

Legyen szabad összefoglalóul utalnom az Intézet 1981—1986 közötti 767 tételt tartalmazó ö s s z p u b l i k á c i ó s tevékenységére, ezen belül 20 magyar és 13 idegen nyelven megjelent könyvünkre, a publikációnkról a fontosabb külföldi referáló folyóiratokban megjelent 535 tételre.

Végül hangsúlyoznom kell azt, hogy feladatainkat és elért eredményeinket s z é k h á z u n k 5 évig tartó átépítése miatt igen nehéz munkahelyi körülmények között valósítottuk meg, ill. értük el. Ez idő alatt azt a csekély m ű s z e r e z e t t s é g ű n k e t sem tudtuk kihasználni, amellyel rendelkezünk. Sőt, a műszerfejlesztésről is le kellett mondanunk. Ezért több hazai és külföldi rokonintézmény műszeres vizsgálataira, számítógépeszközeire kellett támaszkodnunk. E helyen is köszönöm ezeknek az intézeteknek, ill. a közreműködő személyeknek a hatékony segítségét, továbbá azoknak a szervezeteknek a támogatását, amelyek elősegítették munkánkat.

Geographical research of the environment in the service of economic development

DR. MÁRTON PÉCSI

Ladies and Gentlemen,

for the 1987 public session the Presidium of the Hungarian Academy of Sciences proposed its Institutes to report on achievements in fundamental and applied research during the last five years' plan. The Department of Earth and Mining Sciences provided a forum on this meeting for the Geographical Research Institute of the Hungarian Academy of Sciences to start the series of reports.

When preparing this report, several circumstances had to be considered: first, the limitation of time, second, the special genre of speaking to an audience of experts from several disciplines and, third, the fact that my lecture would be supplemented by accounts on the results of the Institute in 1981-1985. In the information booklet of the Academy a summary in theses is given on pp. 56-60. In addition, a summary has been published about our Institute, available for everybody interested at the exhibition of books and posters.

Geography and social expectations

In a broad sense, g e o g r a p h y i s t h e s y s t e m o f knowledge on the g e o g r a p h i c a l e n v i r o n - m e n t o f s o c i e t y. The objective and aspect of geography is multifold. As a school subject, geography serves the purposes of public education through informing about the Earth and its inhabitants, while, from another aspect, as an academic discipline, the approach, objective and depth of research has undergone changes in (almost) every decade of the

second half of our century depending on the actual expectations against geography from other disciplines and from the society.

According to the present expectations, the task of geography is the typification of the state of the geographical environment of society combined with assesment, systemization of spatial physical and social processes and relationships, interpretation and prognostication of changes. The definition also includes that partial geographical disciplines do not represent in themselves the whole of geography.

In its field of research of factors on the Earth and in the geographical environment of society, geography is not alone, the work is shared by the earth sciences and several social and technical sciences.

In this decade the interpretation of geography as a general systems science became an ever strenghtening trend. It reveals the totality and interrelationships of the factors of the geographical environment studied by other sciences and itself.¹ We strive to interpret the Earth and the geographical environment of society as a functional whole of factors in their interaction. At the same time, major factors are investigated separately by other disciplines.

Geography has long been engaged in the study of multivariuous relationships and interactions. Today new requirements call for the investigation of environmental factors (natural or artificial components of space) in interaction even if the task is to interpret partial factors of the geographical environment. This attitude is characteristic of the methodology of geographical studies of space (the environment).

This geographical attitude and methodological procedure has received special emphasis in the exploration and necessary assesment of relationships between man (society) and nature. The changes in the geographical environment of society has accelerated by our days², although some decades ago we postulated and taught a slow change.

New methods and applications

By the time geography surveyed and registered environmental changes by traditonal methods, the state and quality of the environment had substantially changed. Consequently, new methods and procedures had to be sought to survey day-to-day changes.

1. Information system for environmental management

During the last fiveyears' plan - induced by social and economic expectations - it became clear that it is indispensable to construct

¹ As early as the turn of the 20th century, geography was considered a 'science of relations' seeking relationships as now the recent general systems science is conceived (LUDWIG von BERTALANFFY /1939-1972/). In this concept relationships or laws (must) exist which govern the individual types of interacting factors.

² The changes in the geographical environment today are not only due to the cyclical changes of natural phenomena, but increased population growth and rapidly increasing production and consumption - and any other activity - of society.

and operate and Environmental Information System (GIS). The introduction of this efficient system began for mesoregions (counties).

The model of the system is ready for some assesment viewpoints. Special regional data, digitized thematic maps fed into the computer help the weighting of environmental factors. The program prepared for the system compares environmental potentials and requirements and prints new information in a grid map form. On the operation of the GIS model, the present shpere of applications the account and poster by I. TÓZSA and co-workers provides information.

