THE REPRODUCTION OF NATURAL RECREATIONAL POTENTIAL OF THE CARPATHIAN MACROREGION OF UKRAINE: SOCIAL, ENVIRONMENTAL AND ECONOMIC TASKS

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Abstract
In this article was built model of evaluation of risk factors in the system of conservation and protection of natural recreational resources of regions. Based on this model, were created schematic maps of social, environmental and economic tasks to improve conditions of reproduction of natural recreational potential of the Carpathian macroregion in national dimension. All indicators for evaluation the definition based on official statistical data of individual ministries and departments. The results of this study may be an impetus for economic restructuring of macroregion and formation environmental objectives in border cooperation in the field of recreational nature use.

Key words: *Natural recreational resources, Macroregion Carpathian, Playing, Card-scheme tasks.*

JEL Classification: *L12, P25, Q57.*

RESOURCE SAVING AS A VECTOR OF RESEARCHING RECREATION AREAS

Market transformation, changing living and working conditions of the population, massive urbanization, and increased morbidity, deterioration of the quantitative and qualitative characteristics of natural resources led to increased demand for recreational product. Given the trend towards worsening environmental and economic problems in Ukraine and in the world, now the question providing recreational industry quality natural resources is particularly relevant. In particular, this applies to the Carpathian macroregion of Ukraine, where is concentrated the natural resource base for the organization of recreational and tourism activities. In this regard, the development of models to ensure favorable conditions for preservation, improvement, restoration and protection of natural recreational resources (NRR) today requires in-depth research in sphere of economics of recreational nature use.

Problems of development and evaluation of recreational areas organically and inextricably are linked to the territorial distribution of productive forces of the country and social and economic development of regions (Tregobchuk, 1998, c.11).

M. Shchuryk notes that with the purpose of recreation on the Carpathians territories of Ukraine should be build map of macroregion and must be introduced certification of land and forest resources, water sources and other components related to natural resources (Shchuryk, 2011, c.234). The defined indicates an economic necessity for an integrated system of assessment and monitoring of natural recreational resources of macroregion.

Fundamental and qualitatively new perspectives on optimizing conditions for the use and protection of natural recreation components disclosed in the writings of scholars such as Kilinska K., Rudenko V., Anipko N., Andrusiak N. (Kilinska K., Rudenko and ot., 2010), Butko M. (Butko, 2011), Myrdal G. (Myrdal, 1944, p. 1043), of French scientists CREDOS center in Paris (Maresca B., Dujin A. and ot., 2008). However, most part of the research is limited to general theoretical principles when today deserve special attention practical aspects of recreational use of nature, considering regional specificity.

FUNDAMENTAL ASPECTS OF THE ASSESSMENT OF NRR REPRODUCTION CONDITIONS

Materials of the proposed article are the result of a significant amount of research performed based on the following steps:

1. Collection and systematization of official statistics, that to some extent related to reproduction of natural recreational resources and the development of tourism industry in Ukraine in general and in the Carpathian macroregion in particular.

2. Construction of algorithm of economic-mathematical model of assessment of need and efficiency of reproduction NRR in national dimension, using 87 groups of official statistic data. Chosen indicators characterize mainly state of the lands of recreational use; quantitative and qualitative characteristics of atmospheric, water and forest resources; the level of disease in the population as a need for health natural component, economic indicators of tourism industry and so on.

3. Within the algorithm is provided with individual economic-mathematical approach to each group of indicators to their optimal implementation of the system model and to obtain objective results. As a

result, was formed a single numerical system for evaluation of selected parameters on the basis of formulas (1), (2), (3).

$$\begin{cases} \Pi\text{ch}(\text{Rw}) = (\sum_{i=1}^{n} \text{Rw}_i / \Delta N\text{ch}(\text{Rw}_i)) / n; \\ \Delta Nch(Rw_i) = Nch(Rw_i) / 100 \end{cases} \quad (1),$$

where *Пch (Rw)* – value *Rw* of the region in percentage to Ukraine; *Rw ∈R, R* – a set of indicators that characterize the need (appropriateness) playback NRR; *w=1...k, k* – number of indicators; *ΔNch(Rwi)* – one percent for the index Rw_i in Ukraine.

$$\begin{cases} \Pi bo(Rw) = (\sum_{i=1}^{n} Rw_i o / \Delta Nbo(Rw_i o)) / n; \\ \Delta Nbo(Rw_i o) = No(Rw_i o) / 5; \\ Rw_i o = Rw_i / RT, \end{cases} \quad (2),$$

where *Пbo(Rw)* - numerical score index *Rw* in per capita studied administrative unit (AU); $N(Rw_io)$ – figure Rw_io for Ukraine; the number 5 - a numerical score for each group of indicators *Rw* average in Ukraine.

