

AN ECONOMIC APPROACH TO SOME PROBLEMS IN USING GEOGRAPHICAL ENVIRONMENT

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I. INTRODUCTION

Among the approaches to understanding national planning the problem of the rational perspective use of the geographical environment should also be considered.

The problematics of using geographical environment should be examined in several levels of spatial planning: the local, the regional, and the national level, respectively. However, examination of these problems on the level of national planning is of particular importance. It is the perspective character of the national plan, being a spatial cross-section of evolution of the national economy, which enables a comprehensive consideration of the interdependences between the management of existing natural resources and the geographical environment. The interrelation between perspective planning and a rational use made of the geographical environment finds its expression in the necessity of taking into account in the planning process the long-term changes taking place in the geographical environment. This is in order to avoid and prevent any adverse processes which this activity might bring about, and is of particular importance in the process of an intelligent shaping of the basic socio-economic and cultural values represented by socialist planning.

It should be stressed that the time horizon of this perspective should be set further off than the actual time set for the perspective plan. This is so because in this context one has to realize (1) the principal evolutionary tendencies of science and technology and (2) the image of the future spatial socio-economic pattern of the country.

The methodological premises for defining these two elementary factors differ. In spite of the fact that no sound methodological basis exists which would warrant the scientific value of prognoses, there is a way of arriving at a variety of "anticipating" estimates of such socio-economic values as the future size of population and future technological trends — although they may involve different degrees of certainty.

On the other hand, any vision of the future socio-economic pattern must be based on an additional factor: on the system of social values and aims and the

needs as they will develop in future. It must be emphasized, that a clear definition of social values and aims is one of the basic presuppositions for drawing up a perspective plan. This refers to matters like the national security, the size of the national income, the meeting of demand for material goods, the cultural level of the population, and the health services rendered. The ecological conditions in which man lives, the maintenance of the high quality of the geographical environment (its balance), and the protection of the natural landscape must also be assigned to this category of values. In order to prevent discord and misunderstanding in substantiating these purposes, a sharply defined hierarchy of the different social values involved is indispensable.

The possibilities of accomplishing these ends are limited by the productive capacities, human potential, the existing infrastructure, and by conditions and resources of the geographical environment. These factors represent a group of a priori restricting elements in view of the hierarchy of aims adopted. From the viewpoint of perspective spatial planning the locational constraints and transferability of the restricting elements are of great importance. The limitations imposed by conditions and resources of the geographical environment result directly from the degree of the dependence of the various spatial systems, (like settlement, industry, agriculture and transportation), on the environmental factors.

For all the directives, emphasizing the importance of considering the geographical environment in perspective spatial planning, J. Zaremba (1965, p. 606) is right in his assertion, that up to now theory and practical application have failed to create effective means for co-ordinating spatial investments so as to eliminate discrepancies between short-sighted departmental interests and universal social requirements, and for defining the principles and the trends involved in making rational use of the space and of the natural resources of the country.

Both the theoretical and the methodological problematics of a rational use of the geographic environment show a *deficiency* in the group of scientific branches which are dealing with the spatial aspect of economic development. This is most distinctly in evidence in Regional Science which in this group of branches is supposed to play a synthetic and integrating part and which claims to formulate the theoretical basis for spatial planning.

Regional Science has been very successful in the introduction of a new methodology based on mathematical models and statistical methods, which were applied for empirical specification, and use of concepts by which formal systems could be applied for analyses. In this manner it became possible in the framework of Regional Science to use operational methods in location analyses and thus to arrive at optimum locational patterns, in order to obtain a more effective system of spatial economy. However, in its aim at a comprehensive perception of the problem of reaching an optimum in spatial economic activity, Regional Science is burdened with imperfection: the problematics of making rational use of the geographic environment.

Despite the fact that much detailed research has been undertaken in order to gain knowledge about resources and environmental conditions from the viewpoints of technics and natural sciences, and many postulates aiming at protection of the natural resources and the environment have been put forward, there is still a lack of a sound theoretical basis for illuminating the interdependence between resources and environmental conditions on the one hand, and the effectiveness of the economic activity of the society on the other. The fundamental methodological difficulty to be overcome is seen in the inability to define in a measurable and comparable way the effect which particular elements and conditions of the geographical environment have upon economic activities (B. Winiarski 1966, p. 85).

In view of the great importance of this problem it seems imperative to ponder the possibility of establishing this sort of basic assumption.

