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SYSTEMS OF LANDSCAPE CLASSIFICATIONS IN POLAND

In geography there are at least two fundamental approaches to landscape classification. The first is physicogeographical, the other geochemical. Theoretically, the classification is also possible on the basis of physical features — this is the field called landscape geophysics. So far, however, only attempts have been made in this area which have not produced a homogeneous and consistent system of classification.

The geochemical-landscape trend developed in the USSR, in other countries is followed only in some centres although chemical methods have been used for a long time and commonly in specific physicogeographical studies, for instance in studies on soils and water. In Poland the Soviet classification scheme is used. The scheme has been developed by A. Perelman and M. Glazovska, with reference to B. Polynov's idea (Perelman 1966). The taxonomic classification of geochemical landscape is as follows:

Category of landscapes	(abiogenic landscapes and biogenic landscapes);
Group of landscapes	(forest, meadow and steppe, tundra and desert landscapes);
Type of landscapes	distinguished on the basis of biomass and chemical composition (for instance: various types of taiga landscape and landscapes of temperate zone forests);
Family of landscapes	indentified on the basis of differentatied live matter production within a type (for instance: northern, middle, southern taiga or a similar division of tundra or steppes and deserts);
Class of landscapes	that is a division on the basis of typomorhic elements and water migration ions (hydrogen class—H, calcium class—Ca, hydrogen with iron class—H-Fe and others);

Kind of landscapes	distinguished on the basis of intensification of water circulation and mechanical migration (landscapes with poor mechanical migration of matter, landscapes with substantial migration of elements and transitional landscapes);
Sort of landscapes	the division is made on the basis of secondary features of migration (migration of rare-earth elements or features of migration of representative elements which corresponds to differences in bedrock).

The concept of geochemical landscapes stresses the role of mutual subordination of units bordering each other. In accordance with B. Polynov's concept, modified by M. Glazovska, the following types of geochemical landscapes are distinguished:
autonomous (eluvial),
eluvial-accumulative,
accumulative-eluvial,
transeluvial,
superaqueous,
subaqueous.

This classification differs fundamentally from the scheme traditionally accepted in physical geography. Although it seems logical that geochemical methods should permit to make the process of delimitation of spatial physicogeographical units more detailed and objective, in practice this is not so simple.

Physicogeographical units, i.e. geocomplexes, are classified with application of two systems: typological and regional. The first one is a systematization on the basis of similarities and consists in looking for regularities in structure of geocomplexes and generalization of individual features of the units as well as in grouping them into types characterized by a domination of certain features. Regionalization is a classification made on the basis of individual features. A specific role is performed by location of the unit and the particular system of elements composing a given geocomplex.

The following taxonomic scheme, after J. Kondracki (1977) is accepted in Poland in the regional system:

Physicogeographical areas distinguished on the basis of dismemberment of land, morphostructure and climatic macrodifferences.

Provinces identified with reference to geological structure, effects of neotectonic movements and general character of relief as well as climate.

Subprovinces separated within provinces on the basis of hydrographical, biogeographical and soil differences.

Macroregions being an effect of impact of all the above-mentioned factors, in practice distinguished with reference to location, relief character and origin as well as lithological differences.

Mezoregions resulting from a more detailed treatment of criteria for macroregions distinguishing.

Microregions identified on the basis of detailed studies with reference to a complex of physicogeographical phenomena, with particular reference to the degree of their transformation as a result of man's activity. Units of this order are distinguished only in some better investigated fragments of Poland.

The Russian system is most often accepted in typology. Therefore, a homogeneous facies, being equivalent to ecotope, is the smallest unit. Dynamically connected facies make up an *uroczysko* corresponding to relief mezoforms and characterized by a certain fertility reflecting the features of lithological bed. Land use is also an important criterion when distinguishing *uroczyskos*. Groups of *uroczyskos* make up a higher class unit called "mestnosti" (areas). The methodology of distinquishing them is not clearly defined. Most often it is accepted that a *mestnost* is a group of dynamically connected *uroczyskos* referring to the same complex of relief forms and characterized by the same mezoclimate.

Higher class units are called landscapes. There are (coming from lower to higher taxonomic levels) variations, kinds, sorts and classes of landscape. When delimiting them various criteria are used that are considered fundamental at a given taxonomic level and under given physicogeographical conditions. For example: orography is decisive for distinguishing classes of landscapes (landscapes of lowlands, uplands and mountains). Within lowlands, sorts of landscape are identified on the basis of morphometric features of relief and kinds of landscape on genetic principles. In uplands, sorts of landscape define rocks of the bed and kinds of landscape depend on dissection and compactness of relief forms. In mountain landscapes the division into sorts and kinds of landscape is decided by vertical zonality reflecting elevation over the sea level.