$$\begin{cases} \Pi bs(Rw) = (\sum_{i=1}^{n} Rw_i s / \Delta Nbs(Rw_i s)) / n; \\ \Delta Nbs(Rw_i) = Ns(Rw_i s) / 5; \\ Rw_i s = Rw_i / RT \end{cases} \quad (3),$$

where *Пbs(Rw)* - numerical score index *Rw* per 1 sq.km. investigated AU; $\Delta Nbs(Rw_is)$ – one point for Rw_is in Ukraine; $N(Rw_is)$ – indicator Rw_is in Ukraine.

4. According to the algorithm was performed estimation of need and effectiveness of restoration of natural recreational resources of Carpathian macroregion based on the data of the State Statistics Committee of the Ukraine, the Ministry of Ecology and Natural Resources of Ukraine, the State Water Resources Agency of Ukraine, the State Agency of forest resources of Ukraine and other official information.

BASIC SOCIAL, ENVIRONMENTAL AND ECONOMIC TASKS IN THE REPRODUCTION PROCESS OF NRR

As a result of analysis of evaluation is a need to concretize social, environmental and economic challenges of the process of conservation and protection of natural areas and recreational potential. It is about specific statistical data that need to be improved to a certain limit. We foresee three stages to achieve appropriate limits: *first stage* - the initial, this is change of some parameters to at least the level of the average national. *The second stage* – is to improve, the indicators to the mean values of the cross-border countries (only when on condition that cross-border countries have relatively better conditions for reproduction NRR), with whom is easier to negotiate on cooperation and to borrow experience in the organization of measures to protect the natural component. *The third stage* – is to achieve international standards in the field of recreational use of nature.

Within this article we will focus on the first stage. Namely, based on the results of evaluation we construct a schematic map of fundamental social problems as an important stimulant to improve conditions of rest in the Carpathian macroregion of Ukraine.

For this, we define the initial percentage (to achieve the national level average) for "improve" social indicators in the national dimension according to the formula:

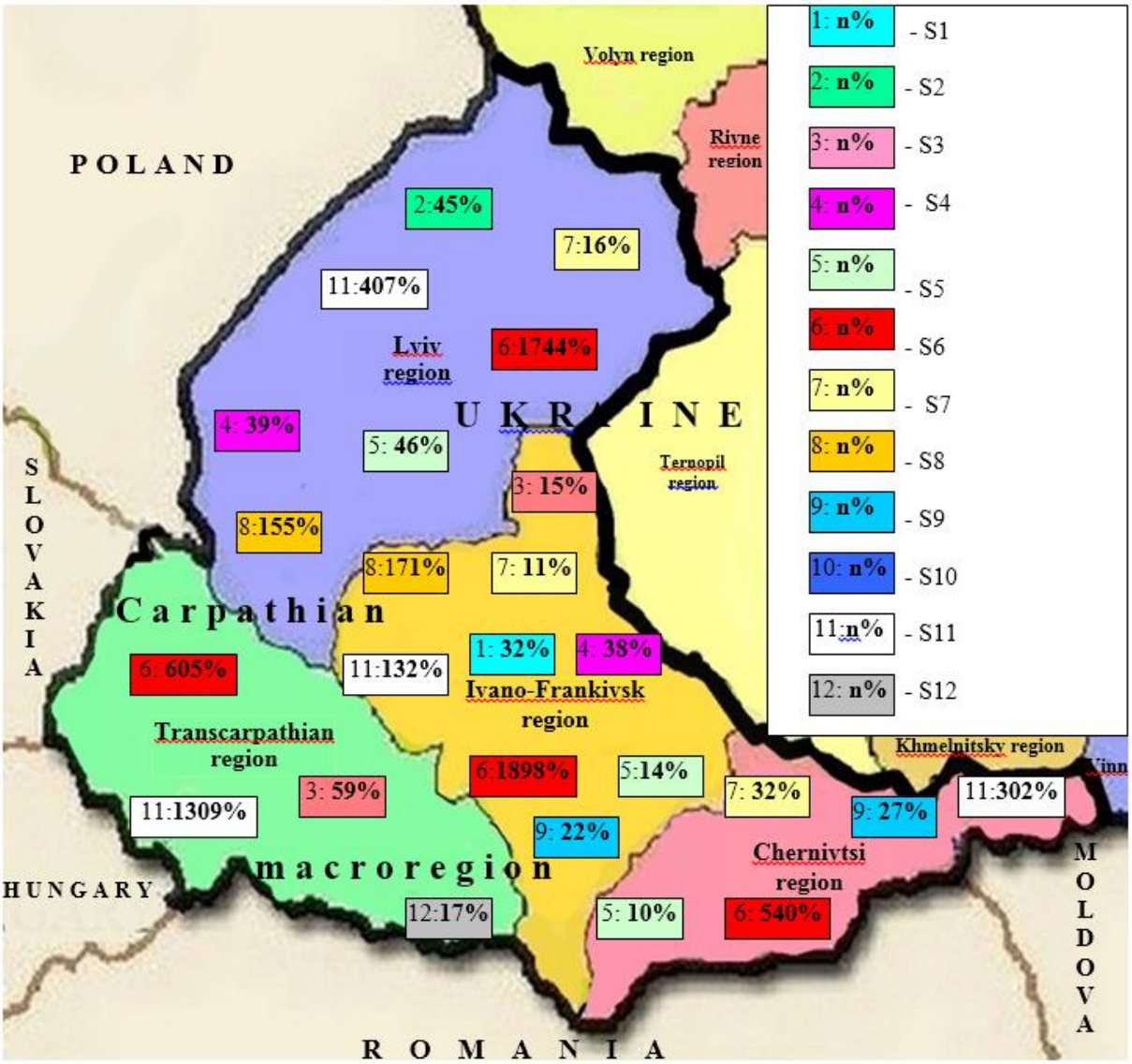
$$S_j = (\Pi bo(S_j) / (Nbo(S_j) / 100)) - 100 \quad (4),$$

