels, it offers the platform for practical application of

geographical skills, overcomes the apperceived duality between physical and socioeconomic geography, shortens the possibilities of student's asserts and in this author's team it offers (rather rare) motivation, which is ensured by publication of quality outputs (uses of student's collected data, shared authorship etc.). Last but not least we would like to remind that key point is the terrain survey, which currently isn't the rule in the landscape research (unfortunately among geography students as well).

Our maim goal is to present alternative approach to classical education in further landscape research and we defined our zero hypothesis as follows: Using comparative and additional methods of qualitative research have its important impact to understand events and patterns in the spatial environment which could be hidden under mere quantitative research.

Structure of this article is conceived from the author's views that came through the projects since 2006 from the students position, (those students whose outputs were published in several articles) through secondary authors, secondary researchers and methodological creators, to seminar tutors in winter terms 2008. This approach carries monotone citation risk (almost all sources came from author's team), on the other hand, we could propose complex personal direct view (especially in the 4th Chapter – Conclusion).

2. Methods and material

Training passes over two linked subjects: Sustainability (winter term) and Urban & rural studies (summer term). Basis of these subjects are the ESPECT/TODS concept and materials from Millennium Ecosystem Assessment enterprise.

2.1 ESPECT and other methodological concepts

In mentioned projects we mainly applied methodological concept ESPECT/TODS – emphasizing relations between six main poles of hexagon: **E**(conomy) - **S**(ociety) - **P**(olitics) - **E**(cology) - **C**(ulture) - **T**(echnology). Inner rhombus with nodes **T**(emporality) - **O**(ppression) - **D**(ominance) - **S**(patiality) "explore simultaneously the spatial and temporal effects of the power/knowledge nexus. Finally, the inclusion of both the hexagon and rhombus into a single framework reflects the necessity for the researcher of investigating ESPECT and TODS as parallel, complementary and interconnected systems since it is not only through the synthesis of nodes, but also through an examination of processes, which coproduce these geometric arrangements, that we can get a better grip on the physical, social, and imagined "reality" (Hynek, Hynek 2007).

The key concept (described above) is connected to close relation between natural and cultural landscape ecosystems mentioned in conceptual document "The millennium Ecosystem Assessment" (MA) (2002-2008). "Natural and managed ecosystems provide human enterprises with essential goods and services". These ecosystems are also being classified as source of liability during its own use. MA concentrates on mutual cross patterns between ecosystem services and quality of human being. Sustainability and MA aspire after preservation of natural resources for next generations under filling actual human needs.

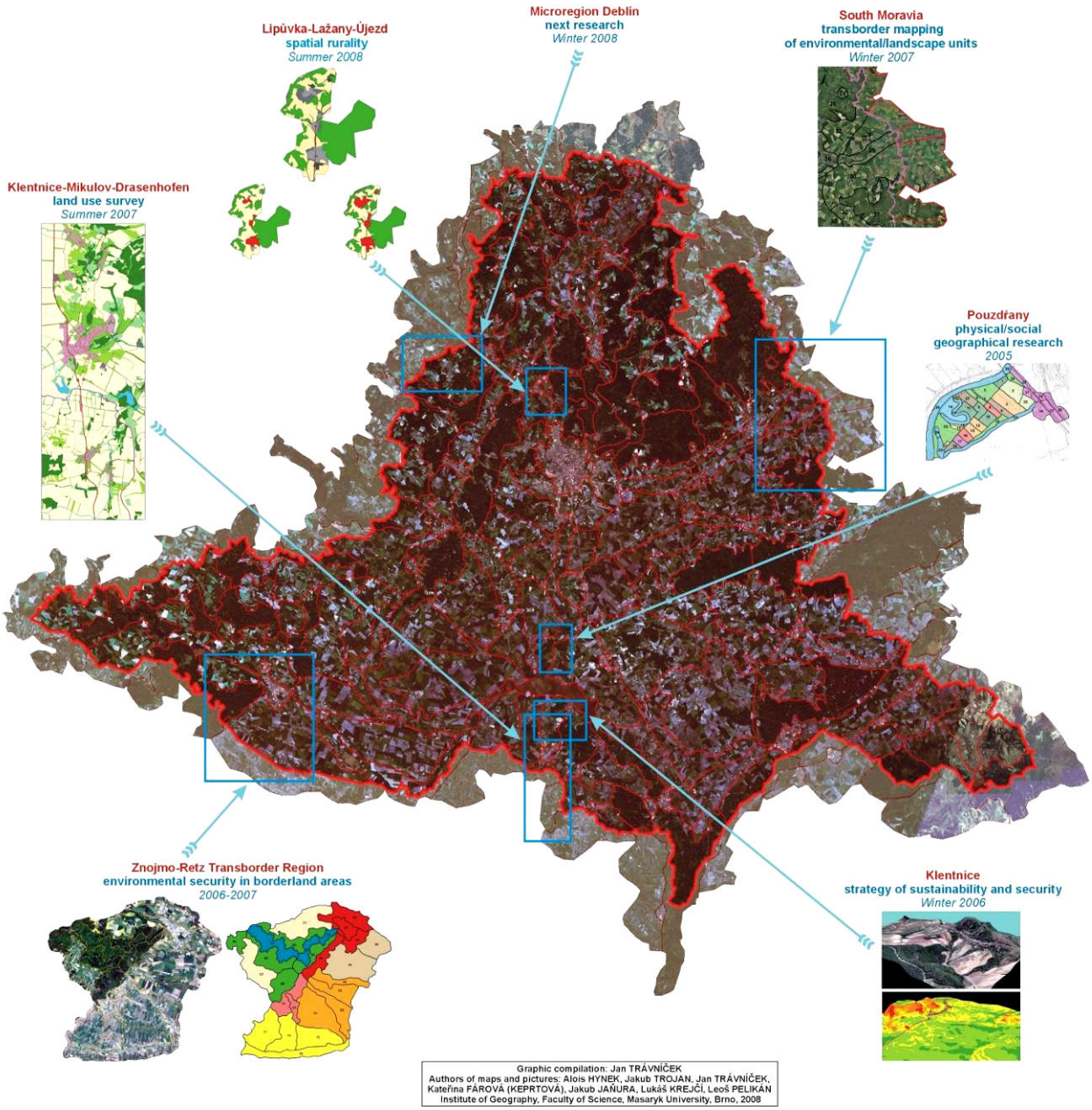
We can see that for projects is typical using of "methodological triangulation" (Denzin 1989, Hendl 1997). This means the combination of variable methods in the single-feature research. Students use "thin" (upper-most) and "thick" (deep) data description and analysis in their component research. They compare quantitative (mostly census) data with qualitative data (with qualitative methods) directly in terrain. For example, they use mind mapping (mental maps), personal documents analysis or interviews with local people and also with important stakeholders, shareholders, outside/inside experts or decision-makers who are interested in research area. The most important is cooperation among university, public administration, local municipality and local community. Most projects end with public presentation of results and implement these results to ordinary life.

