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VALUATION OF THE EFFECTS OF ECONOMIC ACTIVITIES ON ENVIRONMENT FROM THE REGIONAL POINT OF VIEW ON THE EXAMPLE OF THE MODEL REGION OF LIBEREC

The achievement of the optimum state of environment is one of the most important scientific, technico-economic and political present-day problems. The society requires from the different scientific disciplines sufficient data concerning the functioning of the environmental system. The knowledge of the functioning of the environmental system allows to accept measures resulting in an optimization of all elements of environment. It is simultaneously necessary either to avert the origin or reduce the consequences of the negative effects of economic activities on environment. Geography understood at the present time as a science dealing with the relationship of the system of natural milieu and the system of human society in space and time (Demek 1972) has many preconditions for a complex valuation of environment. Studies with a view to geography cannot do without respecting the regional aspects of the problems of environment.

The Institute of Geography of the Czechoslovak Academy of Sciences in Brno has been dealing intensively with the problems of the research methods of the valuations of the effects of Man on environment from the regional viewpoint since 1967.

Tackling of research tasks is based above all on the geographical analysis of regions investigated and on the establishment of the interactions affecting both the elements of the physico-geographical and of the socio-economic environments.

For the purpose of tackling these tasks five model regions were selected in the ČSR with a different level of economic utilization and, accordingly, different consequences of the effects of economic activities on environment. The investigations were carried out in the North Bohemian Lignite District and in the region of Ostrava — i. e. in the regions in which the consequences of the effects of industrial activities on environment manifest themselves very distinctly. Another model region — that of Břeclav — is characterized by prevalence of agriculture in the socio-economic sphere whose influence affects all the elements of the environmental system very strongly. As a region of comparison served the region of Jihlava where industry is not well developed and agricul-

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tural production is not very intensive. The publication submitted summarizes the results of the research carried out in the fifth model region — that of Liberec.

The investigations of the effects of economic activities on environment were based on system approach allowing a complex view of natural and social objects and phenomena occurring inside these objects. The environment is understood as a system of abiotic, biotic and socio-economic elements with Man gets into touch, which he re-modells and uses in order to satisfy his needs, and to which he adapts himself. The subject of knowledge i.e. the environment is understood as a system falling into two subsystems, such as that of natural environment and that of socio-economic environment. The object of research i.e. the economic activities are understood as a complex of all activities of Man orientated towards the creation of material goods for the purpose of satisfying his material and nonmaterial needs.

The investigations were based on the geographical analysis of the region studied which made possible the establishment of most significant interactions between the elements of the physico-geographical and the socio-economic environments. Elements were analyzed which are most significant for the structure of the environmental system from the point of view of geographical valuation.

On the basis of this interdisciplinary co-operation of a great working team the interactions among the elements of both subsystems were studied. It was possible to establish by means of a geographical analysis which interactions manifest themselves and which is the place, the area, the extent and intensity of their effects in the region investigated. But many interactions could not be quantified to the necessary extent with respect to the insufficient amount of information necessary in order to characterize completely the environment.

On the basis of the geographical analysis of the model regions a table was compiled of the interactions in the environmental system in which we tried to establish the intensity of the interactions among the various elements (Table 1). The intensity of the interactions was valued by means of dimension-less quantities. On the basis of the present knowledge of the interactions among the elements of the environmental system all mutual relationships cannot be expressed in another way. This valuation of the interactions allowed to distinguish the significance of the different elements in the environmental system. The synoptic tables of interactions supply a basic information of the structure of the environmental system in the model region.

The work of the research team was orientated towards the establishment and valuation of the negative effects of economic activities on environment. The research results were summarized in the list of negative effects in which each of the elements studied was characterized by the most significant negative effects established by research and affecting the element. All the negative effects have been specified briefly, located, and, if possible, even quantified and economically valued. Measures are given for each negative effect which are able to reduce the effects of the negative influence or exclude completely its effects on the environmental system.

For a complex valuation of the environmental system and the level of its affecting by the negative influence of economic activities the various negative effects must be compared and their significance from the point of view of effecting the whole system should be established.

Research work in the model region of Liberec was orientated towards the establishment and valuation of most significant negative effects of economic activities on environment. Most strongly and most negatively affected element of the environmental system of the model region of Liberec is water. Water is affected by the other elements of the system with medium up to high intensity, the consequences of the negative effects of water are of medium up to great significance for the environment of the region of Liberec.

The general view of the negative effects manifesting themselves in the environmental system allows a general evaluation of the various components by valuation indices of the different negative effects. The valuation indices make possible the comparison of the present state of knowledge and the level of investigations (A), the extent of the effects (B), the intensity of the effects (C) and the significance of the negative effects from the viewpoint of the environmental system of the model region (D). A survey of the valuation of the various components by valuation indices is given in the following tables:

Present state of knowledge and level of investigations (A)

Valuation	Number	%
1 Not investigated	4	6,0
2 Insufficiently investigated	23	32,0
3 Qualified estimate	6	8,0
4 Non-recurring investigation	21	30,0
5 Systematically investigated	17	24,0

Extent of the negative effects (B)

Valuation	Number	%
1 small	2	3,0
2 local	31	44,0
3 local in the whole region	27	38,0
4 in the greater part of the region	11	15,0
5 in the whole region	—	—

