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LANDSCAPE PLANNING IN UKRAINE: THE FIRST LANDSCAPE-PLANNING PROGRAM

ABSTRACT. The paper presents the results of the first, in Ukraine; project on landscape planning widely accepted in European countries. Under the project implemented in 2010–2013, a landscape-planning program has been developed for the Cherkassy oblast. This is the first document of this kind in Ukraine. The program is mainly based on the experience of the German and Russian schools of landscape planning and on research and assessment conducted by the authors, which allowed identifying approaches to landscape planning, principles of the national policy, and characteristics and potential of environmentally friendly planning in Ukraine. The paper discusses the main phases of the work on the development of the landscape program for the oblast. It also identifies the main stages and key concepts and principles of landscape planning. The paper presents the results of integrated research on the identification and classification of conflicts in land use and the integral concept of the

developmental goals for the oblast. The results can be the foundation for adopting management decisions and development of action plans for the lower hierarchal branches.

KEY WORDS: landscape, planning, environmental management, conflict, development.

INTRODUCTION

The interests of society to manage spatial development can be met through different planning approaches and instruments. Planning is “a complex process leading to a consensus based on the recognition of all problems and assessment and identification of the goals. The ultimate goal is to develop a ‘template/model for future development’” [Landscape Planning and Conservation, 2006, p. 46]. An important tool for the European planning, which is developing in Ukraine and ensures the implementation of the principles of sustainable development,

is LANDSCAPE PLANNING (LP) [Landscape Planning: Implementation, 2012; Rudenko et al, 2011; Rudenko, Marunyak, 2012]. LP is accepted as a key planning tool aimed at the conservation of nature and landscape management. One of the most important LP tasks is research on the impact of natural resource use in a particular region, on finding ways to deal with and prevent the existing conflicts between users, and on preventing the loss of natural landscape properties as a result of the destructive impact of human activities. Environmental objectives in LP are achieved through transparent and democratic decision-making by fostering communication and engaging in dialogue all stakeholders – everyone who lives and works in a particular region, makes management decisions, or invests ideas or funds in its development.

BACKGROUND INFORMATION

Ukraine, with its changed landscapes and complexity caused by the transformed environmental properties of the natural components, indeed, needs the development of the new approaches to the environmentally friendly spatial development. Among the most important approaches, is the development of the concept of sustainable development and creation of projects on its implementation, and design of methodological and practical steps for the LP implementation.

In 2010–2013, the authors of this paper examined the experience of landscape programs (LaPro) in Germany [Landschaftsprogramm Brandenburg, 2009; Landschaftsprogramm Saarland, 2009; Landschaftsprogramm Schleswig-Holstein, 1999; etc.], refined and modified the principles and methods of LP developed in Germany [Auhagen, Ermer, Mohrmann, 2002; Heiland, May, 2009; Landschaftsplanung, 2004; Riedel, Lange, 2002] and Russia [Alekseyenko, Drozdov, 2011; Drozdov, 2006, Guidelines for landscape planning, 2001; Landscape Planning: Tools..., 2005], and applied them in a specific spatial planning project. Thus, they have designed a LaPro for the Cherkassy

oblast. According to the works of German and Russian colleagues [Landscape Planning and Conservation, 2006, p. 50], a LP program is a planning document that is “developed at the level of the federal land (districts, cantons, regions, etc.), which states the general purpose, requirements, and activities for the preservation of the nature and landscape management. It establishes a framework for the lower branches of planning”.

The concept of “landscape” in LP is treated in a broad sense and takes into account the different views on the definition. In our study, in accordance with the LP approaches [ILN, 1998] and the definition of the European Landscape Convention, landscape is treated as a “an area [Golubtsov et al, 2011], whose original character is recognized by people and is the result of the action and interaction of natural factors and/or human activity” [The European Landscape Convention, 2004; section 1a]. Depending on the type of assessment, the landscape can be interpreted in different ways: the point of view in relation to the soil or plant species is different from the understanding of the landscape, for example, considering its attractiveness and aesthetic perception [Landschaftsplanung, 2004, p. 22].