II. PASSIVE AND ACTIVE POTENTIAL OF THE GEOGRAPHICAL ENVIRONMENT

From an economic point of view the environmental conditions constitute a set of constraints on economic activities. A geographical environment considered as a complex of conditions for action, consists of two groups of elements: 1) resources, 2) natural conditions.

Natural resources are those components of the geographical environment which can be used for creating some kind of energy (running water, fuel, wind force, tides, forests, solar energy), industrial raw materials (minerals, timber, water), substances for human consumption (plant and animal life) and, finally, the earth (its soil and physiographic complex). All of them are objects in processes of production. The limitations which they impose upon the economy are brought about by the scarcity of particular kinds of these resources and their accessibility both on the ground surface and in the Earth's crust. It should be kept in mind, that the concept of natural resources also comprises the element of work required for exploitation; for instance, soil fertility is also the result of tillage and labour inputs.

Natural conditions, on the other hand, are those components of the geographical environment, like relief and geological structure, soil properties, and hydrographic and climatic conditions, which cannot be expressed as mineral and land resources, although no production could be undertaken without their contribution. These are constraints upon the technology of conversion of the resources (in industry and agriculture) and in the means of overcoming and adapting distance (in communication and construction).

The limitations imposed by the geographical environment may be interpreted in physical and in socio-economic terms.

Physical constraints due to the geographical environment are complex of conditions which set limits to biological and productive processes by defining the amount of raw materials and land extent; thus they represent a *passive* potential of the geographical environment. These physical limitations, essential in character, depend

on the degree to which the environment and the technology of a given production is fully comprehended. Comprehension of both conditions and resources has much advanced in recent times, as the result of extensive soil studies and physiographical, geological, hydrographical and climatic research.

The environmental constraints imposed in a *socio-economic* aspect are defined by those criteria of appraisal or utility, which express the relation of society to the geographical environment in the sphere of economic activity. The application of the principle of *economy* should be supplemented by two additional non-economic criteria: (1) the principle of keeping up ecological conditions suitable for man's life, and (2) the principle of safeguarding a high standard, i.e. a proper balance of the geographical environment, or of recovering this standard in case it had been impaired.

For these two principles it is necessary to draw up ceiling standards for the ecological conditions and the balance of the environment, in due consideration of the disturbances caused by an unsuitable exploitation of the environment. Standards of this type must be based on research in the field of ecology and protection of the natural environment. While little doubt can be raised regarding the principles put forward above, much more controversial is the problem of protecting the esthetic and recreational values of the natural landscape. However, the introduction of such a separate principle poses a variety of problems when it comes to establishing a definite standard; hence it seems that these values might be protected by applying the principle of economy.

In theory it seems possible to introduce into the economic calculation the values realized by these principles in the form of what is called non-economic goods, and their appraisal might be based on the concept of the utility function put forward by J. Neuman and O. Morgenstern (1944).

The realization in the form of an economic calculation of the principle of economy limited by extra-economic criteria defines the extent to which resources should be economically exploited, i.e. the *active* potential of the geographical environment.

The *passive* potential of the geographical environment undergoes changes as the result of a more thorough understanding of this environment, whereas the active potential develops in the process of technological change which makes possible new and more effective methods of using the environment.

In consequence there arise two groups of research problems, the solution of which is the presupposition for comprehending the active potential of the geographical environment:

- (1) the research problems of ecological conditions in view of the changes occurring in the geographical environment — changes caused by man's economic activities,
- (2) the problems of a balance in the geographical environment in view of disturbances and of the range of all destructive activities committed by man's economy.

III. A COMPREHENSIVE EVALUATION OF THE GEOGRAPHICAL ENVIRONMENT

In investigations involving local and regional planning there have been developed methods of appraising geographical environment from the point of view of its usefulness for urban development. According to W. Różycka (1966, p. 9) these methods appear in two different stages dependent upon how complicated the evaluation is: one stage is bonitation, the second is *qualification*.

The methods of bonitation, originally evolved in pedology for defining the utility rate of soils, embrace the evaluation of the features, or of groups of features, of particular elements of the geographical environment.

The methods of qualifications, on the other hand, involve comprehensive evaluation of the geographic environment with regard to suitability of individual areas for various types of use. This sort of evaluation is based on a pre-prepared analytical investigation (a survey), followed by bonitation studies of particular elements of the environment.

The wide scope of application of qualification methods, especially in local (urban) planning raises the question, how far this sort of procedure is suitable for evaluating the geographical environment from the viewpoint of the aims of regional planning.

