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# Contents of Basic Cartographical Models of Ukrainian Initial Natural Resources Potential

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## Abstract

Disclosed are the contents of basic cartographical models of Ukrainian initial natural resources potential (NRP), which includes mineral, water, land, forest, faunistic and natural recreational resources. The primary objects of mapping are administrative district, region and natural-economic region.

The Ukrainian natural resources potential (NRP) mapping characterizes the following basic elements:

- 1) NRP volume.
- 2) NRP componental structure.
- 3) Territorial variety of natural resources.
- 4) Levels of NRP productivity and the population security with it.

Ecologo-economical estimation of NRP is the basis for cartographic modeling. The basis for such economical evaluation is the average annual effect of its utilization. The variety of goals and problems, which practice poses before this evaluation objectively, requires the development of a system of estimation indices. It is at the same time entirely obvious that a generalizing system index is necessary. This would function as commensurability index between different use values of the resources to be evaluated. From the variety of critically analyzed indices (differential rent, differential income, costs productivity, gross production, net income) we have chosen “gross production” as the one which meets the specificity and tasks of NRP evaluation. Gross production is being expressed in the uniform

republican or (when none) regional cadastral prices which, in turn, rely on uniform for the republic total costs. In agriculture, for instance, they include the cost of production, which is defined by the costs in worse natural-climatic zones of goods mass production with average levels of its intensivity, funds provision and the employees skills.

The quantitative expression of the territorial resource potential is defined through its (resource) total value for each direction of its utilization. It is a sum of products of a resource unit use value and its productivity in the whole territory, the resource being exploitable in every way of its utilization. Quantity coefficients are also considered. To reduce calculation routine, in some cases a simplified program to calculate the initial NRP evaluation routine, in some cases a simplified program to calculate the initial NRP evaluation indices has been used. The program was developed by the author for EC-1045 computer in FORTRAN language.

Administrative region and district were the basic territorial units, for which calculations of separate NRP components were being carried on, though, for more specific as to the resources natural economical regions - Ukrainian Carpathians and Podillia - every primary farm-nature utilize was experimentally evaluated.

The Ministry of Environmental Protection of Ukraine and its local departments were the major customers of the country's NRP research, which would have been conducted based on powerful nature utilization GIS, whose principal feature is the availability of automated data banks (DB) of natural

resources potential. As a computer-based system for automation, manipulation and display of huge volumes of statistical, departmental and cartographical information, the created Ukrainian NRP DB contains nearly 40,000 requisites (700 Kbytes approximately) on subregional level (administrative regions), 14,000 Kbytes on regional level (all country's administrative districts), and, on the local level (separate nature utilizes, provided that continuous data excerption is possible) - 100,000 Kbytes (about 2,100 conventional quires). The proportion of informational flows of the Ukrainian NRP DB chains is as 1:20:143 starting from the higher to the middle and to the primary ones correspondingly. Since quality estimation of land, water, forest resources, as, well as mineral stock volumes up for each town are till now not available, accentuated when informationally loading NRP DB was the realization of such methodical approach as continuous observation, which characterizes the resources average development for the year 1990. With these levels of NRP DB development, technical provision of research process, available possibilities to practically excerpt the data, the continuous systematical evaluation and the analysis of the Ukrainian NRP were carried on only on the republican (subregional) and regional (separate administrative districts) levels. The next resources inventory. Including the one for separate nature utilizers, will undoubtedly require much more significant, hard and of several years standing expeditional observations. This is really possible after the year 1997 with the first results published no earlier than in 1999-2000.

Experimental economical estimates of the mineral potential (fuel-power resources, metallic ores, non-ore raw materials for ferrous metallurgy, mining-chemical raw materials, building materials) based on conditional annual productivity indices of coal and iron ore deposits during the adopted normative term of their exploitation, and average actual and normative enterprise capacities data (for non-exploited deposits), as well as on normative exploitation terms data for major productive funds of deposit-assimilating industry branch. Considered was only  $A + B + C_1$  mineral stock, since  $C_2$  category is not being taken into account for most of the minerals when capital investments in deposit assimilation are substantiated. This reflects the ability to satisfy the needs of national economy for the distant future. The country's total (actual) costs were taken as the cadastral prices for coal, oil, natural gas and some other mineral resources. For all other resources we measured regional cadastral prices by ranking the actual costs.