where S_j – percentage how to change the value of social indicator *j* in per capita in a separate region of Carpathian macroregion to achieve the national level; $\Pi bo(S_j)$ – numerical score social indicator *j* in a separate area as a result assessment of social need of reproduction NRR*;* $Nbo(S_j)$ – numerical score social indicator *j* in Ukraine on average*;* j=1,2,…,12.

Figure 1 represents parameters S_j (S_j values given in Table 1) for each area of the Carpathian macroregion.

The specified of indicators of social failure with one hand - pointing to existing consequences of environmental problems. In particular, it concerns the rate of disease of population in the Ivano-Frankivsk region for respiratory diseases that now experts associated with excessive air pollution from industrial facilities. On the other hand, the list of tasks in improving the health of the population, based on the analytical index of certain diseases forms the basic needs and directions of the rational and appropriate use of natural recreational resources for recreation and tourism.

Taking into consideration the above mentioned, the same way we define the key environmental tasks of regions to improve the quantitative and qualitative characteristics of natural recreational resources of Carpathian macroregion and conditions of their reproduction according to the formula: $El_k = (\Pi bo(El_k) / (Nbo(El_k) / 100)) - 100, k = 1,2,...,9$ (5), for environmental indicators as a result of evaluation of social needs of reproduction NRR.



Mark S*1*…*S9* disclosed in the Table 1

Figure 1 – Maps-diagram of main social tasks of improving the regeneration of natural recreational resources in the national dimension

Given the fact that the assessment of environmental load more fully defined in the spatial form, we construct schematic map key environmental objectives to improve natural recreational resources per 1 square kilometre area of each region (Fig. 2).

View of the types of environmentally hazardous industries in areas is needed at least, coming out of the poor conditions of recreation as a promising direction use of natural resources. This need is confirmed by the part of the most significant factors that prevent full recreational development of some of the most attractive for recreation and rest areas in Ukraine and across Europe. It is about the factors affecting the conditions rest and the quality of recreational use of land, water, air and other natural resources. First of all it concerns the areas of environmental emergencies, existence of which leave under threat prospects for outdoor activities in all areas of Carpathian macroregion. Moreover, studies indicate that the movement of contaminated chemicals air, water ducts and groundwater may trigger large-scale cross-border environmental insufficiency in recreational use of nature.

About the scale of possible transboundary environmental crisis indicates geographical location of the macroregion (Fig. 2), including borderline neighbourhood to countries of the European Union, as Romania, Hungary, Slovakia and Poland.