Any qualification for perspective spatial planning on a national scale requires the precise definition of the following problems:

- (1) the type of scale to be applied in bonitation or qualification,
- (2) the range of purposes this evaluation is to serve,
- (3) the basic spatial unit of reference.

The problematics involved in setting scales for evaluations constitutes a basic theoretical and methodical problem in procedures of bonitation and qualification. On the basis of physiographic research in town and country planning, two fundamental types of evaluation of the geographical environment or of some of its elements, have been developed: nominal and ordinal scales.

Type one, nominal scales, use categories like favourable or unfavourable conditions. The only definite relation between these categories is equivalence or difference; they do not imply that either of these categories contains more values, or less of them. This type of scaling, for all its marked suitability for clearly marked purposes, especially in bonitation of separate elements, limits feasible empiric operation to merely an indication of similarities or disparities.

Type two, ordinal scales, mark the relative value of particular elements of the environment from the viewpoint of definite ways of using them but without defining distances between these values. The original arrangement of these evaluations is accomplished by empiric operations in which assumptions concerning majority, equality, or minority are used, and by introduction of transition and asymmetric relations. It should be stressed here that according to principles of logic it is permissible for this type of scale to apply such statistical operations as median values

and certain methods of rank correlation analysis. This is why certain operations like adding and multiplying used in scales of this type are bound to raise objections. Practical application of these operations, such as adding the values of particular elements of the geographical environment carried out from different viewpoints — such as building conditions, health conditions, food-raising facilities, in order to obtain combined qualifying value, fail to indicate the inaccuracies incurred by applying inadmissible mathematical operations. This calls in question the merit of this type of evaluation method.

A number of methodical concepts regarding the qualification of the geographical environment, based on ordinal scales of values, have been developed by T. Bartkowski (1963, 1964). As an example of this sort of concept may serve his attempt at appraising the value of land for a section of the Great Poland Lowland, of some 8000 sq. km extent, in the suburban zone of Poznań. This method lies in an appraisal in a conventional point scale, with a basic areal unit of one sq. km, of all particular features of the geographic environment, such as: land slopes in excess of 5%, high groundwater table, thermic inversion, groundwater pollution, high soil fertility. These characteristics are appraised in a four-degree scale with regard to conditions favourable for building construction, health conditions, nutrition facilities. As the standard of his scale T. Bartkowski chose, optimum conditions prevailing in some area of his model. The points, marking the value of the land considered from the viewpoint of the particular conditions mentioned, are added up, and in this manner a characteristic value for each type of the environment is obtained.

For technical reasons we shall omit discussing the abundant and very essential methodical problematics involved in collecting data and in the cartographical presentation of all particular elements of the geographical environment; however it should be emphasized, that every attempt at bonitation or qualification of the geographical environment is relative, and actually represents an interpretation of the basic investigations which were intended to throw light on existing conditions and on the tendencies towards changes in the environment.

A further essential element in the procedure of qualification is the definition of basic spatial units of evaluation pattern. Neither of the two possible approaches resulting from basic studies, i.e. the grid system and the system of physiographical units, warrant conformity to the basic pattern of the spatio-economic units. However, in view of the marked generalization applied in the national plan, one may consider satisfactory a pattern of units so arranged, that it would allow for transformation with regard to voivodeships division.

Closely linked with the question of what type of scale to apply, is the purpose of qualification. Evaluations based on nominal scales refer to qualifications for more restricted purposes, for which the values can be defined by the "usefulness" of a given element of the environment, for instance, for building purposes, or due to soil values for agriculture, or on account of the beauty of the landscape for

recreation. It is impossible to arrive at a general, multi-purpose qualification of a geographical environment when nominal scales are applied. The use of ordinal scales does not solve the problem of a synthetic evaluation of the geographical environment, because of the previously mentioned reservation in the matter of adding-up individual values.

One way of overcoming these difficulties by introducing synthetic evaluation might be the drawing-up of scales of evaluation based on J. Neuman and O. Morgenstern's theory of utility function. Their concept makes it possible to define values under equivocal conditions in the form of numerical indices which these authors call "utilities". Individual preferences might refer to divergent trends of utilizing an environment, but they would have to satisfy the conditions of transference. However, this problem would require a separate and adequate treatment.

Without going here into the practical usefulness of these two types of scales for the necessarily highly generalized cartographical picture of evaluations or a geographical environment drawn in a national scale, an attempt should be made at compiling qualification maps for the basic elements of an environment, made in different types of scales for the specialized purposes of agriculture, of settlements, and of recreation.