Water resources potential was estimated proceeding from the total economical effect of water utilization in each of the Ukrainian major water-consuming branches: irrigative land farming (where water utilization is most effective), agricultural and industrial production, hydroenergetics. Thus, for instance, surplus gross production, obtained in the result of irrigation, was taken as the index of water resources economical estimate. This was characterized as a difference between plant growing gross production cost on irrigated and non-irrigated lands, calculated in the uniform cadastral prices for agricultural production, which allowed for comparison of the obtained indices with another kinds of natural resources. In Ukraine, the estimate of 1 cubic meter of water was equal to 0.22 rubles. The water resources potential was characterized by average annual volume of the local flow and Byelorussian and Russian rivers inflow (excluding Kiliy branch of the Danube river). The inflow distribution between separate regions was carried on according to major rivers perspective water-economic balances. Preference in water supply is given to those Ukrainian industrial and agricultural regions, which require irrigation most. The land farming irrigation itself will need in the nearest future 10-12 cubic km of the Dnieper waters yearly for each by-river region.

Land potential calculations based on the results of a large-scale general economical evaluation of all republican agricultural lands and were carried on in a uniform system of land cadaster according to recommendations as to the land evaluation procedures. The potential of land resources is being reflected by a generalizing evaluation index - the 1 ha gross production in republican cadastral prices, multiplied by the total area of regional agricultural lands.

Ecological and economical evaluation of forest resources potential was carried on based upon regional initial materials of forest funds inventory, where the prevailing forest growthplace condition types were considered. To reduce the calculation difficulties when analyzing timber-consuming properties, we took advantage of V. Lebedev's special tables, which permit finding necessary quality coefficients of raw materials. Based on wholesale forest production prices, the coefficients allow for conversion of the actual average accretion into conditional timber. The basic price here will be a price of 1 cubic m of "disindividualized" pine with 26-cm average diameter, the pine taken from a 1-commodity class of forest plot. Timber resources potential is a production of major forest-forming sorts yearly increase (considering growth-place condition types), the forest plot area and the cadastral price of 1 cubic meter of "disindividualized" timber with

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introducing its quality coefficients. The by-products use value was estimated based on yearly exploitation harvest index. When estimating, we used the uniform cadastral prices for agricultural production. The estimates of nature-protecting forest functions were defined with the help of "substitutional (or compensatory) costs" method, i.e., costs which would have been unavoidable in creating the "forest environment" with industrial-building methods. With the data on the expenditures, required for creation of the analogous nature-improving and protecting effect of forest environment with industrial methods, we similarly calculated the estimates of water protecting (water clearing) and sanitary-hygienic forest functions. In Mid-Prydnistrovya conditions the estimate of, for instance, 1 fresh hornbeam grove ha (forest code type D2 - rD) equals to 59 rubles.

Annual average actual productivity calculations of hunting, fishing and honey-bearing resources predetermined economical estimates of the faunistic potential in Ukraine. Its annual effectivity is defined in this branch through the adopted calculation norms in state and calculated in our Department cadastral prices.

Recreational territories (lands) themselves, mineral waters and medicinal muds are the major premises to from the republican natural recreational potential and develop spa-sanatorium treatment. Recreational lands potential evaluation in natural expression was carried on proceeding from the ability to satisfy the population normative needs in recreational establishments, places of spa-sanatorium cure, long and short-run rest and tourism. The normative needs in man-hours were calculated and the results were corrected for urban and rural inhabitants according to the acting practice of rest and treatment places planning. When measuring, we used data on the potential needs in Ukrainian recreational territories and considered the possibilities to meet the needs of the recreants from other world regions. To pass on from natural to cost indices, we took advantage of I. Turkevich's methodical approach, where rest is considered as one of the forms of free time use, the economical evaluation of recreational territories being carried on through free time price evaluation. The free time cost is a unit of time gross social product value, distributed among the whole population, which utilizes recreating resources. Economical evaluation of the potential of mineral waters and medicinal muds are based on their balance exploitation stocks and regional (Carpathian) actual costs.

