University of West Hungary

Theses of doctoral (PhD) dissertation

A SURVEY OF CHANGES IN LAND USE

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Background and Objectives

It is a general tendency that land use mainly is associated with economic exploitation of cropland but not a subject of protecting natural resources in the first place.
In Hungary, the economic changes made this sector change its approach on the turn of 1990s, and the concept of land use was extended to a wider and more complex environment system.

The dissertation highlights the complex procedure of change in land use in a selected model area (the impounded reservoir in Pátka and its surrounding); it also tries to analyze how the needs of the environment and economy are enforced in the course of land use change.

Our objective is to show how land use has changed in the selected model area, the impounded reservoir in Pátka and it's surrounding, over the past 150 years on one hand, and defining correlation between planning of land use, and its social requirements, effects on the environment and economic procedures. Another objective of the dissertation is to define zonal frontiers of environmental sensitivity and suitability for cultivation that give the frame of land use change.
One of our tasks was to highlight the ways of social utilization concerning changes and adjust them to the requirements of cross compliance.
It was also aimed in the dissertation to analyze the effects on land use functions in the research carried out for licensing land use change.
Our objective and task was to develop a geographic information system (GIS) database of land use change in the selected model area of the impounded reservoir in Pátka and its surrounding, on the base of which the anther makes recommendations for developing a single database for official licensing.

Data and Methods

The method is based on examination of social and environmental interactions of land use.
To indentify the relationship between land use and cross compliance we needed a method which could provide for exact information about the nature of change.
Environmental analysis of such type of selected model areas is essential as well as examining models adjusted to official licensing, defining their applicability, highlighting a specific system that is compatible with European Union (EU) norms, and the change in use can be observed spatially.
In our research we wanted to combine the methodology of regional Strategic Environmental Monitoring and that of at micro level. In this particular case Watershed of Lake Velence means the macro level where a long-term planning method of land use is used in local circumstances i.e. in the impounded reservoir in Pátka and its surrounding (the three model areas are as follow: Pátka Lesvölgyi residential area, Pátka Béketanya, land in Székesfehérvár top l. N^{0}-20136/6).
Representation of natural potential of the research area was carried out by positioning of the selected model area and characterising land use.
Analysis of land use change in the impounded reservoir in Pátka and its surrounding since 19 th centuries (1806-1869) were carried out using the data essential for developing a database suitable for official licensing.
The applied method was based on the topographic map of the examined area issued in 1987 as well as statistic and spatial correlation of CORINE CLC100 and CLC50 files.
The dissertation reveals all the research results shown in tables and graphs, highlights causes and reasons and gives specific recommendations.
Analysis of planning phases, licensing procedures of changes, records of farmers and present surface covers as well as comparing all them contributed to development of a new database necessary for formation of planned land use. We analyzed and evaluated a GIS model developed during local simulation in accordance with the theory of cross compliance.

Summary of Results

In the dissertation we proved the feasibility of system theory in land use changes in a selected model area by synthesis of cross compliance, regulations, social, environmental and economic effects.

Conceptual categories of a multifunctional agricultural model, land use, changes in land use, present structure and methods of cultivation as well as possible dynamism of changes were analyzed in the dissertation using Hungarian and foreign special literature.
We also introduced European and Hungarian regulating systems of cross compliance, their objectives, findings and the effect of subsidy on production.
Examination of land use change via environmental licensing procedures proved to be an applicable method, that is why Strategic Environmental Monitoring was introduced in the paper, its decision - making mechanism is shown in graphs.
The author explains the documentation of preliminary examination of land use, its procedure and legal regulation in graphs and figures.

Exact recommendations were made for applicability of zonal systems in the model area. We also introduced territories with environmental sensitivity and suitable for cultivation after carrying out tours of inspection and concerning recommendations of special literature.

In the dissertation we revealed land use change in the model area since 2nd Military Survey to present day. Basically we used CORINE CLC10 GIS database and the documentation of 2nd Military Survey (1806-1869). We showed territorial changes in methods of land use in course of surveys.
Analyzing the database of CORINE CLC100 and CORINE CLC50 surface cover in the selected model area we could prove that CORINE CLC50 is not suitable for depicting land use changes at local levels (differences in polygon borders, outlying of partial polygons, contradictions of dynamic range originated from CORINE CLC100).
In course of research we found that we do not have an official GIS database required for licensing of land use change due to its inadequate dynamic range. (According to a valid executive decree, a preliminary inspection is obligatory for changing leasehold over three hectares).

In the dissertation we developed CORINE CLC10 professional model which is based on official cartographic data files, compatible with EU norms and environmental procedures. Using the database of procedure – orientated GIS files, we developed a database that is capable of meeting social, economic and environmental requirements of land use change at present and in the future as well. The new method shows more exact correlations than present geographic models, it also indicates possible future changes providing important service for decision - making authorities.

In the dissertation we proved that CORINE CLC10 method supplemented with the database of special authorities involved can significantly improve planning, administrative and decision – making procedures concerning land use change and make applicable technology more reliable. We found out that CORINE CLC10 GIS database required for environmental procedures and supplemented with the data of special authorities (e.g. protection of heritage, water reserve and conservation) provides landowners for the possibility of facing legal restrictions and obligations during the licensing procedure not only after setting the documentation of preliminary inspection as well as meeting the requirements of cross compliance.

Theses of the Dissertation

1. Exact and applicable recommendations were made for using zonal systems in the selected model area. Territories with environmental sensitivity and suitable for cultivation were identified after inspections at the location. A conception of model was developed.

2. It has been proved that CORINE CLC50 is not suitable for depicting land use changes at local levels (differences in polygon borders, outlying of partial polygons, contradictions of dynamic range originated from CORINE CLC100).

3. It can be assumed that we do not have an official data base of geographic information system used for licensing land use change (four hectares) due to restrictions in dynamic range. (According to a governmental regulation, a preliminary examination is obligatory in case of leasehold over three hectares.)

4. An upgraded model has been produced that is based on official cartographic data, compatible with the EU norms and meets the requirements of environmental procedures. M=1:10 000 scale topographic map segments have been used as a base updated by local tours of inspection. The digitized format of topographic maps shows the situation of 2010, the cover surface is updated.

5. CORINE CLC10 method supplemented with the database of special authorities involved can significantly improve planning, administrative and decision – making procedures considering land use change and make the applicable technologies more reliable. Land owners could be provided for the opportunity the meet the requirements of cross compliance.

6. On the base of material analysed and special literature, we can assume that the system of cross compliance can be fulfilled in the selected model area considering the minimum system of requirements in producing healthy food, conservation of living environment, environment – friendly agricultural production, keeping livestock and food safety. The bases of single system of multifunctional farming are given or can be provided.

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