It should also be stressed, that this kind of work might be treated as some sort of formulation of a direct economic calculation.

IV. REMARKS ON ECONOMIC CALCULATION OF EFFICIENT USE OF NATURAL RESOURCES

Concurring with W. Wilczyński's suggestion (1963, p. 506) the essence of an economic calculation should be defined as a method of measuring costs and benefits of economic activity a method warranting from a social point of view their proper appraisal, and facilitating rational decisions aiming at maximalization of benefits.

Up to now analyses of the problem of using a geographical environment have emphasized the *cognition* and the *evaluation* of existing natural resources and conditions with specific purposes in mind; however, they failed to develop the *principles* of a monetary (indirect) economic calculation of the resource use, a calculation which would serve as basis for executing the principle of economy in setting in motion this potentiality.

This must be mainly ascribed to the difficulties arising when an attempt is made at appraising in money the available natural resources as means of production, as well as to the difficulties involved in formulation and application of the principle of economic use of the natural resources by means of calculation of the indirect costs.

A. THE PROBLEMATICS OF LAND RENT AND NATURAL RESOURCES

A basic problem encountered in an indirect calculation of the exploitation of the resources of the geographical environment is their monetary assessment. The essential question is whether prices can differ from the value which define the socially indispensable outlays for labour and if so, by how much (B. Gruchman 1965, p. 17). Establishing a reasonable pattern for evaluations stipulates considering preferences of a comprehensively social character, which for the most part result from the ratio of available resources to demands, thus from the scarcity of certain resources.

From the viewpoint of a monetary calculation it is the prices obtained for resources available in limited quantities which would dictate action and alternative decisions.

So far no uniform definition exists for the evaluation of resources.

Most progress has been made in the evaluation of land, in connection with land rent — while less attention has been paid to appraising and Earth crust resources.

In the category of *land rent* in capitalist economy with private ownership of land, it is possible partly to solve the question how to appraise the value of some natural resources and, principally, of land. Disregarding the well-known critical comment on the limited usefulness of this category under conditions of a capitalist economy it should be emphasized, that in a socialist economy, as in Poland, the operation of land rent (in the form of a differential rent) is limited to agriculture. The demands for a restitution of the land rent is motivated not only by necessity of a rational management of land which by nature is a limited resource, but also by the economics of investments, in urban and industrial development. Among other factors this refers to the effect of wastefulness in land use has upon the investment costs. Detailed analysis of the problem is given by H. Chołaj (1966).

However, introduction of a land rent calls for a suitable method of how to establish the value of land. An essential difficulty here is, to define what is called by H. Fiszal (1964) the substitute value. He suggests that this value be considered as the income foregone when the given piece of land, previously used by agriculture, is to be occupied for building purposes. H. Fiszal also recommends taking into account as income only the net production value. In this way value looked for would be established as the equivalent of the income foregone or, more exactly, the equivalent of the discounted value of the expected annual income. This concept still requires indications as to the purpose for which the land is to be used. This can be accomplished by preparing an optimum programme of land development.

Restitution of a land rent would in turn create a basis for comparative evaluation of land use for agriculture, industry, urban development or recreation purposes and it would also lead to an intensification of the urban land use by introducing appropriate incentives based on an economic calculation.

The most generalized concept, both in theory and in calculation, dealing with a rent under socialist economy has been put forward by L. Kantorowicz (1961). The differential rent as conceived by L. Kantorowicz refers to the solution of problems involved in the utilization of the most valuable, rare natural resources. The value of this rent is established from the saving in labour, gained due to the optimal use of these resources.

The advantage of taking into account a rent in appraisals of production is that it equalizes production conditions for different resources and warrants profitability where production is rationally based, and it yields a relatively higher appraisal for those types of products for which rare natural resources are used. This in turn is an inducement to apply production methods as effectively as possible.

A new attempt at developing economic evaluation in the form of a system of indices, by which costs would be replaced in an objective way by proportions between different economic values, is the concept of "objectively motivated appraisals" advanced by L. Kantorowicz. In a general way though not very accurately, appraisals objectively motivated may be defined as proportions used for defining the labour indispensable for given production to fulfil the optimum plan contrived in a rational programme of allocating production. However, a precise definition of objectively motivated appraisals would require discussing the fairly complicated mathematical procedure for formulating these proportions in terms of multipliers.