Table 1. The structure of main social tasks and their solution within the recreation

The marking	The social tasks in the optimization of process of use and reproduction of natural recreational potential in the national dimension	Possible directions of solution the task within the recreational use of nature
S1	To reduce the average annual level of cancer disease of population in per capita (IPC) to **n%** relative to the average annual indicators for the period 1995-2011 years, **n –** the number of percents for a particular region	Carrying out of prophylactic measures within provision of recreation services
S2	To reduce the rate of cancer disease of population in per capita (IPC) to **n%** relative to rates for the period 1995-2011 years	
S3	To reduce the average annual level of disease of population for circulatory system diseases in per capita (IPC) to **n%** relative to the average annual indicators for the period 1995-2011 years	The protection and cultivation of medicinal plants and other floral components for use in health-resort industry
S4	To reduce the rates of disease of population for circulatory system diseases (IPC) by **n%** relative to rates for the period studied	
S5	To reduce the annual level of disease of population in respiratory diseases (IPC) by **n%** relative to the average annual indicators for the period studied	Promote improvement in air quality as a recreational resource for economic gain. Development of recreation in forests, in order to recover.
S6	To reduce the rate of disease of population in respiratory diseases (IPC) by **n%** relative to rates for the period studied	
S7	To reduce the annual level of disease of population for diseases of the musculoskeletal system (IPC) by **n%** relative to the average annual indicators for the period studied	Development of recreational use of herbal medicine, based on floristic components of the Carpathian mountains
S8	To reduce the rate of disease of population for diseases of the musculoskeletal system (IPC) by **n%** relative to rates for the period studied	
S9	To reduce the annual level of disease of population for genitourinary diseases (IPC) by **n%** relative to the average annual indicators for the period studied	It is expedient to use the rich potential balneological recreational resources of Carpathian macro region
S10	To reduce the rate of disease of population for genitourinary diseases (IPC) by **n%** relative to rates for the period studied	
S11	To reduce the rate of population decline as a result of external migration (IPC) by **n%** relative to rates for the period 2002-2012 years	Establishment and development of market recreational services
S12	Reducing unemployment in the working age population (IPC)) by **n%** relative to the corresponding indicators in 2011	Recreational use of nature as an important stimulator of social and economic growth

Based on the fact that in the world for rest and recovery they choose the safest areas in environmental terms, in case of not implementing the necessary changes, prospects of Carpathian macroregion on the role of recreational centre of world-class may not be realized. In this context are provided significant economic losses. In other words, it emerges the economic expediency of reproduction of natural recreational potential.

However, there remain a number of unresolved economic problems, the main of which we define by the formula:

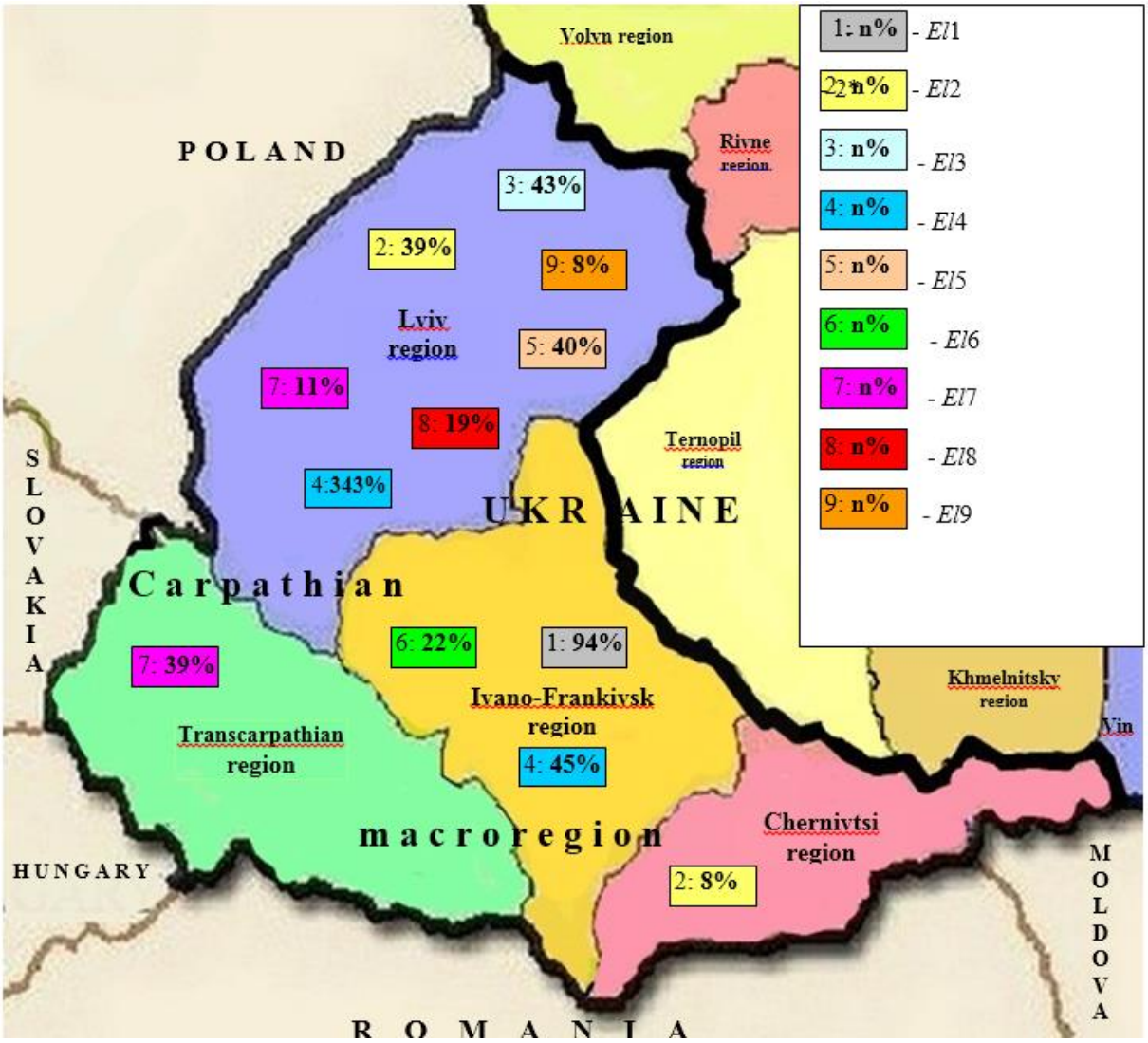
$$En_h = 100 - (\Pi bo(En_h)/(Nbo(En_h)/100)), h = 1,2,...,12, \quad (6)$$