Obviously, the different interpretations of landscape do not contradict, but complement each other; it is important to identify which one is the most suitable for a particular task [Grodzinsky, 2005]. Therefore, in LP, the selection and interpretation of landscape from different points of view is inevitable. For example, the assessment of the most attractive areas for tourism and recreation activities (one of the main objectives of LaPro) includes different approaches to the systematic analysis of the landscape structure:

- classical genetic and morphological approach to determine the natural preconditions for such activities;
- analysis of man-made landscapes based on the types of land use – arable land, hayfields and pastures, industrial sites;

- subject approach –the perception of holidaymakers of certain spaces –a large forest stand, a large forested area, combination of woods and fields, settlements, river valleys;
- cultural studies approach –the identification of the “mental” landscape of historical and cultural artifacts, such as Kholodnyi Yar and Kanevsky Hills.

THE PROBLEM STATEMENT

The purpose of this paper is the discussion of the methodological aspects of LP and the main results obtained in Ukraine during its implementation. The paper presents, in detail, the inventory and assessment stages of this type of planning, the features of the analysis of existing and potential conflicts associated with the use of natural resources, and approaches to the development of the concept of the goals of land use. While working on the LaPro, we have identified the sectoral goals of using the territory of the Cherkassy oblast, focused on a specific component of the environment (climate, air, flora and fauna species and habitats, surface- and groundwater, soil, and landscape shape) for a specific type of human activities. The integral concept of the goals is a final document that, in a map format, reflects the agreed upon differentiation of the territory by the protection goals and the enhancement and development of the landscapes.

The framework conditions for planning in the Cherkassy oblast are an integral part of the preparation of landscape plans and have been discussed in the previous publications [Rudenko et al, 2011]. We want to emphasize that this phase is usually associated with a general spatial analysis and identification of the conditions for a particular area (institutional, social, economic, natural, and environmental) and objectives and tasks of planning.

THE INVENTORY-ASSESSMENT PHASE OF WORK

The main purpose for the inventory-assessment phase of the LaPro development

was to systematize data on the natural and socio-economic conditions of the study area. We conducted a targeted analysis of this information to determine the sensitivity of natural resources to the negative impacts of economic development and their significance to various human activities.

In the course of development of the LaPro for the Cherkassy oblast, the *inventory* of all available information on the socio-economic development conditions, characteristics of the natural resource use, and all the components of the natural resources was conducted [Golubtsov et al, 2011; Landscape Planning: Implementation, 2012]:

- **socio-economic conditions:** parameters that characterize the structure of industry, agriculture, transport infrastructure, foreign trade, demographics, labor market, social security infrastructure, etc. This information is important for setting the planning goals and identifying general directions and opportunities for development of the territory; it is necessary, therefore, for the selection of appropriate types of territorial assessment. For example, based on the structure of production (the dominance of agriculture) and the data on employment (high unemployment), one of the goals of the framework LP project was to define the recreational potential of the area as an alternative to the traditional industries; therefore, it was necessary to assess the attractiveness of the landscape for tourism and recreation;

- **natural resource use:** features and structure of the natural resources, the structure of land use, emissions, waste disposal, hazardous objects, etc. These data is the basis for defining the anthropogenic load on the landscape, identifying conflicts between the natural environment and human activities, finding the ways to optimize the structure of agricultural land and expand protected areas, and other activities;

- **climate and air:** solar radiation, atmospheric circulation, atmospheric pres-

sure, wind direction, temperature of air and soil, precipitation, and atmospheric phenomena; the local climate (mesoclimate) and mesoclimatic regionalization; air emissions of individual pollutants from stationary sources;