The presented system is not perfect. The unclear methods of distinguishing the *mestnosti* has already been mentioned. Also the way to delimit the *uroczyskos* may arouse some doubts. The basic feature of typological units is their relatively homogeneous character. Typological units of a high rank are also homogeneous, of course on a given scale and at a given level of generalization, whereas the very definition of

uroczysko contains a contradiction of homogeneity. *Uroczyskos* which cover relief forms must be, by their very nature, heterogeneous, and as a matter of fact they are. Conditions are different within a top part of a hillock and in upper parts of its slopes and still different in its lower parts. W. Prokayev (1983) has recently pointed to this fact. He is of the opinion that, in future, it will be necessary to adopt other criteria for delimiting geocomplexes of this rank, or, and this seems to be a much better solution, to treat suburoczyskos as basic units of field mapping.

As the above remarks show, in geochemistry of landscape and in complex physical geography various and uncomparable systems of unit classification are applied. The weak point of the geochemical system is lack of logical justification for the order of features considered in the classification. It seems that some corrections could bring the two classifications nearer though their mutual relation can be explained on the basis of partial geocomplexes. As early as in 1964, G. Haase wrote that studies on landscape could be conducted in two ways: as studies of natural components ended with distinguishing partial geocomplexes or through an analysis of a complex of natural phenomena and distinguishing full geocomplexes. Obviously, studies of components aiming at delimiting geocomplexes have to be done against the background of other elements of the natural environment and these are also complex studies. For the smallest partial geocomples G. Haase introduced the following names: morphotopes, climatopes, hydrotopes, biotopes and pedotopes. Each name defines the small homogeneous area from a given viewpoint.

Partial geocomplexes are distinguished by many authors (see Richling, Ostaszewska 1983). The works concern mostly distinguishing units with a certain system of water circulation, a certain type of soil processes as well as units with a certain topoclimate. Recently there has been an interesting publication concerning distinguishing and classification of energy exchange units on the so-called active surface (Grzybowski 1983). The smallest, homogeneous unit in which the surface of energy exchange is formed identically is called energotope by the author.

Very much different methods are used for delimitation of partial geocomplexes. Units of the different rank are distinguished and the same names happen to be understood differently. Thus it is most important to define the mutual relation of the smallest full geocomplexes — facies, that is ecotopes and the smallest partial geocomplexes. The units may be identical. However, many examples can be quoted that the smallest partial geocomplex may cover more than one ecotope. It is understandable that adjacent ecotopes do not have to differ with

respect to all features of the natural environment. For instance, within a flat bottom of a depression, that is one morphotype, there may be different moisture conditions with respective, different vegetation, that is various ecotopes. This produces a conclusion that topological partial geocomplexes are either equivalent to ecotopes or are made up of a number of ecotopes which are the smallest element of the natural environment organization.

Grouping of the same ecotopes may result in distinguishing *uroczyskos* or *mestnosti*, but also for instance hydrotopes and groups of them which should be classified further within the limits of river catchment areas. In German terminology there is a term "associations of ecotopes" (*Okotopgefüge*) and "groups of associations of ecotopes" (*Okotopgefägegruppen*). A similar procedure may also be applied with reference to partial geocomplexes. Units produced by grouping of partial geocomplexes of a topological level are proposed to be called associations and their connections — groups of associations of hydrotopes, pedotopes, etc. The principles of the basic classification are illustrated in Fig. 1.

By joining partial geocomplexes it is possible, similarly as for full geocomplexes, to obtain both typological units of a higher level as well as regional units.

Regionalization and typology may be done either by dividing larger units into smaller ones or by grouping small geocomplexes into larger wholes. The first method is called deductive, the other — inductive.

Dividing is a less accurate procedure, it requires many arbitrary decisions, therefore effects of work of different authors are usually uncomparable. As a good example may serve an analysis of general-scale landscape maps developed during the past dozen years or so in a few East European countries. Despite the fact that all the authors have first taken into consideration a general division of landscapes into mountain and lowland ones, further divisions are not totally in agreement with each other and the applied criteria differ fundamentally. Physicogeographical regionalizations of neighbouring countries are equivalent only in some cases. Most frequently regional borders end with state borders, although also here the first stage was to identify large tectonical-structural provinces.

