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PRESENTATION OF NATURAL RESOURCES  
ON DETAILED PHYSIOGRAPHICAL MAPS  
AT THE SCALES OF 1:1 000, TO 1:100 000  
WITH RESPECT TO ENVIRONMENT PROTECTION

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PRESENTATION OF NATURAL RESOURCES  
ON DETAILED PHYSIOGRAPHICAL MAPS  
AT THE SCALES OF 1:10 000 TO 1:100 000  
WITH RESPECT TO ENVIRONMENT PROTECTION

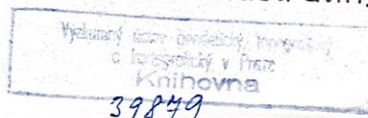
Research on the environment and rational management of the resources of the environment / in broad sense of the word / are gaining more and more importance at the present level of civilizational development. The economic and social policy of many countries aims at utilization of the newest achievements of science and technology for shaping the human environment in a rational way, according to the guidance of zoology and principles of zootechnics.

It brings about the necessity of continual acquisition and registration of sufficient amount of information on the subject, with the purpose of their optimal elaboration and effective utilization. The effective utilization of the collected body of information depends, to a large extent, on their processing and presentation, which should be suited to the psychophysical characteristics and perception capabilities of men.

The merits of cartographic presentation have brought about its ever increasing utilization for preparation of prognosis, draft and final design elaborations and for construction purposes.

The subject of this article is a selected group of detailed physiographical maps at the scales of 1:1 000 to 1:100 000. Detailed physiographical maps have either analytical or analytical-bonitational character.

They are elaborated on the basis of observations and measurements of the environment. All these elaborations aim at illustrating physio-



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graphy by characterizing the selected elements and features of the natural environment and providing integrated evaluation of the environment.

Analytical maps contain characteristics of particular features or groups of features and present mainly relief, geological and water conditions. Analytical-bonitational maps additionally contain the evaluation of particular features and present mainly soil, vegetation, local climates, wild life and animal husbandry. All these maps have been up till now elaborated separately by representatives of natural and geographic sciences and urban planners, within the scope of urban survey for the purpose of preparing development plans for the areas, where the landscape has to be preserved, or for the areas of great social and economic significance.

Physiographical elaborations are of great importance in sozology, as they illustrate the changes imposed on the environment by the economic activity of men. Detailed physiographical maps precisely illustrating the state and properties of the resources of the natural environment serve mainly as source material for:

1. Elaboration of sozological maps illustrating correlations between lithosphere, hydrosphere, atmosphere, biosphere and anthroposphere. Analysis of these maps leads to the establishment of most appropriate directions for shaping new and socially advantageous equilibrium in the environment.

2. Detailed urban planning studies and elaborations for economic decision making / on problems bordering on the interests of sozology /.

3. Elaboration of various derived maps in smaller scales, containing selected source material and enabling evaluation of one or several elements of the natural environment / for example from the point of view of their suitability for certain economic purposes /.

The body of information contained in detailed physiographical maps

embraces usually following seven elements of physiography:

1. relief
2. geology
3. hydrography
4. soils
5. vegetation
6. local climate / incl. topoclimate /
7. wild life and animal husbandry

Integrated research, embracing all aspects of physiographical characteristics of the environment is being conducted in Poland. The results will lead to the determination of types of physiographical maps to be produced, their content and form of presentation.

One of the most interesting elaborations on the subject has been prepared by the staff of the Research Institute on Environmental Development. A set of maps covering six components of the environment / points 1-6 above / has been prepared. According to the research conducted at the Institute, as well as results of experiments performed with regard to specific conditions prevailing in Poland, and existing cartographic elaborations, following set of detailed physiographical maps / designed mainly for urban planning / has been proposed:

#### I. R e l i e f

Presentation of relief forms basic element of physiographical elaborations allowing appropriate consideration of the remaining components of the environment. Full characteristic of relief comprises of topography, morphometry, geomorphology and relief creating factors / currently active /. Depending on the degree of diversity of relief, the scale of elaboration, the degree of accuracy of base map and intended application, maps with different content and different type of graphical presentation are produced.

Following collection of analytical maps of relief. has been proposed;

1. Contoured maps at the scales 1:1 000 to 1:25 000
2. Layered relief maps at the scales 1:5 000 to 1:10 000
3. Maps representing average slope values at the scales 1:5 000 to 1:10 000
4. Geomorphological maps / maps representing landforms in accordance with a genetic system of classification / at the scales 1:10 000 to 1:25 000
5. Maps presenting currently active relief creating factors at the scales 1:10 000 to 1:25 000.