- **surface water and groundwater:** reserves of groundwater and surface water, surface water quality, water consumption, the depth of groundwater, groundwater aquifers (interstratal water) and their characteristics (distribution, thickness, chemical composition, etc.);
- **species of flora and fauna, biotopes:** the distribution of species of flora and fauna, the main biotope types, ranges of concentration of rare species of plants and animals listed in the Red Book;
- **soil:** the distribution of soils, soil-forming rocks, physical and chemical soil characteristics (size distribution, cation exchange capacity, humus content, pH, water permeability), areas with manifestation of adverse economic activity processes (salinization, waterlogging, eroded soils). Radioactive contamination from the Chernobyl nuclear power plant;
- **landscapes:** natural territorial complexes, modern landscapes, landscape image, geographical localization and characterization of the cultural and historical heritage, visual observation and photography;

The systematized and processed information is incorporated in the LaPro in a text format supplemented with the descriptions of the nature and society and the cartographic material developed and organized using GIS techniques (ArcGIS software). The geographic information system for the Cherkassy oblast in the LaPro consists of the raster (topographic and thematic) and vector maps (basic scale 1:200 000) positioned in the same coordinate system and linked with the databases on the territorial characteristics. The data on the current

land use and territorial planning of the area became the basis for the determination of conflicts between the existing and planned human activities and landscape functioning.

The important principles of the inventory phase of the study is the maximal level of the integral scope of work, which is consistent with a reasonable selectivity of data screening (evaluation of the data utility at the inventory stage) and flexibility of decision-making (the interchangeability of data and possible use of expert assessment). These principles are particularly relevant considering the situation in Ukraine, namely, obsolete data, their deficit and inconsistencies, and the immature system of environmental monitoring.

According to the modern LP concept [Auhagen, Ermer, Mohrmann, 2002; 6/Guidelines for landscape planning, 2001; Landschaftsplanung, 2004; 16/Riedel, Lange, 2002], ASSESSMENT in LP is used, first, for spatial differentiation of landscape features significance and, secondly, for identification of areas most vulnerable to the negative impacts of human activities. The evaluation criteria, according to the experience acquired to date, must meet the following requirements. They should focus on the goals of the territorial use stated in the framework project, correspond to the modern conditions of the natural environment, forecast possible changes of conditions of the natural components in the course of the implementation of the main directions of the territorial use, and identify the allowable level of such use [Guidelines for landscape planning, 2001, Vol. II, pp. 14–15]. Two categories of assessment are used in LP, namely, significance and sensitivity, each represented, as a rule, by 3–5-point ranking scales [Auhagen, Ermer, Mohrmann, 2002; Heiland, May, 2009; Landschaftsplanung, 2004]. A 3-point scale is used in the LP program in the Cherkassy oblast: for sensitivity/significance, it is high, medium, and low.

Significance means the level of correspondence of the conditions of the natural components to their reference state and is used to identify the optimal level of targeted use-functions, individual for each

natural component (for example, significance of soil to cereal or other crops production corresponds to the natural soil fertility) [Guidelines for landscape planning, 2001, Vol. II, p. 15]. The important criteria for defining the significance are such characteristics of the components as productivity, diversity, rarity, uniqueness, historical significance, and aesthetical attractiveness. Obviously, the same range has different significance for different landscape functions [Heiland, May, 2009]. "High" significance of landscape means that the target use within its boundaries is realized to the most optimal level; "low" significance means that there are few or no preconditions for such use. For example, the elevated and strongly dissected by gullies landscape of Kanevsky dislocation is highly important for the natural protection and tourism, but has low significance for agriculture.

Sensitivity is generally regarded as the intensity and speed of reaction of natural components to certain impacts (chemical pollution, soil plowing, recreational activities, etc.), the elasticity with respect to its return to the original state (a state of the components prior to or at the beginning of the intensification of anthropogenic impact) [Landschaftsplanung, 2004, p. 84]. "High" ("low") sensitivity means the higher (lower) probability of a component to degradation due to the impact.

In the development of the LaPro for the Cherkassy oblast, the focus was on the types of assessment of sensitivity and significance of the natural resources (Table 1) that correspond to the framework goals of planning [Rudenko et al, 2011]: development of agriculture, recreation activities, and tourism; optimization of water supply and consumption; and protection of bio- and landscape diversity (Fig. 1).

