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SOME PROBLEMS OF THE DEVELOPMENT OF REGIONS WITH HIGHLY IMPAIRED GEOGRAPHIC ENVIRONMENT

One of the grave problems of modern industrial society is the progressively growing devastation of geographic environment as a consequence of the rapid and unbridled development of industry. It manifests itself in the excessive pollution of air by various gases, dust, and fly-ash, by the pollution of both the surface and ground water, and by the growing devastation of agricultural land. The volume of healthy environment per inhabitant is thus continuously decreasing.

Devastation of geographic environment is the most conspicuous in the main industrial regions of Europe (the Ruhr, the Upper Silesian basin, the Saar etc.) and of North America (Pittsburg, New York etc.), though its destructive results can well be studied in the territory of the Czechoslovak Socialist Republic as well. Regions with a certain degree of impairment of geographic environment extend over more than twelve thousand square kilometers of the country, which amounts roughly to ten per cent of the territory of the Republic. These regions are inhabited by one-third of the population of the country.

The highest degree of impairment of environment has been reached in the North Bohemian soft-coal basin and in the Ostrava industrial conurbation. The former is inhabited by over half a million people, and its air is polluted by 400 thousand tons of fly-ash and by 380 thousand tons of sulphur dioxide a year. The damage inflicted by excessive detrimental emission upon forestry, agriculture, industrial plants and structures, and upon the population amount to nearly two milliard Czechoslovak crowns a year. These impairments press down the regional productivity by 20 %. In the Ostrava conurbation, with a population of six hundred thousand, more than 190 thousand tons of fly-ash and 200 thousand tons of sulphur dioxide are blown into environmental air. The adverse effect on geographic environment does not reach that level of the North Bohemian coal basin, but it is very strong even here.

A number of analyses showing the extent and intensity of the damage inflicted upon the geographic environment have been worked out and the detrimental effects of that damage upon man's life have been drawn attention to. Institutions and public organizations have been established for the preservation and protection of the landscape and the respective regulations and norms have been issued. The importance of these steps and measures is certainly quite considerable, nevertheless the continuing devastation of the geographic environment has not been put an end to.

The main cause of that situation can be seen in the ignorance of the methods of measurement of the economic effects of the damage inflicted upon the individual factors making up geographic environment and in the complete lack of knowledge of methods of redress.

The aim of the present paper is to throw light at some problems caused by the development of industry in the geographically impaired regions and to draw attention to a possible variant of solution. Our attention has been focused upon industry because it is the main source of adverse influence on geographic environment, including devastation of that environment.

This research of the conflict between industry and geographic environment may seem useful and promising, nevertheless it also poses many difficulties, especially in regions with the highest impairment of geographic environment.

These regions are in most cases the main industrial bases of the country. They yield the greater part of fuels, energy, steel, chemicals etc., upon which the whole complex of the manufacturing industries of other regions depend for their smooth running.

The extent and intensity of industry in these regions have mostly more than overshot the margin set by their natural and economic conditions. Further development of industry in these regions is conditioned by the removal of mobile productive factors (labour, building capacity, energy, water etc.) from other parts of the country, and, in the most recent years, by import from abroad, which is often materialized without respect to costs going with such transport and transactions.

In these regions the preferred development of certain industries, e. g. fuels and power, chemicals, metallurgy, has been effected under simultaneous repression (and even displacement) of industries of a purely manufacturing character. An unbalanced structure of industry has thus evolved in the devastated regions with industry making demands upon the regional conditions of production that are out of any proportion.

The preference granted to the key industries beyond the limits set by the economic conditions has become the principal cause of the devastation of the geographic environment in these regions, which seems to be ushering in a crisis of the whole ecological system.

The present trends of industrial development in these regions are however not permanent. In the near future the structure of industry will have to undergo a thorough process of conversion. The deepest changes are likely to occur where coal mining and the production of electrical energy constitute the key branches. (These changes will be called forth by the switch from coal to fuel oils, gas, and atomic power.)

The few glances at the industry in the regions with deeply impaired geographic environment taken above, will already have pointed to a variety of problems that must be dealt with as soon as a more rational development of those regions is embarked upon, and to a diversity of methods which will have to be applied in the solution of the task.

With respect to what has been said above it seems advisable to deal with the conflict between the development of industry and geographic environment by focusing our attention on the character and the extent of the change which the present structure of industry would have to undergo in order that it may be put in line with the natural and economic conditions of production in the region and stopped from causing excessive damage to geographic environment. The aim of that change is to prepare the way for the regeneration of the devastated environment to an acceptable state, which would also answer the needs of the whole society.

An absolute shortage of information is the main obstacle to the strife for more rational variants of the development of industry in the devastated regions. Since

the statistics and the records do not yield the necessary information it will be important to direct initial research to the creation of a special system of information and to the collection of the data. It follows from the nature of the task itself that the information needed will be of a twofold character.