When it comes to a product in limited supply, the appraisal is not only based on all definite conditions of its production and use. A diminution in the supply of one factor, as well as an increase in production for which the given factor is highly important, — both may lead to an increment of the value of this factor. This refers to variable factors which are limited in quantity, and where consumption per unit of production depends on the method of production. Apart from labour and power, natural resources must also be assigned to this group of factors. In this concept the appraisal of rare natural resources of highest value is done by means of the differential rent. The magnitude of this rent is established on the basis of those savings in labour, which are gained from making use of these resources in the optimum plan; hence it has the same properties as an objectively motivated appraisal.

Here attention must be called to the fact, that in this concept both the natural resources and the equipment for their use are mere factors bringing savings in labour. Hence the consideration of outlays for this type of factors and their appraisal must be looked upon merely as a means for an optimal division of labour and for comparing costs incurred under various conditions.

Making use of the concept presented by L. Kantorowicz of taking into account objectively motivated appraisals may lead to a more effective utilization of the natural resources. This concept, however, has several drawbacks. This has been most convincingly indicated by W. Niemczynow (cf L. Kantorowicz 1961, p. 13) who asserts, that objectively motivated appraisals are merely criteria which make

possible a quantitative appraisal of the limitations of production facilities and natural resources, the inadequacy of the rate at which plant equipment is operated, and the extent to which the programme of production is strained.

B. INTERPRETATION AND REALIZATION OF THE PRINCIPLE OF ECONOMY IN THE USE OF NATURAL RESOURCES

The interpretation of the principle of economy in relation to utilization of natural resources in a perspective scale implies, that all those kinds of resources which in production should be used economically, must be consumed in such manner as to make them last as long as possible, though within the limits set by actual needs of the population. Hence this rule does not apply to those natural resources which can be exploited in unlimited quantities, either because they occur in quantities practically inexhaustible or because they are automatically restored.

One can specify more accurately this rule by distinguishing the various kinds of natural resources and by taking into account their particular conditions of occurrence. For this purpose two basic categories of natural resources must be considered separately: renewable and non-renewable resources.

To *renewable* resources, i.e. those which under certain conditions may become exhausted belong water power, forest resources, and soil fertility. Here restoration is conditional upon social efforts, be it prior investments indispensable for utilizing the resources such as water power plants, or in the form of continuously effort like reforestation, or soil conservation.

Among the *non-renewable* resources, i.e. resources gradually decreasing in time, in the first place mineral raw materials should be mentioned. Ch. Bettelheim (1959) suggests, that to each of these two categories separate principles in economic calculations should be applied.

As regards *renewable* resources, for which restoration a certain amount of social labour is required, the rule should be that they ought to be exploited at such a rate that their preservation and even their enrichment should be possible, if this should seem indispensable for meeting future demands: while at the same time current needs are satisfied. The developing of this rule, considered from an economic point of view, may involve interpretation of the cost of renewing natural resources as a factor in the social costs of producing those commodities requiring these resources for their production. Therefore, this cost should be included in the price of the commodities. This approach will comply with the principle of economy by limiting the demand for the given resource. This results from the fact, that if the price of a commodity include the social cost of renewing the resources used for its production its competitiveness will be less than when the additional cost is not taken into account.

This interpretation gives as opportunity of realizing the principle of profitability in the use of resources of the renewable kind, as foreseen in the perspective

plan of national economy. The principle can be put to use by fixing that rate of exploitation of renewable natural resources which ensures their preservation and, possibly, their expansion also.

As regards *non-renewable* resources a difference must be made between resources which will be exhausted in a distant future and those which will be depleted in a short time. The former may be treated as if they were renewable. Here the principle of economy can be upheld by including in the production cost of the commodities the cost of exploration of new deposits, the cost of investment on the exploitation of the given resources, and perhaps also increases in the cost of exploitation. On the other hand, for resources depleted in a short time there have to be taken into account the costs of discovering and producing some substitute products.

C. MODEL OF BALANCE OF ENVIRONMENTAL COSTS AND BENEFITS

Realization of the basic social aim, i.e. the highest possible fulfilment of social needs in managing resources and conditions of the geographical environment, can be achieved by either of two methods: by using the natural resources for productive purposes or, on the contrary, by refraining from doing so, that is, by foregoing the chance of increasing the national income in favour of directly satisfying current needs, this involving the maintenance of a suitably high standard of the geographical environment.