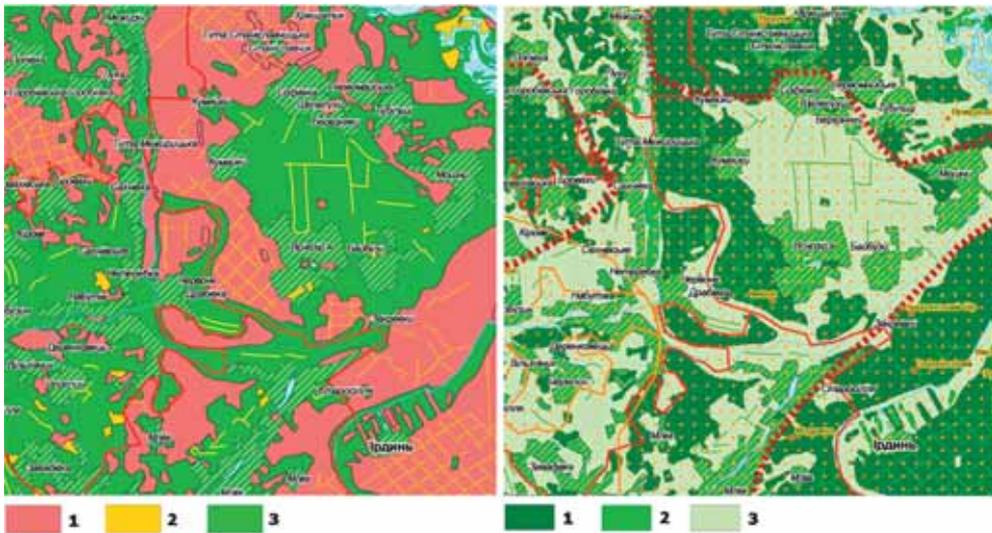


Fig. 1. Ukraine. The landscape program of the Cherkassy oblast. The sensitivity of biotopes to anthropogenic impact (a) and biotope significance (b) (fragments)

a) Sensitivity of biotopes to anthropogenic and natural impacts

Legend: 1. High –Biotopes with the highest sensitivity (low stability) to the anthropogenic impact (forest stands, wetlands); 2. Medium –Biotopes with the medium level of sensitivity (stability) to the anthropogenic impact (perennial stands, hay-fields, forest protective belts) 3. Low –Biotopes with a relatively low sensitivity (high stability) to the anthropogenic impact (arable land territories of settlements)

b) Significance of the "Species and biotopes" component

Legend: 1. High –Biotopes with insignificant anthropogenic change that provide for the environmental conditions close to natural; 2. Medium – Biotopes with notable anthropogenic change that provide conditions for habitat for some species; 3. Low – Biotopes with significant anthropogenic impact and poor biodiversity

**Table 1. Ukraine. The landscape program for the Cherkassy oblast.
Assessment of sensitivity and significance of the components**

SENSITIVITY	SIGNIFICANCE
Climate and air	
Sensitivity of air to chemical substances pollution	Significance of climatic conditions to human livability
	Significance of climatic conditions to recreation
	Significance of climatic conditions to agriculture
	Significance of climatic conditions to solar and wind energy generation
Ground and surface water	
Sensitivity of groundwater to chemical pollution	Significance of groundwater (interstratal) to water supply
	Availability of water resources
	Quality of surface water
Species of flora and fauna; biotopes	
Sensitivity of biotopes to anthropogenic and natural impacts	Significance of the component "Species and biotopes"
Soils	
Sensitivity of soils to chemical pollution	Natural productivity of soils (significance to crop production)
Sensitivity of soils to water erosion	
Sensitivity of soils to wind erosion	
Landscapes and landscape image	
	Significance of landscapes to tourism and recreation

IDENTIFICATION AND ASSESSMENT OF NATURAL RESOURCE USE CONFLICTS

It is well known that most of the environmental problems that arise in the course of natural resource use exist not because of their fundamental unresolved uncertainty, but due to the collision of interests of users of natural resources in the absence of effective practices of conflict management and population unawareness of their possible negative effects. Thus, the analysis of the methodology for territorial assessment through the prism of the geographical environment and production indicates that "the elimination of territorial conflicts is the most important task of optimizing natural resources. There are "intensive," "spatial," and "environmental" ways of solving the problem" [Socio-economic geography, 2011]. At the same time, conflict resolution techniques using LP methods assume accounting for all these approaches depending on the situation, potential, and intentions of the process participants.

