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Environmental protection in regions with high level of anthropogenic transformation of geosystems and specific agricultural land use

Abstract: The characteristic features of specific land use Ukraine are described, differences in the development area and type of land use changes within the large natural-economic and administrative regions are characterized. The experience of the ecological network planning at the regional level, based on specific land use studies and determination of anthropogenic transformation of regional ecosystems submitted.

Keywords: territorial planning, land use, anthropogenic transformation of landscapes, ecological networks.

In Ukrainian industrial sphere the branch-wise planning and administrating were traditionally in priority, as long as the territorial aspects of social development were considered to be secondary. Nevertheless, appearance of a lot of contradictions in the system between society and nature shows the necessity in changing the priorities. The major number of modern native researchers in the sphere of territorial planning, territorial management, landscape planning [1, 2, 5, 6, 8, 11], emphasize the necessity in usage of territorial model, directing on saving the ecological, social and economical balance. According to the modern methodology the main task of territorial planning lies in the growth of the living standards. The solution of this task by methods of territorial planning presupposes

searching of the best spatial connection between nature – population – house holdings both in regions, or county in general. At the same time the planning organization of natural environment is oriented on the formation of natural ecological safety basis, and the resettlement planning – on the spatial organization of population with guaranteed territorial safety and capability of active agricultural activity, the industrial planning – on the effective natural-resources potential of territories, labor force usage and minimal environmental pollution [11].

The modern national politics of Ukraine in the sphere of environmental safety and spatial planning is forming in the context of Europe politics and is mostly oriented on prevention, control and regulation of negative anthropogenic influence on conditions and quality of the environment. At present day in Ukraine on nationwide level the main principles of national and regional ecological net schemes are worked out and legislatively accepted. As for the basic structural elements of ecological net and its parts, their list differentiates in normative and scientific sources, but generally is quite defined and validate.

At the same time the development of regional eco-nets appears to be a hard task in Ukraine because of the high level of territorial land invasion and fragmentation of natural landscapes. Thus, land usage on the South of Ukraine, in Kherson oblast particularly, has a pronounced agricultural character – the level of agricultural land invasion is about 69%, in agricultural enterprises' ownership, and citizens ownership (generally, for agricultural activities) is about 64% of territory. Such specific way of management results in a very high level of natural environment transformation and causes different problems while the formation of ecological territorial safety basis – eco-net usage.

In former USSR territory planning was centralized. Town-building and rayon planning (which objects were not the administrative territorial units, but industrial zones, rayons, urbanized areals at the earliest steps of their development) were regulated according to the system of regiment documents (building codes and other instructions), that provided the necessary system of public life arrangement, conditions of urban activity, spatial organization of settlements. As it is correctly

mentioned in the paper [6] in the soviet system the rational idea, that was one of the central for town-building in the West, became the main facility of consistent approach. Command and Administration system created a sophisticated, detailed system of territorial planning with industrial prevailing. It is brightly shown while geo-ecological and natural safety problems solving by the methods of territorial planning.

The section "Environment protection" in schemes and projects of rayon planning at any territorial level was necessary and irreplaceable [3], in addition to this, environmental actions of rational usage of different territorial resources were researched in the industrial context. Thus, to the main tasks while projecting and planning belong:

- Protection of the air space from pollution within industrial implementation;
- Protection of water pond, land cover, wild life;
- Improving of sanitation and epidemiological conditions;
- Protections of historical and material culture;
- Formation of territorial system of high protection priority;
- Creating of complex system of environmental protection of the region;

It should be mentioned that these tasks found their solution only in works of ministers and departments without any reflections on the level of development and implementation of rational territorial organization models of nature usage in the system "nature – society", which was developed in the context of ecological-social-economical balance ideas. It should be noticed that results of such a sectoral approach are presented even now, when, for example there is a list of ecological expertise objects which does not include territories of administrative regions as a necessary and important object of expert determination. It must be underlined that geographers have been working for a long time with models of rational territorial organization of systems "nature-population-government". Thus, the model of polar landscape, developed by B.B. Rodoman [9] may be taken as one of the first tries in searching of territorial combination of different production units and, as a result,

in making the functional territorial zoning. This model was modified and detailed by O.G. Topchiev [10] into the model of rational territorial organization of nature usage, but taking in account different social and economic factors and mental specific of modern Ukrainian society, these models even now do not find their reflections in organizational and planning of territorial regions practice.

At present day, there is a situation, where the great differentiations in territorial usage exist, especially from the point of view of environmental safety between Ukraine and European countries. Thus, for example, on the satellite images (photos), due to their visibility, the macro-scaling differentiations in territorial usage are clearly presented and it is well shown how the type of land usage transforms in the large natural and economic and administrative regions. As an example may be used the image of separate units of France territory (fig.1) (region Poitou-Charentes) and Ukraine one (Novotroitsk rayon of Kherson oblast), which are located in similar geomorphologiacal conditions, that allows to emphasize on the leading role of administrative factor in territorial formation and developing [7].