The storage and retrieval system data base first elaborated in the Geographical Research Institute enables geography in Hungary to supply rapid and efficient services to society, first of all, in the environmental management surveys (environmental protection, pollution, natural resources, land use).

2. Computer methods in remote sensing

Among the first, we developed and applied a method for the interpretation of digitized remote sensing images in the Institute. The goals were the investigation of changes in the quality of natural and artificial components of the geographical environment, recording of seasonal or periodical changes and recognition of hidden environmental elements and their characteristics and observation of the interrelationships between landscape factors and various environmental influences. The geonmical interpretation of the information stored in space and aerial images (in global, regional and topological dimensions) enormously accelerates and promotes the exploration of the Earth's surface and land use and changes in a given environment. With traditional methods environmental analyses would take long years.³

First in Hungary, the Institute produced a coloured image map of crop pattern and settlement structure through computer classification.

We are also the first to prepare a land cover map of a county at 1:50.000 scale. The method was also used during checking the delimitation of agroecological microregions.

Applying the information from recent space images of high resolution and sensitivity (Thematic Mapper), methodological experiments were made to identify hydrocarbon traps. In foreign literature mention was made of carbon isotope anomalies found above several km deep structural (fault) traps in semidesert areas. Relying on the principle of interactions between environmental factors, the working hypothesis was formulated that in the temperate belt the detection of isotopic anomalies would be possible in the soils or vegetation along hidden fault-lines. The anomalies may be sensed spectrophotographically in leaves of cultivated crops or perennial plants. The investigations were carried out for the southern part of the Danube—Tisza interfluve, data were classified by computer and recognizable points interpreted. Over large part of the area under study the interpretation lines expressed the deep situated hydrocarbon storing structures with minor shifts on the surface. On the significance of this research and on possible applications GY. HAHN and co-workers will lecture and present a poster.

³ In order to raise the efficiency of geographical research through the application of remote sensing, many researchers of the Institute attended a two-year postgraduate course at the Budapest Technical University.

Here suffice it to say that the method, promising in mineral resources exploration too, did not receive a sponsor, in spite of our efforts of many years, until finally the Central Geological Office offered the opportunity of commissioned work and helped to start research. The budget of the Geographical Research Institute is far too limited to finance such an expensive research necessitating TM tapes, computer programming and capacity and isotope analyses. Our Institute only has intellectual capacities, but lacks the necessary equipment. Acknowledging the initial results, now the Academy and the National Bureau for Technical Development gives some financial support to verify the method. However, the limited resources only allow a slow progress.

3. Assessment methods of socio-economic factors and exploitation of environmental resources

Apart from those already mentioned, other efficient methods have also been elaborated or applied for the assessment of certain groups of environmental factors for various aspects of environmental management. Some of them were meant to assess social and economic factors, such as the social geographical assessment methods of settlements and their environments and procedures of analyzing and typifying socio-economic spatial processes, of assessing small town networks, of investigating the relationships of physical conditions and settlement development. They are detailed in volumes of papers and dissertations.

The environmental impact statement surveying human impact on the environment with its consequences has also been applied for Hungarian conditions and our Institute contributed to it with initiation and coordination. In some cases the physical environments of major technical establishments in Hungary suffered serious destruction. The investigations revealing the circumstances of unforeseen environmental decline had no theoretical or methodological foundations. The need for such investigations was proposed at the beginning of the five years' plan on the basis of foreign experiences and examples. The elaboration of methods began at the commission of the Hungarian Academy of Sciences and other government bodies. Our Institute had a significant contribution to the elaboration of a methods forecasting the environmental changes induced by the technical implementation of the projected Gabčíkovo (Bős) - Nagymaros Barrage System. The proposal of the ad hoc committee of the Academy was submitted to the environmental committee of the government by the secretary general of the Academy. As a consequence, a government decree was issued to ensure that EIS should be part of the investment plan of all major projects.

Another important EIS was ordered by the State Planning Committee through the Secretary General of the Academy of Sciences. An expert opinion and EIS was ordered for the Ministry of Industry to cover the expected damage caused by new development in bauxite mining at Nyirád and the resulting change in karst water budget (primarily involving reduction in the yield and temperature of water recharge to the Hévíz thermal lake). In addition to coordinating the work in the ad hoc committee, our Institute contributed to the project by the elaboration of methods of investigation, expert opinion and management proposal. The method will be applied for the survey of environmental impact of

deep mining in the area of the whole Transdanubian Mountains at the beginning of the five years' plan.