A maximalization of the national income, which constitutes a clearly fixed and quantified form of the principle of the national economy and controls the choice in the utilization of resources and conditions — especially when it comes to industrial investments — is liable to impair the attributes of the geographical environment from the viewpoint of health and recreation facilities and of its esthetic values thus disturbing its balance. The concept of quality of the geographical environment is much more difficult to quantify than factors like population or infrastructure. Usually only catastrophic conditions which signify an abrupt worsening of the properties of the geographical environment, such as for instance river pollution, are apt to call attention to the costs incurred due to a disturbance of the equilibrium. This implies the necessity of formulating the model of a balance by identifying environmental costs and benefits.

The construction of this type of a formal model is based on the introduction of the concept of an equilibrium of the environment. This concept would make it possible to compare the changing benefits in the environment resulting from optimum locations chosen, with the costs involved by disturbances of the equilibrium (which may come to light *ex post*), and with costs incurred *ex ante* in order to prevent a worsening of the environmental conditions — situations which may have to be faced in consequence of some alternative trends of economic development. However, for this sort of a model there is required a definition (a quantification) of the effect which the alternative programmes will bring about. And here

arises the difficulty of establishing the monetary value of this effect. A suitable example of introducing the environmental costs and benefits into interindustry model, is given by J. H. Cumberland (1966). The model suggested by J. H. Cumberland is illustrated in the form of an input-output table for the given region. This model includes rows and columns which make it possible to identify the costs and the benefits. The former costs are incurred due to impairment of its balance and to the prevention of damage to the environment resulting from economic development. These pros and cons can be split up according to different economic branches. In this concept the rows and columns of the equilibrium of the environment constitute the framework of a conventional table showing regional input-output analysis.

Purchasing industry		Environmental balance (B)
Producing industry		
	Input-output table	Cost of restoring the quality of the environ- ment
Environmental benefits (+) Q		
Environmental cost (→) C	Cost of impairment of the environment	
Environmental balance (A)		

Regional input-output table with environmental balance

Environmental balance expressed by row *a* should be interpreted as a measure of the effect of the environment upon the economic activity. This balance consists of the benefits of the environment by sectors, expressed in money (row *Q*) and of the hypothetical cost caused by the impairment of the environment (line *C*). Entry *B* seen in the balance column of the environment should be interpreted as the cost to be incurred by particular sectors in order to prevent losses of the environment, to neutralize changes of the environment harmful from the viewpoint of health conditions or esthetic values, etc., and to restore the quality of the environment. Both rows and columns can be subdivided into sub-branches consistent with corresponding environmental factors encountered in a given region, as far as relevant data for these factors are available.

Hence from the viewpoint of planning of the economic development row *A* and column *B* show the estimated values of specific benefits and costs, resulting from the operation of environmental conditions and not taken into account in the

regional input-output analysis. The whole of the balance sheet of the environment can serve as set of criteria for evaluating the perspective plan of regional development from the viewpoint of the part played by the environment.

The leading conclusion to be drawn from this sort of analysis is, that is a solution expressed by *Q* and *C*, is unsatisfactory thus that value *A* is positive. Agreement to this solution would of necessity lead to a worsening of the quality of the environment in spite of relative economic advantages. Hence, an essential element in maintaining the balance of an environment is that the proportion should be $Q > B$.

For the problematics of prospective spatial planning, of essential importance are two further research problems referring to the use of a geographical environment.

The first is the problem of the capacity of geographical environment, and this must be examined from the viewpoint of the saturation of the environment with population and the fixed assets (in terms of their value and structure). Every attempt at defining this capacity is of necessity relative and depends on type of economic use, like industrial-urban agricultural or recreational. This attempt must be based in the first place upon the results of an equilibrium analysis, from which results one can establish the amount of investment funds required for protecting the environment. It also must be based on a comprehensive appraisal of the most appropriate way of utilizing the environment. The basis for defining marginal conditions of the capacity mentioned should be indices characterizing the saturation of the environment, derived from the standards of ecological conditions recommended for human life, and the aim of maintaining the equilibrium of the environment, — thus the realization of the two principal rules which supplement and restrict economic activities.

The second problem is how to draw up the rules for investigations of the regional structure of the country from the viewpoint of the degree of the intensity of its development, in proportion to the level dictated by the natural conditions. This requires, apart from the above mentioned indices of saturation, further empirical indices recording: overloading of the environment, hazards to its equilibrium, and determinations of resources so far unexploited that might be utilized for activating the economy.

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