Information of the first type refers to the natural and economic conditions of the region under examination. It includes information on the extent of industrial areas, on raw material and water resources, and on climatic conditions, as well as information on transport facilities, sources of energy, demographic conditions and conditions for settlement, facilities of the non-manufacturing infrastructure etc. Very useful are data giving the overall capacity of each of the mentioned conditions and the measure up to which a certain condition has already been drawn upon and exploited by industrial production. Data of this type will help to determine the marginal conditions for the industrial development of the given region.

In order to be able to make use of the economic criteria in dealing with the development of industry we will have to ascertain the unit costs of each condition in the territory of the region. The existing uniform state prices charged to industrial enterprises for the exploitation of the conditions, however, do not admit of any ascertainment of that kind.

A very important part of that first type of information are data on the admissible measure of negative influence of industry upon the geographic environment of the region, i. e. a measure that would still ensure to the population healthy conditions of life.

An experience has shown that it is the acquisition of the information characterized in the above paragraph that is the most difficult of all. Here lies the explanation of the fact that the state norms of admissible concentration of harmful substances discharged into air and water are far from being acceptable. These norms do not take account of substantial differences between the natural conditions of the different regions, and they even ignore the growing intensity of the harmful effect of diverse sorts of pollution cumulating in the same area and within a limited time span. It is this cumulative effect of the polluting substances that in most cases leads to critical situations ending in tragic consequences.

The second set of information are data concerning industrial production, i. e. data listing the demands of various industries on the natural and economic conditions of the region and the economic effectiveness of the exploitation of those conditions. This second set of information should also include data on the reverse influence of the different industries upon geographic environment.

Since the existing structure of industry in the mentioned regions will have to be changed, the required data must also be found for those branches of the manufacturing industry which have not been established in these regions so far, but which can be looked upon as eligible for relocation. These data will have to reflect the influence of new techniques of production and the ideas about the optimum size of industrial plants.

It is important that we should also be supplied with data on the intensity of the economic bonds between the different branches of industry within the framework of the production cycles that have already been introduced or are at least introduceable into the region under examination. The industry of the region could thus be treated as a system of mutually dependent branches of production.

Despite the fact that a system of information of the type outlined above can hardly be considered exhaustible, we are convinced that it would yield sufficient

data for the treatment of the deficiencies of the existing structure of industry, especially for the treatment of the deficiencies of the relation between that structure and the natural and economic conditions of the region. That system of information would enable looking for those variants of industrial development of the region that could restore the impaired balance of its geographic environment which is determined by the relation between the natural conditions and the economic activity of man.

It is obvious that in searching for the optimum solution of that problem a large number of combinations will have to be considered. It therefore seems advisable to tackle the task with the help of mathematical modelling methods and the modern computing techniques. The principle of the solution consists in the method of correlating the given natural and economic conditions of the region (determined by a system of limiting conditions, including those preserving the geographic environment) with various combinations of the types of industrial production so that an optimum may be reached that will answer the purpose of the task.

Mention should also be made that a solution of this kind is rather difficult to reach for any region of the country, which applies even more to regions that constitute the chief industrial bases of the country. They are regions suffering from a surfeit of industry and its harmful waste to such an extent that the development of industry is hindered by ever-growing difficulties and by the rising costs of production.

The complexity of our task may in a way be due to its interdisciplinary character. The formulation and the solution of the task necessarily presuppose close collaboration between the physical and the economic geography and a close contact between the geography on one side and the other branches of science, both natural and social, on the other.

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NĚKTERÉ PROBLÉMY ROZVOJE OBLASTÍ SE SILNĚ NARUŠENÝM GEOGRAFICKÝM PROSTŘEDÍM

Jedním ze závažných problémů soudobé industriální společnosti je vzrůstající poškozování geografického prostředí. Projevuje se nejen nadměrným znečišťováním ovzduší, nejrůznějšími plyny, popílkem a prachem, intoxikací povrchových a podzemních vod, ale i devastací zemědělské a lesní půdy.

Nejvíce je geografické prostředí poškozováno v hlavních průmyslových oblastech, zaměřených na těžbu paliv, energetiku, hutní a chemický průmysl. Poškozené prostředí zhoršuje podmínky reprodukce průmyslové výroby a obyvatelstva a ztěžuje plánování dalšího rozvoje hospodářství oblasti.

