

Integrated Landscape Management As Basic Tool for Sustainable Development of Agricultural Landscape



Agriculture

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ABSTRACT

The aim of the paper is to present basic principles of integrated ecological landscape management of agricultural landscape. Integrated landscape management is a modern but very topical theme of landscape research promoting integration of natural, cultural-historical and socio-economical resources in a particular are. It follows from the necessity to solve not only mankind's environmental but also existential problems which often origin because individual branches of economy and industries enforce their interests in the sphere of land use. Practical application of integrated ecological landscape management contributes not only to elimination of environmental problems, but also to intensifying of socio-economical development of the given areas in harmony with capacities of natural resources.

Introduction

Existence of human population depends on land. Land is source of food and raw matter of crucial importance for human existence and simultaneously it is the spatial source for all productive and non-productive activities central for the development of human civilization. Land is simultaneously one of the most sensitive and most important environmental components. Basic specificities of land/soil as a natural resource are:

- Land is one of the most spatially extensive natural resource of landscape.
- It depends on action of all natural, especially climatic, conditions.
- It is exposed to direct negative effects of many stress factors accompanying human activities in landscape,
- It represents the vital condition for the existence of terrestrial landscape ecosystems.
- It represents the spatial basis for the development of all social activities in landscape.
- It is the basic productive means of agricultural process focused on production of food which provides for the nutrition of human population,
- It is the scene of interest clashes, as land covers almost entire economically exploited space.

These are the reasons why appropriate management of land and disposing of land (ecological optimisation of farming landscape) is essential for further existence of humanity.

Assessment of environmental problems

Agricultural landscape is subject to continuous changes. In the past, people vitally depended on their land and landscape. It provided them with subsistence and they handled the natural resources with delicacy and rationality. They respected, drew inspiration from land and lived in harmony with it (Kršáková, 2010). Progressively and increasingly humans interfered in landscape. They recreated and negatively modified it. Negative interferences of humans in landscape caused a number of environmental problems. Environmental problems connected with the use and protection of land resources are classified into the following basic groups (Izakovičová, Miklós, Drdoš, 1997):

Problems caused by negative effects of other resorts and industries to the land pool – These problems manifest themselves by the threat to qualitative and quantitative properties of soil and its sources. The most important problems include:

Occupation of farmland pool for other than agricultural activities such as construction of industrial areas, residential units, shopping and logistic centres, transport structures and lines and the like. If stagnation of the economic development is to be avoided, occupation of farmland cannot be altogether stopped, however it is necessary to avoid occupation of the best quality land.

Depreciation of land by foreign substances with origins in other activities such as industry and transport (industrial and

transport exhalation) urbanization (emissions of local heating systems, deposition of wastes on farmland, etc.) forest management (chemical substances protecting forest ecosystems), and water management (application of polluted waters to irrigation). Increased concentration of such substances causes soil contamination.

Problems caused by the effects of intensive farming a- This is the case when the natural resource itself, farmland, is threatened due to application of inappropriate agro-technological and agro-chemical procedures which cause increase of natural risks and hazards such as erosion-accumulation process, soil compaction, desiccation, etc. Repeated cultivation of monocultures on the same land deprives the soil of nutrients, air and moisture. Frequent cultivation of cereals on the same land causes the phenomenon referred to as the soil weariness, leads to over-reproduction of pests, weeds and overall decrease of fertility. Farming applying industrial fertilizers and chemical substances may also greatly contribute to soil contamination.

Problems caused by effects of intensive farming on other natural resources –This process results in is threatening and degradation of natural resources and disturbed ecological landscape stability. The most important problems of this type are:

Threatening of water resources due to application of chemicals in farming, release of agricultural wastewater directly into streams, water pollution in the consequence of agrochemical runoff, seepage of excrements, silo squash into groundwater, negative effects of intensive use of mechanisms, etc.

Threatening of the gene pool and forest sources due to continuous pressure of the expanding farming productions on natural ecosystems and in the consequence of chemical substances applied by aircrafts. Such negative activities have threatened even destroyed many valuable biotopes, gene pool localities, elements of the NATURA 2000 network, etc.

Threatening of spatial landscape stability – Farming has considerably modified agricultural landscape especially in countries where socialisation and collectivisation of agriculture took place. Typical for that period was land consolidation followed by the emergence of a mono-functional agricultural landscape with distinct negative effects on the environment. Balk were removed, terrace fields, meadows and pastures as well as river bank growths, wetlands and picturesque stake vineyards were gradually disappearing and changing into large-block fields and industrial vineyards. All that negatively impacted the ecological stability and overall image of agricultural landscape.