The Cherkassy oblast is a region of Ukraine with a relatively favorable environmental state. At the same time, as shown by a detailed analysis, there are a number of problems and conflicts in natural resource use, whose solution is required to ensure the continued sustainable development. Some of them are historically caused by the features of the productive forces in the USSR, while others formed in a significant economic downturn after Ukraine gained its independence.

A conflict associated with the inefficient use of agricultural land and crop-rotation structure is a wide spread and growing phenomenon. The region has problems of the national level and scale: radiation pollution from the Chernobyl nuclear power plant, environmental conditions of water resources, primarily, of the Dnieper river valley and adjacent territories, and aging of capital assets and infrastructure facilities. The processes have different type of dynamics

and regime. There are potential difficulties associated with functioning and protection of practically all natural components.

The following groups of conflicts were considered in the study region:

- the time of occurrence (those that have arisen in the past, today, or may arise in the future);
- scale (national, regional, or local level);
- the duration and frequency of manifestation (permanent, seasonal, or episodic).

The social sector was considered in a special block (unemployment, morbidity, poor quality of public services, and the aging of the population). Processing of information on conflicts and assessment of their impact at the final phase of work (including representation in a specially compiled map) indicate that there are two groups of conflicts (existing and potential). This has allowed taking into account existing natural resource use conflicts and problems in the region by identifying the territories with maximal intensity of their manifestation in the present and future.

The final phase of the LaPro creation was the development of the INTEGRAL CONCEPT OF THE GOALS. The main goal of the LP program, i.e., the highest hierarchical level of LP, is the identification of the main functional zones of the territorial use, general goals of the use development, and requirements to the protection of the nature and landscape management. According to LP approaches, there are three types of the goals, namely, preservation, development, and enhancement (Table 2).

The goals were derived based on the assessment of landscape conditions with all available data on the evaluation of the landscape components significance and sensitivity (Table 2; Development principles). This was achieved by the superimposition of the evaluation maps on each component [Guidelines for landscape planning, 2001]. Thus, the assessment and analysis of each evaluated component result in the maps on the sectoral goals. Mapping the sectoral goals allowed delineating the main directions of the balanced use of the natural resources: surface and groundwater, climate and air, soil, flora and fauna species, and landscapes.

At the final stage of the LaPro development, the sectoral goals were integrated in the

Table 2. Ukraine. The landscape program of the Cherkassy oblast.
Types of goals and principles of their development

[based on 6/Guidelines for landscape planning, 2001, Vo. II, p. 29; 12/ Landschaftsplanung, 2004]

Types of goals	Types of actions and activities	Principles of development
PRESERVATION	Preservation of the existing environmental conditions, which is only possible when the territory either is not used or is not intensively used.	Is adopted in the cases when landscapes have the highest significance and the highest sensitivity to impacts. For the especially significant landscapes, the use is restricted and a regime similar to the nature-reserve (the regime of special protection) is established.
DEVELOPMENT	Territorial development is allowed at either low- or high intensity level. The implementation of the "Development" goal results in the preservation or decrease of its protection status (environmental protection) by one level.	Is adopted for the rest of the territory with special attention given to the level of assessment of sensitivity to the negative impacts. For the development of the existing and planned land use, landscapes with the high level of stability are suitable. The natural resource use is achieved in compliance with the existing legal requirements.
ENHANCEMENT	Only a complex of activities for territorial enhancement is allowed. This relates to the territories that have been or are affected by the intensive use and have a high level of sensitivity of different destructive impacts.	Is adopted for the territories characterized by low significance. All natural complexes affected in the course of use are combined into one zone for enhancement and rehabilitation. For the territories under the danger of irreversible changes or for the landscapes with a low ability to regeneration, special additional activities should be undertaken.