A)

B)

Fig.1 Differentiations in land use of France and Ukraine* territories:

A) Novotroitsk rayon of Kherson oblast (Ukraine);**
B) Region Poitou-Charentes, France;

* The images of one scale
** The circles of the image show the zone of radial irrigation systems

Realization of "eco-net" concept in regional aspect is directed on the solving of a number of important theoretical and practical tasks directing on the saving of biological multiplicity, keeping of a dynamic balance between rational usage of natural resources potential and providing the approximation of interest in saving of environment and steady development while dominating of environmental criteria, demands and showings.

The potential spatial resources of eco-nets development are clearly noted in Ukraine legislation. It is important, that while including the territories to the eco-nets the form of owning and category of land do not change. Besides, owners and users of these territories have an opportunity to take the public funding for wild life safety. The basis of eco-net – are the reservation units, but actually all units, with differently saved natural landscapes, may become the elements of eco-net.

It should be mentioned, that on the regional level there are reserves for creating the wildlife sanctuaries and developing of ecological net, especially in river valleys, in steppe hollows, on sand arenas, sea shores, in steppe podah, on outcrocks of rocks and other territories. A large reserve of regional ecological net formation may become the unproductive and degradated house holdings, which lost their agricultural potential in result of intense and irrational use.

The strategy of developing and planning of eco-net on the regional level will be defined according to the specific of land use and the level of anthropogenic transformations of regional geosystems. Here is shown the research on the example of Kherson oblast of Ukraine.

On the first step the main task becomes the defining of the level of anthropogenic nature systems transformations in Kherson oblast and showing the regional regularities in their transformation. Although even at this day there are different approaches to criteria and methods of anthropogenic load and transformation of natural territorial complexes valuation. In our opinion the most useful is usage of such an integral exponent as regional index of anthropogenic transformation of nature systems by K.G. Goffman [4], specified in papers of P.G. Shyshchenko [12]. Calculated anthropogenic transformation coefficient ranges from 0 to 10 and characterizes the next regularity: the more is the area of land use type and the higher is the index of transformation deepness – the higher becomes the level of agricultural changes in the region.

Taking into account the large Kat range of fluctuations, the five-staged scale of its interpretation is used. It should be mentioned here that slightly transformed landscapes (Kat 2,00 - 3,80) in Kherson oblast are absent, and only Gola Pristan region with Kat = 3,88 approaches to this group. The calculation in terms of administrative units gave the opportunity to define certain groups of territories according to the level of anthropogenic transformation (table 1).

Tab. 1. Grouping of Kherson oblast territories according to the level of anthropogenic transformation

Level of anthropogenic transformation of rayons territories	**Transformed**	**Middle level of transformation**	**High level of transformation**	**Extremely transformed**
Kat fluctuations	3,81 - 5,30	5,31 - 6,50	6,51 - 7,40	7,41 - 8,00
Share (in%) that occupies these territories from the total area	29,57	11,53	26,52	32,38

The analysis of results single out the following characteristics of the spatial distribution of natural areas that are anthropogenically transformed (Kherson Oblast):

1) lower from the expected territorial transformation within Kherson and Nova Kakhovka is due to the high percentage in structure land usage of natural areas, recreations and forests;
2) the majority of the administrative districts with high transformational indices are to the East and North of the area and are characterized by a high percentage of arable land in the structure of land usage;
3) high percentage of forests for the steppe zone (5,3%) obtained by the high localization of artificial forest plantation Oleshky Sands territory (Hola Pristan,Tsiurypinsk, Nova Kakhovka) Indices of forests for the majority territories is lower;

According to cluster results was conducted classification of Kherson's administrative and territorial units in land usage structure (fig. 2).