Recently, among EISs nuclear plants gained importance, both for their safe operation and the investigation of their allocation in social space. During preliminary planning of the Paks nuclear plant further development, the Geographical Research Institute was commissioned to prepare the geomorphological map of the environs of the plant in a 30 km radius circle at overview and detailed scales. In addition, proposals were made for the contents of a survey assessing the social and environmental policy implications of the nuclear plant and its ecological impact as well as for the evaluation of environmental loadability.

Comprehensive research of natural resources in Hungary

The efforts to introduce new methods described here briefly and the examples of concrete tasks presented illustrate the scope of research activities in the Institute, viz. the inventory of natural resources in Hungary and their utilization by regions. This topic was included in the government level primary research direction managed by the Hungarian Academy of Sciences. The functions of the coordination bureau were fulfilled in our Institute. Involving institutions, agencies and experts a comprehensive state-of-the-art study was prepared on the share natural resources have in national wealth, their utilization, their role in meeting home demands and in exports. At the same time, for further research in the primary research direction ecological, economic and environmental protection aspects and methods were provided.

Within this research direction, the Institute contributed to methodological development, survey of environmental factors and natural resources during the five years' plan. Landscape monographs were prepared on the Transdanubian Mountains, regional geography of the Bakony and Bükk Mountains, touristic assessment of the Danube Bend Mountains and information system for Somogy county. In the latter two topics the application of computer is a new achievement in the efficient assessment of the geographical environment.

Our Institute has also been commissioned by several ministries, national authorities and related planning bureaus to assess the quality of the environment for the whole country or for certain regions from economic, planning, ecological, environmental protection, defence and other aspects, such as

- the National Plan for Recreation Areas (for the Scientific Institute for Urban Management); the touristic assessment of the natural endowments of Hungary were summarized in a volume of papers;

- the National Plan for Water Management (a National Water Authority publication); we also published a volume of papers to assess the physical factors influencing the resources of water management and the perspectives of their utilization;

- our study on the relationships of natural conditions and settlement development (assessing local resources and geographical potential energies) served the formulation of the settlement development plan elaborated under the guidance of the Ministry of Construction and Urban Development;

- a new special defence-oriented regional geographical study was experimented for the area of Transdanubia to the order of the Cartographic Service Hungarian People's Army;

- the methods elaborated and applied for the engineering geological and soil mechanical assessment of relief as well as our engineering geomorphological maps have constantly been required by the Central Geological Office and the Surveying and Soils Analysis Enterprise. Along with several other institutions we took part in the engineering geological mapping of Budapest, Eger, Pécs and the Balaton environs with engineering geomorphological maps as well as in the preparation of the Engineering Geological Atlas of Budapest. In engineering geomorphological mapping and mapping surfaces endangered by mass movements much experience has accumulated during the more than a decade period for which they are practised; it is published in a volume of papers.

The inventory of natural resources and primarily their assessment from agroecological aspect is served by the numerical evaluation of the factors of the physical environment for agriculture. The principles and methods are analyzed in a volume. The new method for the delimitation of agroecological microregions in Hungary is founded on the above.

Recently, agroecological microregions have been delimited for four counties of Transdanubia based on land capability computed from the best types of agricultural habitat for the six major crops in Hungary. A grid map of the regions is printed by computer. GÓCZAN, L. and co-workers will present the method and the results in detail in a separate report.

The Council of Ministers (government) ordered the elaboration of agroecological microregionalization of the country from the Academy of Sciences. The Geographical Research Institute undertook this task, unfortunately, only possessing poor financial support from the Academy and limited computer supply. The Ministry of Agriculture and Food helps data collection. It is a pioneering work of national importance, not only within geography!

Assessment of the state and changes of the geographical environment

During the last five years' plan the Institute worked successfully in the accomplishment of several scientific tasks of primary importance at the Academy (research main direction 'Natural Resources') and partly in ministries (National Office for Environmental Protection and Nature Conservation, Ministry of Construction and Urban Development). The rational management of (natural) resources and settlement development were formulated in long-term plans founded on our research in which assessments of environmental protection and nature conservation aspects were incorporated.

Factors of the physical environment and of the social, economic and administrative spheres had to be treated together and in interaction.

There were and still are research tasks, where the changes of the geographical environment are not only surveyed for the present, but a longer period of landscape development has to be studied in order to assess and prognosticate the stability of the present environment.

This aim was also served by the investigation of surficial deposits (loesses, sands, travertines, floodplain, terrace and slope deposits) carried out relying on much experience and expertise and the assessment of relief and landscape evolution

types and their thematic mapping. The achievements and methods are summarized on more than a hundred thematic maps (of which the following are published: loess map of Hungary, landscape type map of Hungary, geomorphological and hydrological maps of the Danubian countries).