## II. G e o l o g y

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Geological and geotechnical features and properties, technical characteristics of ground, building conditions, land suitability for various kinds of development and characteristic of mineral resources / including natural building materials. / form the content of geological maps.

Following set of analytical and analytical-bonitational maps has been suggested:

1. Geological maps at the scales 1:10 000 to 1:25 000
2. Geological-ground resistance maps at the scales 1:2 000 to 1:5 000
3. Geological-engineering maps at the scales 1:2 000 to 1:5 000
4. Ground resistance maps at the scales 1:2 000 to 1:5 000
5. Mineral resources maps at the scales 1:1 000 to 1:10 000
6. Documentation maps at the scales 1:5 000 to 1:10 000.

## III. H y d r o g r a p h y

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Water, as one of the basic factors shaping the physiography of

the region is, besides relief, strongly taken into consideration in evaluation of the area, irrespective of the function of the proposed development. Large body of information, fully illustrating water conditions, forms the content of hydrographical maps. Information concerns surface waters, ground and underground waters, depths of water layers, the degree of ground permeability, physico-chemical properties of underground waters, hydrobiological type of surface waters, sources and degree of water pollution. Suitability of the area for different kinds of development from the point of view of ground water conditions is also defined.

Following set of analytical maps has been rendered appropriate:

1. Surface water maps at the scales 1:1 000 to 1:50 000
2. Ground water maps at the scales 1:5 000 to 1:25 000
3. Ground water table configuration maps at the scales 1:2 000 to 1:25 000
4. Hydrogeological maps at the scales 1:5 000 to 1:50 000
5. Surface water pollution maps at the scales 1:5 000 to 1:50 000
6. Underground water pollution maps at the scales 1:5 000 to 1:50 000.

#### IV. Soils

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Content of soil and soil-bonitation maps is composed of detailed information concerning natural properties of soil and its suitability for agriculture. Also unfavourable phenomena, connected with urbanization and degradation of the natural environment such as soil erosion, changes in the environment resulting from the lowering of ground water level, from improper forest management in the past, increasing use of chemical fertilizers are illustrated. Cartographic presentation of all this phenomena helps solving problems concerning rational utilization of ever decreasing area of arable land and its preservation.

Following set of analytical-bonitational maps is suggested:

1. Soil bonitation maps at the scales 1:2 000 to 1:10 000
2. Maps of the agricultural suitability of soils at the scales 1:5 000 to 1:25 000
3. Soil erosion maps and maps showing unfavourable changes in the environment caused by lowering of the ground water level at the scales 1:5 000 to 1:25 000
4. Maps of recultivated areas at the scales 1:5 000 to 1:25 000
5. Maps of legally protected soils at the scales 1:5 000 to 1:25 000.

#### V. V e g e t a t i o n

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The analysis of vegetation for urban planning purposes concerns primarily forest areas. Research is mainly concentrated on the determination of the features of natural habitats, possibilities of sustaining timber production and suitability for recreation. Environment protection program has imposed new requirements on physiographical elaborations: analysis of vegetation / especially forests / from the point of view of sanitation, creation of national parks, nature reserves, and other protected natural areas, creation of protection zones around industrial areas, etc.

Following set of analytical and analytical-bonitational maps has been proposed:

1. Natural habitat maps at the scales 1:10 000 to 1:25 000
2. Vegetation inventory maps with presentation of damages caused by industrial pollution at the scale 1:5 000
3. Maps showing the endurance of natural habitats at the scales 1:2 000 to 1:5 000
4. Maps showing the endurance of species at the scales 1:2 000 to 1:5 000
5. Maps of topoclimates inside wooded areas at the scales 1:5 000 to 1:10 000.

## VI. Local climate / topoclimate /

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Features of the group of atmospheric phenomena and processes which depend on other physiographical characteristics of the area is being studied, to form the description of the local climate. Such an elaboration is prepared on the basis of many years of measurements and observations. Basic bonitational map of local climate is most often elaborated for the purpose of urban planning. In some cases, also maps showing distribution of different components of the climate are prepared. Within this group of physiographical elaborations the maps presenting sanitary conditions of the atmosphere are the most important.

The set of analytical-bonitational maps comprises:

1. Basic bonitational map of topoclimates at the scales 1:2 000 to 1:10 000
2. Bonitational maps of local climates for the purpose of planning housing, industry and recreation at the scales 1:2 000 to 1:10 000
3. Maps showing maximum possible sunshine duration at the scales 1:2 000 to 1:25 000
4. Maps of local wind distribution at the scales 1:2 000 to 1:25 000
5. Maps of atmospheric pollution at the scales 1:5 000 to 1:50 000
6. Maps of sanitary conditions of the atmosphere at the scales 1:5 000 to 1:50 000
7. Maps showing the influence of forests and waters on local climate at the scales 1:5 000 to 1:50 000.

