Environmental study of landscape dynamics

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Abstract
Students of Geography take part in geographical fieldwork based at the Department of Geography, Masaryk University in the Czech Republic. The fieldwork aims are focused on development of environmental and geographical thought, knowledge integration dealing with human and physical geography and other related disciplines with emphasis on new practical skills achievement. The fieldwork location is situated on the border of the valuable preserve area with unique karst relief just in the Czech Republic. This varied environment enables them to study human impacts on the environment from many points of view, including the monitoring of landscape changes over time.

Intending geography teachers study archive materials for changes of landscape. They work with old maps (maps of the first military mapping around 1870), with archive air photos taken 50 years ago, current air photos and up to date maps. They mark the most significant changes in the landscape during centuries. With teacher´s support they evaluate mainly changes of relief, waters, share of arable land and forests, urban areas spreading or their disappearance, road network, size changes of farm lands as an irreversible human impact caused by the change of economic structure in the half of the 2Oth century (named „collectivization“). Students search relationships and connections and predict future development of the preserve area and explore landscape evolution.

Key words: environmentalism, development of landscape, geographical synthesis, profession preparation of geography teacher

Introduction

For centuries landscape changes documents an interaction of natural forces and human influence (Ruda, 2008). Monitoring of the development of landscape includes the study of actual landscape state, landscape imagine based on historic maps analysis and especially evaluation of landscape changes. Understanding of process of environmental synthesis is serious skill and knowledge.

Future teachers of Geography studying at the Masaryk University use university fieldwork laboratory which is situated on the border of Moravian Karst preserve area. It enables to observe differences between the development of protected landscape with limited economic activity and landscape without higher level of protection.

Students work in the terrain and classroom as well. The fieldwork is mainly aimed at skills connected with primary data collection (orientation in terrain, terrain mapping, observing, material collection and analysing). Their work in the classroom is focused on studying historic documents and old maps, facts synthesis and presentation.

Views on the landscape

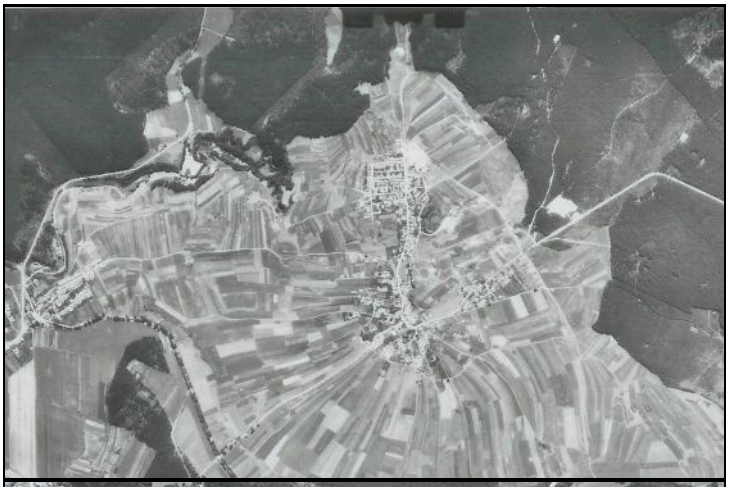
Landscape is a specific part of earth´s surface which can be observed inside to its outer attributes. These are the result of natural conditions and human activity. Inside image of the landscape comes from its material fundament, dynamics of natural, human and matter-energy process (Kolejka, 1987). Spatial understanding of the real state influenced further development of necessary methodical approaches of many disciplines. Individual possibilities of landscape usage are the result between natural area characteristics and technical opportunities on one side and knowledge and human abilities of a specific period of time on the other side (Kolejka, Marek, 2006).

The state of the landscape can be studied from map, Remote Sensing materials (aerial photos and satellite images) or captured during mobile mapping (Gajdoš, Midriak, 2007). While the mobile mapping captures the real state of the landscape archive materials are necessary for studying the development of landscape. The Czech Republic has many valuable map products and old aerial photos of an ancient landscape. The first military mapping was the first wide area mapping of the current Czech Republic (former it was a part of Austrian Empire). The accomplishment of the mapping is the set of maps in the scale of 1:28 800. The maps are without an accurate mathematic base and have visible signature of cartographer – officer – riding a horse, passing through the landscape a carefully mapping routes, rivers, streams, land use (arable land, meadows, pastures etc.) and various buildings – churches, mills. Maps were manually painted therefore objects can be easily identified (Figure 1). Maps are very valuable because of capturing landscape in its full species richness at the beginning of industrial revolution (Svatoňová, 2008).