The Ukrainian integral NRP is a sum of each resource type potentials for all administrative regions.

Known are some other approaches to evaluate the NRP. At the same time Z. Kargazhanov,

having analyzed the available proposals, concludes the validity of estimating the territorial combinations of natural resources, based on summing separate types values and considering the effect from the resources complex utilization. The author substantiates economico-mathematical model of such evaluation. However, with the complexity of the given problem, no suggested model to optimize the assimilation of territorial resource combinations is quantitatively realized in nature utilization conditions, and the newest works in this field are the direct corroboration to this. It is therefore most likely that to this. It is therefore most likely that the territorial NRP definition, basing on the total economical effect from the resources utilization should be considered as a methodical approach, which responds to the up-to-date state of this question development.

Thus, the Ukrainian integral NRP, being defined by our methods, equals 53.95 million rubles (in the prices of 1990). In this connection, among the most important nowadays problems of NRP research in conditions of cost orientation loss, non-stability, multiple price increases as a result of the republican entry in the real market economics is that of indexation of the cadastral prices, which are being taken advantage of when monetarily defining the absolute NRP value.

At the same time, for macroeconomical comparisons, the solution of the problem to indexate cadaster prices is possible through realization of, at least, two approaches. The first concerns the use in measurements of the world market actual prices. The other deals with calculations of the aggregate potential which is a combination of interconnected labour, material and natural resources, these three defining possibilities to gain the objectively stipulated level of the national economy results (for details see V. RUDENKO. AGGREGATE RESOURCES AND NATURAL RESOURCES POTENTIALS OF THE UKRAINIAN SSR: METHODICS AND EXPERIENCE OF EVALUATION// Vestnik of Moscow University.- Series 5.- Geography.-1991.-#2.-P.P.36-43).

The Ukrainian annual NRP in current dollar equivalent equals to 62.45 billion. The share of the most important mineral resources in the total NRP is of 27.75%, land resources percent 39, recreational - 18.5. Although these data are approximate as a result of international comparisons methodology and methodics weak elaboration, we nevertheless can't but point out that, overall, both the value and the proportion of the resources in dollars do not differ more than in 1 order of magnitude. This is of much significance if we remember that the dollar in this country is speculatively overestimated and that disproportion's in internal actual prices, for industrial

raw materials and agricultural production in particular are available.

With present boundlessness of the economy market development the defined inner proportions between the republican joint potential components can possibly serve as a stabilizing orientator. Even with further limitless growth of market costs for labour resources, major and working funds and natural resources, we on the whole can foresee that the proportions formed each decade between them would be preserved despite the definite fluctuations in both sides.

Thus, having at disposal cost indices of national wealth or national income, material resources for the whole 1994 and the next period of time, one will calculate most likely enough the NRP absolute value for this or that republican region, despite the present price non-stability. That will allow for inclusion of the territorial NRP evaluation into extended orientating analysis of the market nature utilization processes. Here we should note that the given examples of cadaster prices indexation need further elaboration and specification. A full scale use of evaluation indices of NRP in both territorial and temporal aspects requires stabilization of the financial and monetary systems, introduction of a national banknote of full value, namely - hryvna, realization of market reform in the whole and, based on this, the growth of living standards. Among the major trends of the measured Ukrainian NRP rationalization, utilization, protection and reproduction the following issues should be pointed out: smoothing of the levels of regional socio-economical development towards the levels of their NRP development; the country's socio-territorial complexes reorientation to the development of non-metal-capacious branches; ecologo-economical adaptation of the formed national economy structure to its NRP structure; further development and steady formation of regional natural resources complexes which would suit the local NRP and their structure and organization be improved.