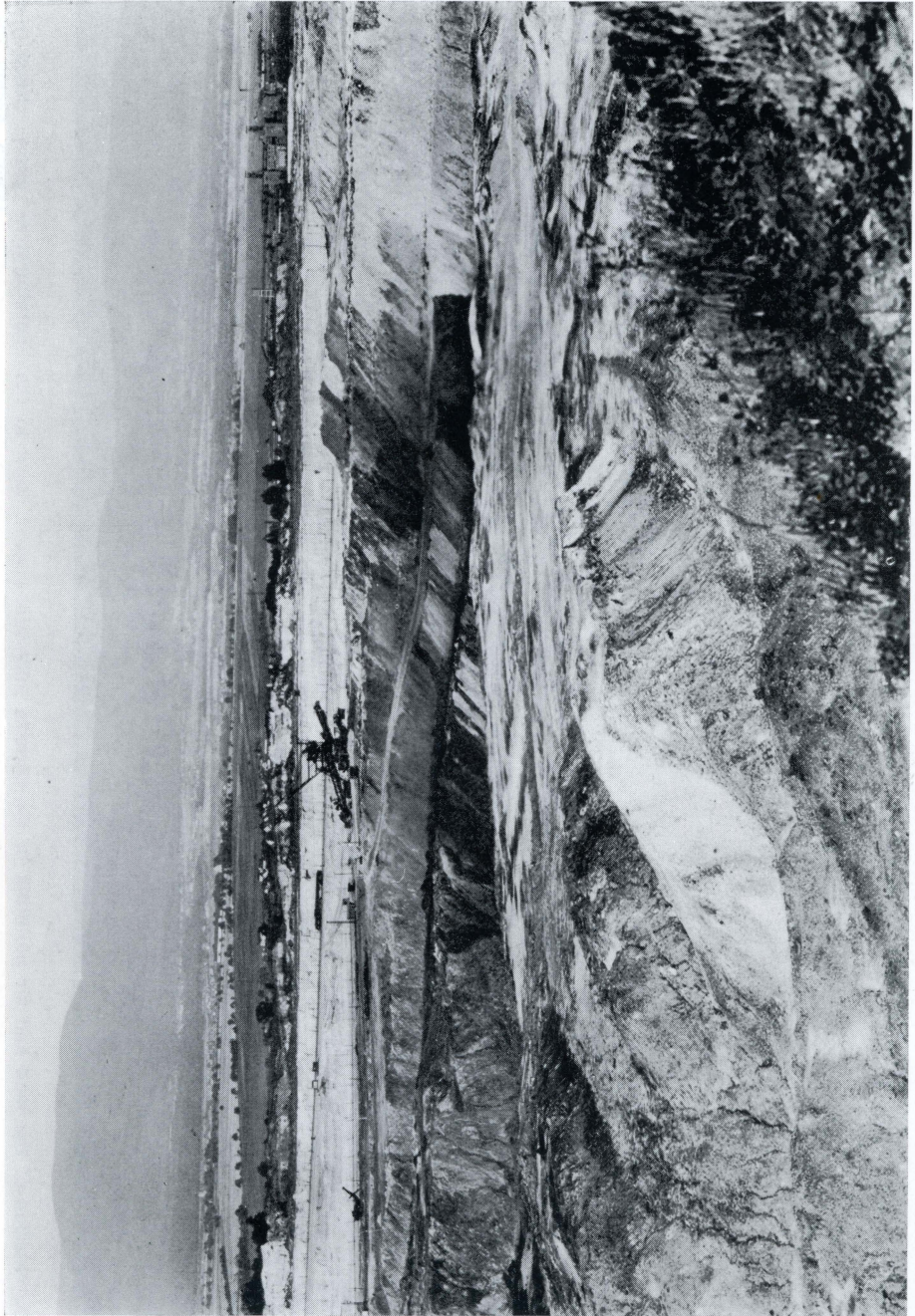
V článku jsou naznačeny hlavní problémy, které při rozvíjení průmyslu v oblastech se silně narušeným geografickým prostředím vznikají a je nastíněn přístup k jejich řešení. Spočívá v určení přípustné míry negativních vlivů průmyslu na geografické prostředí zkoumané oblasti a v hledání variant územní struktury průmyslu, které by — při dodržování celospolečenských potřeb — tuto hranici nepřekračovaly.

Je uvedena charakteristika potřebné informační soustavy a naznačen přístup k řešení úlohy pomocí metod matematického modelování.

K obrázkům na křídové příloze:

1. Devastace povrchu lomem Maxim Gorkij u Bíliny — pohled ze svahů Kaňkova k severu, v pozadí Krušné hory.

2. Krajina devastovaná těžbou a průmyslovou činností na Ostravsku. Pohled z odvalu jámy Trojice na metalurgický závod Nová huť Klementa Gottwalda. (Foto archiv ČSAV)



1. Devastation of the land in Mostecká kotlina (coal basin near the town Most). View from the south to the Ore Mountains.



2. Devastation of the land and air pollution in the Ostrava industrial region. View to the metallurgical plant „Nová huť KČ“.
[Photo Archiv GÜ ČSAV]