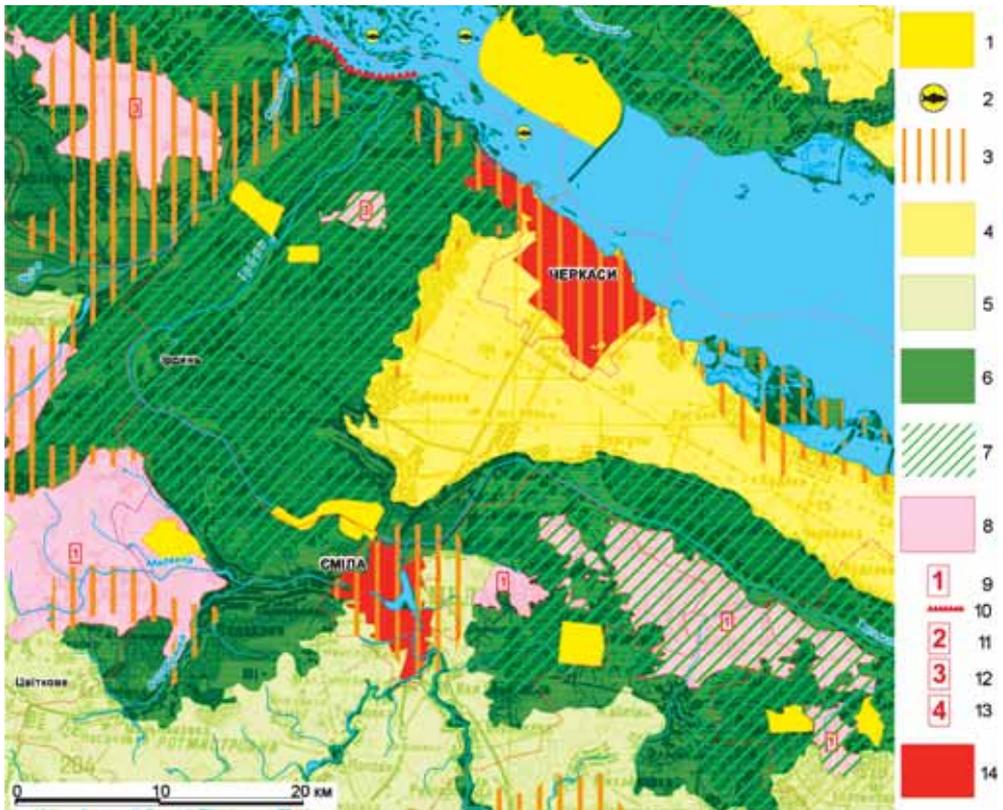


Fig. 2. Ukraine. The landscape program for the Cherkassy oblast. The integral concept of the goals (a fragment).

Legend: 1 –**Environmental protection.** Possible use: ban on agricultural use; scientific research; regulated tourism related to studies of the nature. Territorial characteristics: landscapes with high sensitivity and presence of rare and typical types of plants and animals, specifically, 2 –spawning grounds. 3 –**Preservation of natural and cultural heritage.** Possible use: controlled development for landscape preservation; tourism development; preservation of the traditional types of agriculture. Territorial characteristics: historical cultural landscapes with a significant number of cultural heritage objects. 4 –**Balanced environmentally friendly agriculture.** Possible use: crop rotations; controlled use of machinery and proper use of fertilizers; promotion of biodiversity; biotope maintenance in settlements; maintenance and development of the regional green corridors. Territorial characteristics: agricultural landscapes with high natural soil fertility and low sensitivity to pollution and erosion. 5 –**Balanced land use with emphasis on resources that require protection.** Possible use: development of different types and forms of land use; promotion of environmentally friendly agriculture and horticulture; promotion of tree planting; controlled use of soils subjected to erosion. Territorial characteristics: agricultural landscapes with higher sensitivity to water erosion; forest management areas; river valleys; orchards and tree belts. 6 –**Balanced land use with emphasis on the development of the tourism and environmental network.** Possible use: forest management to maintain natural conditions and increase of forest planting; controlled hunting; production of goods typical for the region; development of recreation opportunities in attractive landscapes and historical sites; development of the environmental network. Territorial characteristics: Landscapes attractive for tourism and recreation; with high bio- and landscape diversity and special importance as habitats for rare species, e.g., large forested areas. Special attention –7 –distribution ranges and concentration of rare species of plants and animals, potentially, the cores of the network; special natural resources use regime and controlled tourism. 8 –**Mitigation of negative impacts on landscape for environmental improvement.** Possible use: non-intensive, special land use for rehabilitation of resources that require protections; enhanced monitoring of negative impacts and phenomena. Territorial characteristics: landscapes subjected to such negative impacts –9 –water erosion; 10 –abrasion of river banks; 11 –wind erosion; 12 –consequences of radioactive pollution of soils highly sensitive to chemical pollution; 13 –continual flooding. 14 –**Mitigation of negative impacts on landscape for the population livability enhancement.** Possible use: decrease or cessation of negative impacts, e.g., noise or chemical pollution. Territorial characteristics: sites of large communities near industrial areas and automobile highways