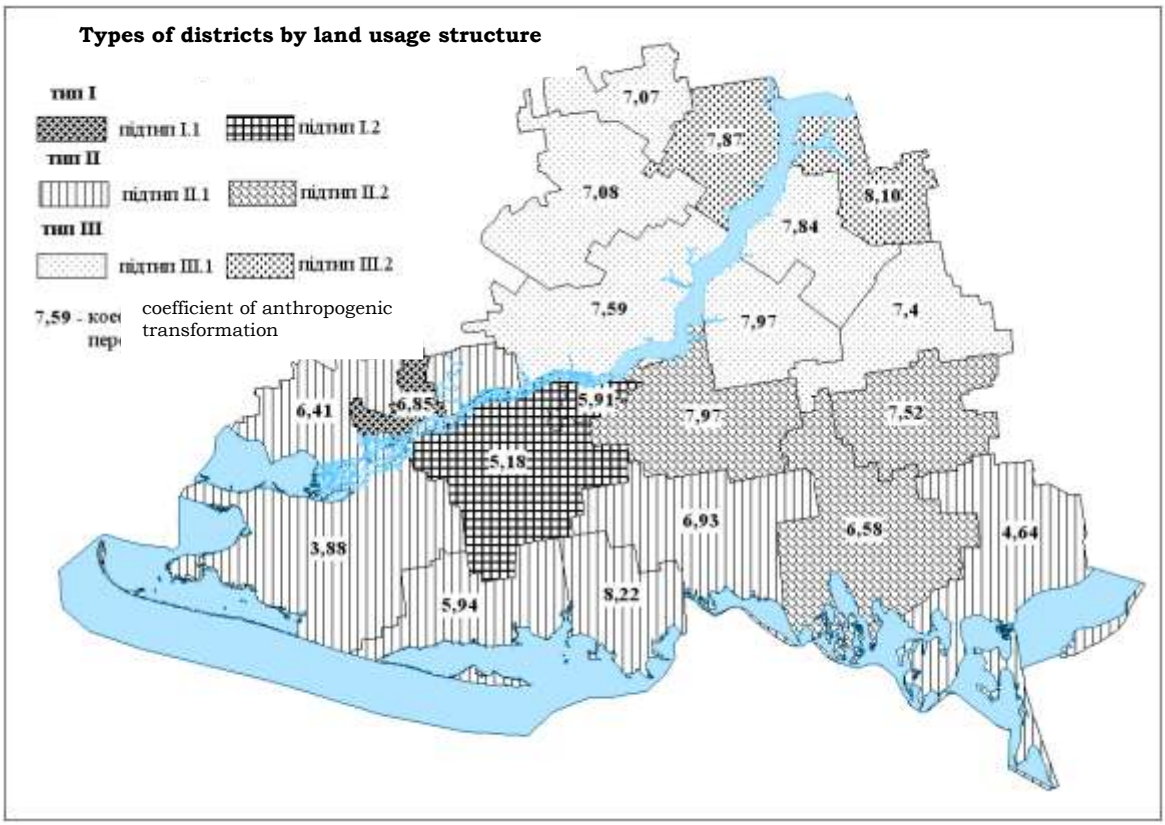

Fig. 2 Classification of Kherson's administrative-territorial units in land usage structure and the level of anthropogenic transformation of landscapes

Due to explored indices, a comparative analysis of selected types and subtypes permits to note specific features of the structure land usage and transformation of geosystem into its limits:

1) Type I is characterized by a high concentration in the structure of usage long term dryland's, an extremely high concentration of forests, rural and urban development, lands of industrial usage and owing to seaside location, the high percentage of wetlands, natural areas, unaltered by human activity.

2) Within II type features of type's differentiation in land usage permits to mark the following main features: regional highest concentration of natural preserves, irrigated lands, and dryland's meadows, pastures. It should be noted that the northern border of the type conducted by the boundaries of the administrative-territorial units, almost completely coincide with the medium-steppe's and south-steppe's bounds of steppe areas in the East European plain.

3) III type is characterized by the highest indices in the structure of farmland, rural development, water reservoirs and channels (only at the expense of subtype III.2 and its location and the banks of the Kakhovka reservoir). At the expense of land usage features, this type has the greatest indicators of anthropogenic transformation of natural geosystem.

The practice of regional management and planning in Ukraine closely approached to the need assessment, analysis and planning of the regions as a whole "managerial" of natural-economic local systems. Geo-planning as an integrated territorial planning of regions on the basis of the ideas of ecological and socio-economic equilibrium that can solve most of the problems regarding the formation of a rational territorial organization of nature usage in the nature-society system.

The structure of land usage and the level of anthropogenic transformation can be differ on the regional level, which involves further identifying factors of this situation and development strategies of environmental protection with differentiation approaches of forming eco-nets. Under conditions of high anthropogenic transformation and specific nature usage by real possibilities of building eco-nets and expansion of protected areas NRF are:

-remove agricultural lands in case of economic loss and environmental hazards;

-remove from the industrial usage of the land, which lost the natural condition and constitute an increased danger for the preservation of the environment;

-providing the benefits of restoring natural landscapes as the most appropriate type of land usage that drop out from agricultural and industrial usage, a securing of the environmental status of the existing territories and objects NRF with the creation of its inventory;

-establishment of water protected zones and coastal protective lines around water objects, increasing of forest areas, forest belts around agricultural lands, industrial and residential zones.

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