Intensity of the effect of the negative influence on the element investigated (C)

Valuation	Number	%
1 very low	2	3,0
2 low	31	44,0
3 medium	25	35,0
4 high	13	18,0
5 extremely high	—	—

Significance of the effects of the negative influence from the viewpoint of the environmental system in the region (D)

Significance	Number	%
1 negligible	7	10,0
2 small	31	44,0
3 medium	27	38,0
4 great	6	8,0
5 extremely great	—	—

From the survey of the valuation of the present state of knowledge and level of the investigations of the negative effects in the model region (A) it follows that the level of information of the problems of the negative effects on the environment of the model region is not high enough. Only 1/4 of the negative effects are systematically investigated. Most negative effects in the region act locally, only 15% acting in the prevailing part of the region (B). The intensity of most negative effects is low up to medium extremely high intensity has not been established at all (C). On the basis of the valuation of the significance of the negative effects from the point of view of the environmental system (D) the region of Liberec can be classed with the environment affected a little up to medium by negative effects. Only 8% of the negative effects are of great significance from the point of view of the environmental system. No negative effect is of extremely great significance.

On the basis of a complex valuation of negative effects it was established that the negative effects of the economic activities on the environment of the model region of Liberec manifest themselves mostly locally and are predominantly of low and medium intensity and of small and medium significance — only 8% being of great significance from the point of view of the environmental system of the region. Only a small part of the negative effects is systematically studied.

The Liberec region can accordingly be classed with regions with an environment affected a little and/or to a medium extent by negative effects. Most significant negative effects are caused by settlements and industry. The effects of settlements manifest themselves in the prevailing part of the model region mostly with medium and high intensity and are of medium up to great significance in the environmental system of the region. Industry affects 7 elements with low, medium up to high intensity and some of its effects are of great significance for the environmental system of the model region.

The investigations in the Liberec region and other model regions have confirmed that the knowledge of the structure and functions of the extraordinarily complicated environmental system should be based on complex interdisciplinary research. The valuation of the negative effects of economic activities on environment is one of the basic stages of this research. The knowledge gained during the investigations of the model regions completes and concretizes the general methods of the valuations of the effects of economic activities on environment. The investigations of the regions contributed both to the solution of the material problems of the environment of the different regions investigated and to the verification of theoretical and methodical approaches and the regional valuation of the state of the environment. The research results achieved in the model regions allow to carry out a comparative analysis of the state of the environment in the Czech Socialist Republic from the regional point of view.

The methodical approach elaborated in the course of the investigations of the model regions in the Czech Socialist Republic enabled us to value complexly the negative effects on the individual elements of the environmental system and on the whole system. Future interdisciplinary research should be orientated towards the enlargement of knowledge concerning regional differentiation of the negative effects of economic activities on the environment and the objectivization of the criteria of valuation. The methods of cartographical valuation should necessarily be further elaborated with the application of most modern methods of remote sensing.

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VREDNOTENJE VPLIVA EKONOMSKIH DEJAVNIKOV NA OKOLJE NA PRIMERU MODELNE REGIJE LIBEREC

Studija obravnava vrednotenje negativnih učinkov ekonomskih dejavnosti na okolje v modelni regiji Liberec. Povzema izsledke raziskave ugotavljanja metod ekonomskega in neekonomskega vrednotenja človekovega vpliva na okolje z regionalnega vidika. Raziskava je bila zasnovana na geografski analizi obravnavane regije. Analizirani so bili najpomembnejši elementi strukture okolja z vidika geografskega vrednotenja. Cilj raziskovalne skupine je bil ugotoviti in ovrednotiti negativne vplive ekonomske dejavnosti na okolje. Vsak izmed njih je bil na kratko opisan, lociran in če je bilo mogoče tudi kvantificiran in ekonomsko ovrednoten. Za medsebojno primerjavo posameznih negativnih vplivov in določitev njihovega pomena v sistemu okolja, je bila uporabljena metoda najmanjših vrednosti (količin). Do sedaj pridobljeno znanje in raven raziskave negativnih vplivov so bili prav tako vrednoteni, kakor njihova razširjenost in intenzivnost ter pomembnost z vidika vplivanja na okolje v modelni regiji.

Na osnovi splošne opredelitve negativnih vplivov je bilo ugotovljeno, da se negativni vplivi ekonomskih dejavnosti na okolje v modelni regiji Liberec kažejo lokalno in z nizko ali srednjo stopnjo intenzivnosti ter so večinoma malo ali srednje pomembni. Samo 8% jih ima velik pomen z vidika celotnega sistema okolja v modelni regiji in le majhno število negativnih vplivov je bilo sistematično proučenih.

Modelno regijo Liberec lahko torej uvrstimo med območja z le malo več kot zmernim vplivom negativnih elementov na okolje. Naselja in industrija ustvarjajo najpomembnejše negativne učinke. Učinki naselij se kažejo v večjem delu modelne regije največkrat s srednjo in visoko intenzivnostjo ter imajo velik pomen za sistem okolja. Industrija vpliva na 7 elementov z nizko ter srednjo do visoko intenzivnostjo in nekateri njeni učinki imajo prav tako velik pomen na okolje v modelni regiji.