2.2 Progress of projects, resulted publication

We are insiders in both subjects since 2006. This year concurred to experiences from years 2004-2006, where the main aim was physical and social geographical research of Pouzdřany municipality. (Hynek, Herber, Svozil 2007).

Year 2006 was dedicated to cooperation between university and rural community in finding strategy of sustainability and security of Klentnice municipality (Hynek, Svozil, Trávníček 2007, Svozil, Trávníček 2007) ended with student's public seminar for local residents in Klentnice. Borders were crossed over throughout the transborder mapping and father research of Klentnice-Mikulov-Drasenhofen (Hynek, Hynek, Svozil 2008) and international project Environmental Security in Borderland Areas: Exploring the Znojmo/Retz Transborder Region (Hynek, Hynek, Herber, Christian, eds. 2007).

Fig. 1 Map of environmental spatial units of South Moravia and other projects (source: authors)



The main basis for training in autumn 2007 was map of landscape ecosystems of South Moravia. Students lengthened border units **(see fig. 1)** over the region (county) border (narrowly about the map creation and extending units in Svozil, Trávníček, Trojan, Šťastný (2008). The next chapters describe in detail project of Lipůvka-Lažany-Újezd proceeded in summer term 2008.

3. Results

As a result of training activities continuously following last terms we could present project from the last semester. This project was held in the North part of Brno hinterland – around municipalities Lipůvka, Lažany, Újezd u Černé Hory. The idea of this project was invented by B. Svozil and A. Hynek and its main part was done during the course Urban and Rural studies. Methods used in this project were based on qualitative and also quantitative research of spatial rurality.

Selection of these three villages was because of its inner differences (e.g. in primary characteristics of population based on census 2001 or in the cadastral area) but some greater outer resemblances. Student's aim was to discover partial hidden patterns inside studied area.

3.1 Research area

Short description of selected municipalities could be described as follows: Lipůvka is situated in the crossing and it is suffering from negative subsequence of heavy traffic (almost 23 thousands cars per day) connected with heavy noise exceeding the limit. This main road is called I/43 and it's the main connection between Greater Brno area and Svitavy region. Lažany lies on the same road and its primary function is (and historically also was) transit. The intersection has much negativity, but some plus factors such as excellent connectivity, important transition function and good capital movement in the space of flows are attendant as well. Lipůvka, in addition, is a nodal place for other surrounding smaller villages (except sport and leisure time activities which are fairly located in Lažany). A bit different is historical settlement based on radial spatial pattern called Újezd u Černé Hory. It has many interests such as historical agricultural backgrounds (connected to present by large piggery built in socialist era), unique cemetery with old church in the central hill **(see fig. 2)** and closed people communities, which is caused by Újezd's remoteness (e.g. the connection with I/43 is set by minor road). The remoteness is also relative, because Újezd could be considered as one of the possible gate to Tišnov tourist region (Hynek, Svozil, Trávníček, Trojan 2008).

Fig. 2 Radial spatial pattern, relict landscape and dominant church in Újezd u Černé Hory (source: J. Trávníček)

3.2 Research topic and selected aims

Students were free to choose which research topic would be their half-semestral goal. Groups of students (each group consists of 2 or 3 people) have gone to the terrain and decided what they focused on during their further research. Here are some selected themes:

- History, present and future state of piggery and its impact to social life in Újezd u Černé Hory.
- The role of R/43 and its Nazi history for the life in the subrural areas of Greater Brno area.