final map “The integral concept of the goals”, which highlights the functional areas and the priority objectives of further action in relation to the landscape and outlines the future of natural resource management in the region (Fig. 2). The map also takes into account the existing and potential conflicts related to environmental management.

The consolidation of the sectoral goals invariably raises the question of selecting the priority targets. The highest priority, as a rule, is given to the goals associated with rehabilitation or enhancement: mitigation of impact (e.g., pollution or erosion) or prevention of landscape degradation due to negative impacts. Given the choice between alternative uses at the same site, the preference should be given to the *preservation* objectives of the current high-value landscapes, not to the *development* goals with an uncertain outcome: thus, the preservation of highly significant productive agricultural soils are of higher priority than the development of the recreational potential there. However, the main goal is to preserve and maintain the high level of biodiversity, rather than to develop any other economic sectors.

It should be emphasized that any of the types of the goals for the relatively large territory under the LaPro framework at a scale 1:200 000 should be regarded as a recommendation for the priority for this territory, but without excluding other uses (goal types) within smaller areas. The practice of LP [e.g., Landschaftsprogramm Brandenburg, 2009; Landschaftsprogramm Saarland, 2009; Landschaftsprogramm Schleswig-Holstein, 1999;] suggests that the types of goals at the level of LP programs are not always clearly separated from each other. However, the fundamental differences between them must be understood, since these differences play an important role in determining the priorities for related purposes at the subsequent levels of planning.

CONCLUSIONS

The LaPro for the Cherkassy oblast is the modern planning document developed for the first time ever in Ukraine. This is the first official document of this kind, in line with the traditions and practices of the European LP. The program for the Cherkassy oblast contains an explanatory note and maps, 10 in total, at a basic scale of 1:200 000, and more than 40 maps on a smaller scale.

At the core of the LaPro are the digital maps compiled using the integral assessment of the regional territory and applying modern software products (ArcGIS). The GIS-based LaPro contains information on the components of the nature (climate and atmosphere, surface and groundwater, soil, and flora and fauna), anthropogenic load on the landscapes, and existing and potential conflicts associated with this load. Thus, besides the planning goals, the LaPro promotes compilation of the regional database that can be used for other purposes also.

The main resulting document of the LaPro is the map “The integral concept of the goals” that presents the main directions of the natural resource use in the Cherkassy oblast complying with the principles of sustainable development. The map utilized the results of the assessment of landscape sensitivity to the existing and potential negative impacts and their significance to the priority types of natural resource use. The LaPro identifies general goals for the preservation, development, and enhancement of the landscapes. These goals have to be further refined and developed in detail at the subsequent stages of LP.

The LaPro has been coordinated with the materials of the territorial planning of the Cherkassy oblast and is a comprehensive framework for the management and investment decisions and the development strategy that provides territorially “bound” solutions to issues related to the placement of certain objects and types of economic activity. ■

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