A volume of papers was published on the classical trends in landscape research and landscape typology, and university courses were held and notes were written on landscape and environmental analyses.

The evaluation of landscape types on the watershed of Lake Balaton indirectly served the environmental protection project. The field experiments in the Balaton Uplands aiming at the measurement of soil loss, wash of nutrients were directly associated with environmental protection.

Human intervention accelerates the changes of the physical environment and induces the upset of environmental balance and even causes environmental crises locally. However, these changes are not as rapid as the transformation of socio-economic factors and changes of living conditions. In Hungarian society fundamental changes took place following the 1980's and their causes and consequences could not be revealed through the application of traditional methods. The elaboration of the research trend of social geography became a necessity and foreign achievements in this field had to be applied to home conditions. This recent trend in geography investigates socio-economic processes, human, local societal or group relationships with emphasis. The social changes are motivated not only by man as a productive force but by differentiated individual, group and local interests. In the production of material wealth new forms of organization developed or strengthened. Therefore, some important functions of social co-existence (working, dwelling supply, education, public supply and services) have conspicuously transformed.

Social geography studies the relations and community integrations of settlements, settlement assemblages and local societies and in connection with that seeks solutions for the development, administration problems of settlements. Commissioned by leaders of settlements, volumes of studies were published (for Eger and BÉlapátfalva and settlement group).

An investigation was launched to reveal what is the interest an average agricultural producers' farm takes in the exploitation of the physical potential.

The collective farms investigated were motivated most directly by the expectations of economic management. They were not always favourable for the better consideration of physical endowments as price and subsidy systems exert a stronger control on the profitability of agricultural products than a more rational crop pattern based on differences in local potentials. The circumstance that the adjustment to physical potential is required is only a moderate motivation for collective farms. It seems, however, that farms use their physical endowments optimally if their incomes depend on this adjustment (from a paper by É. PERGER).

National Atlas of Hungary

After several years of research, design and editing, with the cooperation of twelve ministries or authorities, involving a wide range of disciplines in the earth sciences and other fields, through the coordination of the Geographical Research Institute the new National Atlas of Hungary is under preparation. It reflects the state of the country in the early 1980's, but, in addition to recording these conditions it monitors the

changes in economy and society over the last 20 years. On 273 map pages, more than 400 maps and supplementary charts, explanations the natural resources of the country (relief, geology, hydrological resources, climate, soils, biosphere etc.) are presented along with the distribution, movements of population, settlements, systems of education, medical supply, supply level of population, trade, utilities, dwelling supply, transport situation, patterns of social production and division of labour, particularly of industry and the characteristics of agriculture and its achievements.

Most of the models and manuscripts of maps are ready. The checking of proofs made in the Cartographia Enterprise, is continuous. Next year the sheets will be printed at the Cartographic Service of the Hungarian People's Army.

The Atlas will be published in Hungarian and English with memoirs and index. The interest for the Atlas is significant as observed during publicity activities.

Here I would like to thank the efficient professional, financial and moral help given by authorities and related sciences enabling us to publish an atlas of national importance.

Ladies and Gentlemen,

I am sorry that the limitations of time did not allow me to report on some internationally significant research results of our Institute. I ask for the understanding of those colleagues of mine in the Institute whose achievements I did not mention. In this respect, I have to say that I selected from my own activities too and in the supplementary reports and posters, booklets and publications exhibited information is contained on these achievements.

Allow me to mention the publications of the Institute numbering 767 items between 1981 and 1986, the 20 Hungarian and 13 foreign language books and the 535 mentions of our publications in important foreign referative journals.

Finally, I have to emphasize that all these results were achieved under hard conditions caused by the restoration of our headquarters, lasting for five years. During this period we could not even use our poor stock of instruments. We have to give up development of equipment and rely on instrumental investigations in home and foreign institutions. I am grateful for these institutions and persons and all those agencies that helped in our work.

Beszámoló a Nemzetközi Földrajzi Unió "Geomorfológiai térképezés"
Munkacsoportjának üléséről
(Ciechocinek, 1987. máj. 25-31.)

Az IGU 1986. szeptemberi regionális konferenciájához kapcsolódó ülésén a "Geomorfológiai térképezés" munkacsoport elfogadta, hogy tagjai legközelebb Lengyelországban találkozzanak. Az 1987-es rendezvény házigazdája a Lengyel Tudományos Akadémia Földrajzi Intézetének Torunban működő "Alföldek geomorfológiája és hidrológiája" elnevezésű osztálya volt, személy szerint pedig annak szervezőképességéről jól ismert vezetője, JAN SZUPRYCZYNSKI