where En_h – the percentage of how much you want to change the value of the economic indicator *h* per one person in a separate Carpathian macroregion to achieve the national level;

$\Pi bo(En_h)$ – numerical score economic indicator *h* in a separate area as a result assessment of the financial and economic efficiency of reproduction NRR;

$Nbo(En_h)$ – numerical score economic indicator *h* average in Ukraine as a result of appropriate assessment.

Now, in terms of market transformations, namely the definitions in Figure 3 are the key economic challenges in the regulation of reproduction of the natural resource base of recreation in the macroregion.



Mark *El1 … El9* disclosed in the table 2

Figure 2 – Maps-diagram of main environmental tasks of improving the regeneration of natural recreational resources in the national dimension

Table 2. The structure of environmental tasks and their solution within the recreation industry

The marking	The environmental tasks as the direction of the optimization of process of use and reproduction of natural recreational potential in the national dimension	Possible directions of solution the task within the recreational use of nature
El1	To reduce annual emissions of air pollutants from stationary sources by **n**% per 1 square kilometer (PSKm) relative to the average annual indicators for the period of 1995-2011 years, **n** – the number of percents for a particular region	Installing the economic benefits of recreation development in exchange eco-hazardous industrial facilities
El2	To reduce annual emissions of air pollutants from mobile sources by **n**% per 1 square kilometer (PSKm) relative to the average annual indicators for the period of 1995-2011 years	As a result of prosperity of recreational industry it is possible to reduce heavy and obsolete equipment
El3	To reduce annual emissions of pollutants with return water to surface water by **n**% (PSKm) relative to the average annual indicators for the period 2008-2010 years	Solvency of manufacturer of recreational product to pay for high quality treatment facilities
El4	To reduce annual emissions of pollutants with return water to surface water with excess of standards for maximum allowable discharge by	Within the areas of health and rest are not provided large and

	n% (PSKm) relative to the average annual indicators for the period of 2008-2010 years	extremely dangerous quantities of waste, such as industrial
El5	To reduce annual emissions of use of mineral fertilizers for agricultural crops by **n**% (PSKm) relative to the average annual indicators for the period of 2008-2010 years	Increasing demand for environmentally friendly food as a quality recreational resource
El6	Reforestation **n%** of potential forests (PSKm) by **n%** relative to the corresponding indicators in 2011	Rising of demand for wooded areas for recreational purposes
El7	To reduce the degree of artificial deforestation (defoliation) by **n%** relative to the corresponding indicators in 2010	Increasing the price of aesthetic and recreational properties of woods
El8	To reduce the degree of forest disease by **n%** relative to the corresponding indicators in 2010	
El9	To reduce the coefficient of demographic burden by **n%** relative to the corresponding indicators in 2010	Reducing the level of urbanization by intensifying recreational use of natural resources