Figure 1: Map of the first military mapping, 1780.

Aerial photography of wide areas in the Czech Republic was organized between years 1936 and 1938. Archive aerial photographs are deposited in the Archive of the Army of the Czech Republic from where it is possible to buy them.

a)



b)

Figure 2: Land use changes: a) Historical aerial photo, 1953 b) Recent aerial photo, 1999

Students´ work with aerial photographs

For observation of the development of the landscape students use copies of coloured maps from the first military mapping around 1780, set of aerial photographs from 1953 and 1999 covering study area (Figure 2). They use tourist maps in the scale of 1:50 000 to identify objects in photographs too. Students work with worksheets completed with objectives, recommended methods and procedures, basic theory and requested results (Figure 3).

Sample of working procedure:

1. Preparation of material (to create the sat of images)
2. Calculation of the approximate scale of up-to-date and historical satellite images
3. Identifying elements on Remote Sensing images
4. Identifying elements on the military maps
5. Find out defunct villages, rename of villages
6. Identifying landscape changes
    a. relief shape variations
    b. stream network
    c. distribution of water areas
    d. change of number of villages – defunct villages, new villages, rename of villages
    e. residential estate and recreation estate
    f. ways and roads – the relation between old and new ways and roads

g. arable land – more or less, new areas or the decrease of areas benefit of forest, villages, roads; changes in the way of maintenance, agricultural building, influence of agriculture on landscape

7. Synthesis of the results – evaluation of the main changes in land use and their reasons; assessment of revolutionary development of landscape during the relevant eras
8. Prediction of the next development of landscape, way of land use, ecological issues etc., independent work within the drawing and commentary making

Figure 3: Students work

Students survey work during thematic mapping

Another task connected to activities mentioned before is thematic mapping of recent land use. Field mapping is useful for the mapping of land use in smaller areas. That is the reason why each group of students map just the area of 20 km^2. The scale of the base map is 1:10 000.

Students prepare the legend before mapping, it is based on the purpose of the map. An typical legend will be simplified legend from the European project CORINE (CO-oRdination of INformation on the Environment; this programme was founded by the European Union to acquire up-to-date data about the environment situation, its changes in the future and to monitor reasons of these changes.).

Students work in the field and map homogenous (in case of defining typological elements) territories with the one type land use. They can map the concrete usage of areas that show the results of human activity in the landscape.

Sample of mapping procedure:

1. Create work groups
2. Divide the mapping area (each group maps other part of the area)
3. Go through a CORINE legend
4. Adapt the legend (simplify or complete the legend) for the specific situation of land use in Jedovnice and its neighbourhood.
5. Map selected part of the landscape (without – blind parts). Map individual features into the map within symbolization by colour or pattern.
6. Put map together.
7. Complete all map elements into the legend.
8. Present the results.

The completed map of land use can be used in many ways for evaluation in the research, education and practice. In connection with a map of landscape, this map presents relations between parts of nature much better than any other thematic maps. It also explains some of the reflections in anthropogenic influence on the area. The map can be used for other analysis (measurement, evaluation) and synthesis (the possibilities of optimal organization) that students and teacher do together. At the end of this activity, students compare the results obtained with usage of distant ways as well as with the way of field mapping.

Conclusion

Fieldwork practice is helpful in realisation of education aims. They enable abilities and skills to be developed (Knecht, Svatoňová, 2008). Fieldwork is an important part of Geography teaching. Present experiences show that fieldwork has been missing from Geography teaching (Hofmann, 2008). The reasons are that it is time-consuming and teachers are under-prepared to complete fieldwork. Working with students in real situation is helpful in school practice. Young teachers repeat many tasks that they learned at university. Our experiences show that many graduate students come back with their pupils to the "crime scene" and teach them how to study landscapes. This motivates them to examine the environmental issues and solutions and their interest in nature.

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