## VII. Wild life and animal husbandry

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Physiographical elaborations for urban planning provide mainly information on protected species, distribution and number of cattle



and wild life of the forest, water and air.

Following analytical-bonitational maps are prepared / all at the scales 1:25 000 to 1:100 000 /:

1. Maps of distribution of cattle
2. Maps of distribution of protected species
3. Maps of haunting areas
4. Maps of wild life management

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The necessity of performing extensive research on all the elements of the environment, which should be based on the results of continual field studies and appropriate measuring network with facilities for continual data registration, with full utilization of aerial photography and satellite imagery, determines the content and scale of detailed physiographical maps both from the scientific and practical point of view. The content and scale of detailed physiographical elaborations depends also on the degree of the existing development of the area. Large scale maps / 1:1 000 to 1:100 000 / are prepared for highly urbanized and industrialized areas of developed countries.

Detailed cartographical presentation and documentation of most stable elements of the environment, such as relief and geology can now be achieved, is economically sound and depends mainly on the adopted research methods and precision of measurements.

Soils, especially on cultivated areas, constitute very changeable element of the environment. Changes result from cultivation, the use of chemical fertilizers, etc. Characteristics of soil also depend on other, changeable elements, such as topoclimate, ground water level, sanitary conditions of the air, leading to fundamental changes in soil types. Changes in dynamics and structure of soils have to be presented on frequently up-dated detailed physiographical maps.

Physiographical characteristics of vegetation / mainly forests / should show not only complicated biotical and abiotical conditions, but

also very important changes caused of the economic activity of men and resulting in essential and rapid changes both in vegetation and other components of the environment. Frequent inventory and evaluation of forest resources is thus highly desirable.

More and more importance is now being attached to up-dating the knowledge on water resources and the state of atmosphere. It results from the growing awareness that both water and air belong, in some respect, to non-renewable resources. Increasing water and air pollution exerts unfavourable influence on living conditions of population and jeopardizes the very future of our civilization. The extent of these changes evokes growing concern among the societies all over the globe. Monitoring of the air and water necessitates maintenance of extensive measuring networks and facilities, separately for surface waters, ground waters and the atmosphere. Elaboration of up-dated maps showing the actual composition of water and air against the background of emitters / the amount, kind and distribution of emission / would be possible on basis of frequent measurements. This complicated problem can be solved at the present level of technological development, provided that the acquisition, dissemination, storage and processing of data collected from ground measuring networks, aerial photographs and satellite imagery will be based on most modern achievements of science and technology in the field of automatics and computer science.

Physiographical maps elaborated on basis of mean yearly or long-term values do not fulfill practical requirements of the present time. Such maps are often elaborated on basis of individual measurements taken in locations which are not representative for the area or on the basis of incomplete information.

Following basic methods of cartographical presentation of content of physiographical maps are currently used: choropleth method / with the use of symbols and numerical values /, chorochromatic method, isoline method, diagrammatic method and representation of phe-

nomena by means of cartographic symbols. Symbols used in elaborations presenting similar phenomena often differ considerably.

I would like to present following general conclusions concerning topics discussed in the paper:

1. Environmental physiographical research, especially in highly developed countries should be intensified and conducted methodically and continually. Modern achievements of science and technology in the field of data acquisition, dissemination and collection should be employed and appropriate measuring network should be established and maintained.

2. Environmental research should be integrated and should deal with all the elements of the environment, which affect ecological equilibrium, zoology, urban and spatial planning, environmental development engineering, social and economic policy, etc.

3. Maps provide best illustration of the results of research on the environment and its degradation. A set of detailed physiographical maps provides full physiological characteristic of any given area in the most concise and clear form.

4. Set of detailed physiographical maps should be treated as basic documentary, source and information material for research in ecology and zoology, for urban and spatial planning and for all activities aiming at sound utilization and preservation of the environment.

5. Universal classification of detailed physiographical maps based on the requirements of development and preservation of the environment should be elaborated. It should embrace kinds, contents, scales, technical characteristics and methods of utilization of detailed physiographical maps.

6. General, comprehensive and clear system of symbols should be developed for cartographical representation of qualitative and quantitative characteristics of phenomena. It is important that such a system meets the requirements of automatic elaboration of detailed physiographical maps.