Mark *En1 ... En12* disclosed in the table 3

Figure 3 – Maps-diagram of main economical tasks of improving the regeneration of natural recreational resources in the national dimension

Table 3. The structure of economic problems and their solution within the recreation industry

The marking	The economic tasks as the direction of the optimization of process of use and reproduction of natural recreational potential in the national dimension	Possible directions of solution the task within the recreational use of nature
En1	To increase to **n%** annual fees in the form of environmental tax, in per capita (IPC) relative to the corresponding indicators in 2011	Installing the economic substance of environmental charges in the context of maintaining quality recreational resources
En2	To increase to **n%** capital expenditures for environmental protection (IPC) relative to the corresponding indicators in 2011	Possibility of covering costs by raising the recreational industry. Equity interest of tourism enterprises in preserving natural potential
En3	To increase to **n%** operating costs of enterprises, organizations and institutions for environmental protection (IPC) relative to the corresponding indicators in 2011	
En4	To increase to **n%** costs on health, reproduction and record wild animals, organize hunting grounds (IPC) relative to the corresponding indicators in 2011	Intensification of cognitive recreation and amateur hunting
En5	To increase to **n%** capital investment of enterprises, organizations and institutions in the protection and rational use of natural resources (IPC) relative to the corresponding indicators in 2011	Enhancing investment attractiveness of macro region via perspective of recreational development
En6	To increase to **n%** volume of goods sold (works, services) companies with major economic activity "Hotels and Restaurants" (IPC) relative to the corresponding indicators in 2011	Improving the environment for staying of the guests
En7	To increase to **n%** volume of goods sold (works, services) companies with major economic activity "Health care and social assistance" (IPC) relative to the corresponding indicators in 2011	Attracting foreign tourists with unique medical and health resources
En8	To increase to **n%** number of employees at enterprises number of employees at companies with major economic activity "Hotels and Restaurants" (IPC) relative to the corresponding indicators in 2011	Intensification of recreational usage of nature
En9	To increase to **n%** number of employees at enterprises number of employees at companies with major economic activity "Health care and social assistance" (IPC) relative to the corresponding indicators in 2011	Effective and rational use of balneological resources
En10	To improve to **n%** indicator of no operating sanatoriums and resorts (as of 01/01/2012) (IPC)	Restoration of infrastructure base of recreation
En11	To reduce to **n**% imports of travel services relative to exports (based on tourist flows) (IPC) relative to the average annual indicators for the period of 2000-2011 years	Increasing of recreational attractiveness of natural objects
En12	To raise to **n**% balance of foreign economic activities of hotels and restaurants (IPC) relative to the corresponding indicators in 2011	

Tasks in Tables 1, 2, 3 are determined mainly concerning the year 2011 and the period of 1995-2012 years, because over the years at the end of 2012 it is the most complete volume of state approved statistical information.

It should also be noted that the defined indicators are based on official statistics. However, the improvement of the tasks requires the improvement of statistical reporting system in the country, including expert opinion regarding the not enough objectivity of statistics.

CONCLUSION

Enumerated by us directions of development of recreational activities in the form of maps, diagrams indicate the main stages of the formation of favorable ecological and economic environment for the reproduction of natural recreational resources in Carpathian macroregion of Ukraine, namely:

1) When choosing strategies of the development of the macro region, with a presence of large natural resource base, designed for rest and recovery, reasonable alternative (based on international experience) is a recreational activity.

2) If you make this choice, then do it with those calculations that predict preservation and proper use of recreational resources, sustainable development of recreation areas: correct choice of directions of tourist activities; environmental analysis and control; establish norms of resource use; feasibility, economic-organizational and legal support of security measures.

3) To enhance the recreational potential of macro region there must be used opportunities to attract

recreational attractive territories and other resources industry into commercial use of recreational scope.

4) Due to the negative impact of existing types of recreation on the state of natural resources, which are used, they need to be replaced, or, if necessary, to entrust their use to other eco-safe areas of the economy.

The advantages of the proposed model are:

- the permissible adapting to conduct the assessment in the international and regional dimension;

- the structure of the algorithm presents the base to create a holistic of software of different programming languages;

- the possibility of using the model to explore other regions of Ukraine and other countries in order to determine thresholds for comparison of national indicators. Last generates prospects for further researching based on the proposed model.

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