- Concentration of sport and leisure time activities to Lažany – causes and consequences.
- Service commuting and its spatial impacts (with cartographic geovizualization).
- Observing the actors network and predicting the patterns (focus on historical spatial facts) – short movie with controlled interviews with main actors (talking about main actants) was prepared by this group.
- Terrain mapping of functional polygons in Lipůvka, Lažany and Újezd u Černé Hory.

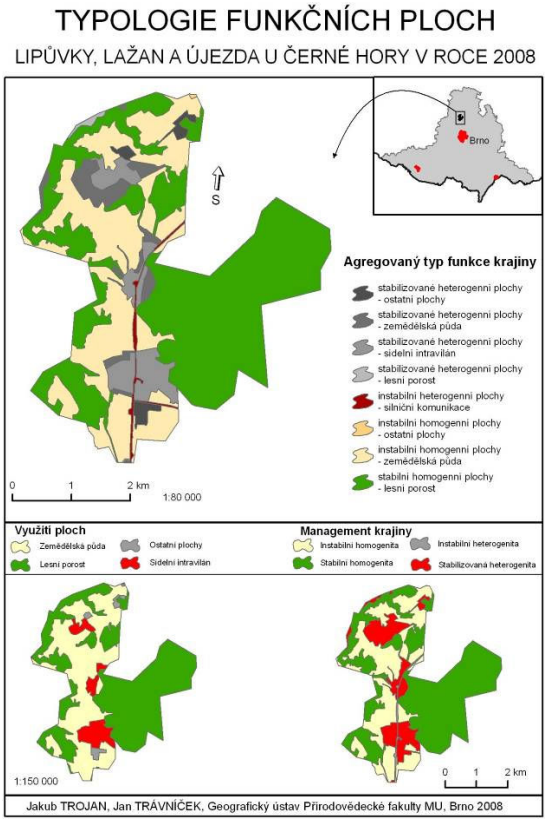
3.3 Project results

Especially last three quotations (from the subchapter above) were successful – the original map based on qualitative and quantitative (correlation between work commuting and service commuting weighted by number of bus lines) evaluation of questionnaires distributed among people observing they spatial commuting for services (such as basic foodstuff, doctor, specialized doctors, culture etc.) was practical output acceptable for further analysis (which is useful for municipalities and transport undertaking).

Artistic and also scientific (from geographical and historical point of view) added value had research done by V. Walter and O. Oulehla. They found main actors of each municipality, took video camera and asked the actors about interesting actants (e.g. historical settlement of villages, key points of spatial actants relocations, actors/actants network patterns and so on). The professional short documentary film was edited. Its indisputable asset is raised with its integrated scientific approach to the topic and artistic presentation of collected data.

Terrain mapping of functional polygons was done by authors of this article **(see fig. 3)**. Principle of the mapping was in terrain analysis of each facet from two points of view – in term of landscape management and in term of perceptional land use utilization. Final synthesis of functional landscape types, modeled in GIS environment, is supplemented with evaluation of dividing lines among particular elements. We also aimed at dependency between sharpness of functional types change and dynamics of their usage. Map of aggregated areas is shown below. Detailed description of methods and results concerning functional polygons mapping is described in Hynek, Svozil, Trávníček, Trojan (2008) and is also being prepared as poster.

Fig. 3 Innovative typological map of functional units as student research result (source: authors)



These results acknowledge zero hypothesis in the Introduction chapter and give example of successful combination of quantitative and rather qualitative data mining.

4. Discussion

This training process is rather exacting to both interested sides – to teachers providing the concepts and coordinating whole project training and also to students who are ripped out of ordinary education (represented by memorizing things) and pushed into terrain. Nowadays, most students prefer exactly and uniquely determined tasks with no own added value (and no added energy costs). Unfortunately, this type of students is still prevailing in Czech education system. Team building, which is one part of added value engaged during project training, is one of the soft skills requested by potential employers in the labour market.

Farther scientific research is part of doctoral degree programmes and students should have awareness of qualitative and quantitative methods. Quantitative methods are commonly taught in bachelors programmes but qualitative research represented e.g. by project training is missing even in masters degree programmes. Furthermore practical outputs from subjects are missing and student's motivation is reduced, that's why practical outputs (such as articles in geographical volumes, conferences, presentations etc.) of partial projects research at Institute of Geography Brno (described in last chapter) belong to necessary motivation for students.

Project training, which has unreplaceable position in the university education, must have practical outputs and this condition is in the courses led by A. Hynek and B. Svozil satisfied and fulfilled.

4. Conclusions

Finalization of project syllabus preparation for winter term 2008 is pending. Students should make a proposal of strategic documents in the border of South Moravian Region with interference overlapping to Vysočina Region. This could be done in the area of microregion Deblín. The cooperation is being planned with local primary school in Deblín and final public presentation in examined area. Research should consequently assess experiences and approaches from previous projects and creates a student platform for application of sustainability and environmental security principles in local/regional politics.

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