Problems threatening the environment and human health due to intensive farming. Origins of these problems are attributable to the effects of agriculture as a stressor burdening the living space of humans and directly affecting the human organism. Here belong overload of the environment due to use of agricultural chemicals, increased dust, noise, and odour rates and

microorganisms propagating infections. A frequent problem in terms of human health is the deficient quality of agricultural products and of human food sources. Many food articles are overloaded by increased concentrations of foreign substances.

Causes of these problems and circumstance leading to their origin are many. The principal ones are:

The ever-prevailing approach to the use of farmland from positions of individual industries. Development of industries and branches is often pursued at the cost of development in agriculture because it is connected with the demand and occupation of land or some negative impacts on land which threaten the agricultural land pool:

In a quantitative way - Occupation of land and its exhaustion in pursue of activities proper to individual economic industries.

In a qualitative way – Depreciation of land by foreign substances produced by industries and agriculture itself.

One-sided use of farming landscape ignoring the nature of landscape space as an integration of natural resources of certain quality and with certain limits of their reproduction capacity. For instance: farming ignoring presence of groundwater and the level of substrate permeability may cause its depreciation by seepage of chemicals, excrements from animal production and the like.

Preference to short-term economic effects at the cost of ecological effects. For instance: it is a nonsense from the ecological point of view to take crop yields per hectare for the main criterion if they were reached thanks to overuse of industrial fertilizers and unsuitable mechanisms threatening the quality of the crops, quality of soil and water, etc.

Lack of expert landscape-ecological information about the territory of a given agricultural landscape, deficient information about effects of individual anthropogenic activities on nature and natural resources including soil.

Deficient ecologisation of many technologies including the agricultural one, considerable damage caused to agricultural land pool, erosion, etc. .

Rigid legislations concerning nature and natural resource protection. Legal provisions often do not respond sufficiently rapidly to the economic development and the associated negative impacts on land and other natural resources.

Underfinanced measures which should eliminate the stress factors and introduce new ecologically harmless technologies.

Low environmental awareness, low educational level of population active in agriculture and low adaptability of labour.

Conclusion and proposals

If the food safety and sustainable use of natural resources is to be ensured a new system of management must be inevitably adopted. It is necessary to ensure ecological way of land management – ecologisation of farming landscape. Ecological optimisation is in fact the harmony of activities which focus on satisfaction of human demands concerning production of safe and healthy agricultural produce with the natural landscape conditions and the development of other social activities pursued in farming landscape. Ecological optimisation will eliminate the present and prevent new environmental, social and economic

problems and in a long time span it will provide for sustainable development of the concerned territory.

Ecologisation must be based on application of integrated management which leans on perception of landscape as a geosystem; it means a system which integrates natural resources in certain space. It is precisely space that represents the uniting framework, the scene where all resources exist as mutually overlapping layers (geological resources, water and soil sources, climate, biotic sources, morphometric parameters). Space is interpreted as an integrity of all individual natural resources in a given territory regardless the economic branch or industry.

Integrated approach to the assessment of farming landscape in turn must be based on landscape research in its three fundamental dimensions: environmental, social and economic. Implications and relationships between individual dimensions must be studied with the aim to define such landscape management which harmonizes social development of a territory with its natural, socio-economic and cultural/historical potential respecting the specificities of agricultural landscape. The optimising process of farming landscape must respect the following principles:

Stabilisation. The target is to create functional and spatially stable farming landscape with functioning ecological networks on all hierarchic levels.

Eco-so-zoological principle, the aim of which is nature and natural resource protection before their quantitative and qualitative degradation. It means that the proposed activities in ecologically optimising process of farming landscape must be in harmony with natural landscape potential.

Hygienic principle where the target is protection of human health. The ecological optimising process of farming landscape must respect demands inherent to protection of human health and use of all plots and structures in farming landscape must be adapted to this purpose.

Safety – The aim is protection of safety for all elements of the technical sphere of farming landscape such as animal farms, transport communications, electric conduits, and the like. These elements and their operation require certain protective zones which must be fully respected in the course of the ecologically-optimising process of farming landscape.

Compositional and aesthetic principle which means compilation of a single functional aesthetically satisfactory system of farming landscape.

Socio-economic principle. The aim is creation of a prospering farming landscape ensuring adequate quality of life of the concerned rural population and food safety.

Multi-functionality. It means respect for all functions of farming landscape including those of ecosystems and provision for their optimal use.

Land and the rural environment provide a variety of functions or goods and services covering production, regulation, habitat and information. Multi-functionality therefore is a key feature for implementing sustainable land development. (Wiggering, Dalchow, Glemnitz, Helming, Muller, Schultz, Stachow, Zander, 2007)

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