Among methods of regionalization based on dividing into smaller units, the method of leading factors seems to be most important. A leading factor means both an individual component as well as a group of components, exerting decisive influence on the character of the unit (Kondracki 1976). Attempts to formalize the process of dividing consist in, for instance, transferring onto one map borders of analytical regions

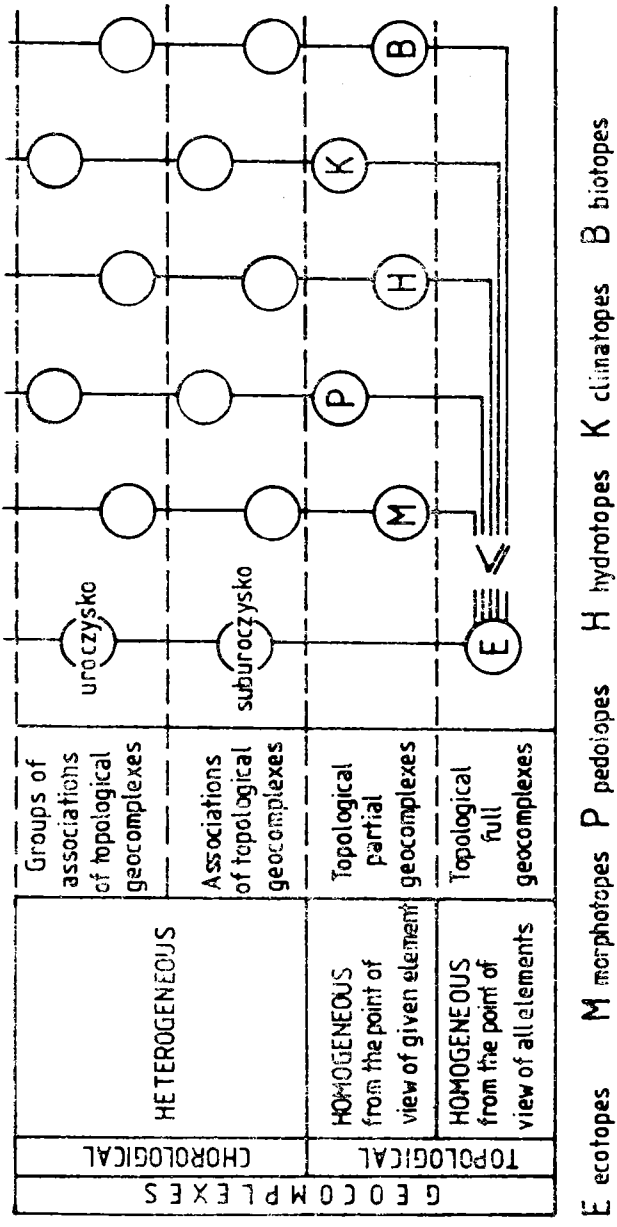

Fig. 1. Diagram of typological classification of partial geocomplexes

and distringuishing the borders of physicogeographical regions on the basis of identity of borders of partial regions. The method has been used in the past in Finland by J. Grano and attempts to modify it have been recently undertaken in the USSR.

Regionalization by grouping small units into larger ones is much more precise and most often is made in accordance with strictly defined principles. Among the methods used in Poland there are the neighbouring method, the dendrite and border analysis method.

The neighbouring method has been developed by A. Marsz (1966). He had been conducting studies on units of *uroczysko* rank along lines of specially made cross-sections. The analysis allowed him to find out at which places the sections crossed borders of microregions. The same author has also developed an inductive method of regionalization, called the dendrite method (Marsz 1974). The procedure is to draw dendrite families from a node located within any typological unit to be joined. The procedure is subject to strict principles and is completed when all branches of dendrite are dead. Units covered by one dendrite family make up a region.

The method of border analysis (Richling 1976) consists in distinguishing more important borders between the initial geocomplexes. The importance of the borders is determined with a number of features differentiating the neighbouring basic units. The procedure is to eliminate less important borders and to join neighbouring geocomplexes. Joining lasts so long until automatically an area with clear borders is delimited. The area is treated as a region.

As practice shows, joining and dividing are complementary methods. In the case of joining, it is noticeable relatively quickly that the group of small original units is insufficient to distinguish units of higher taxonomic level. There is also a clear limitation concerning application of the dividing method. It is difficult, if at all possible, to obtain the smallest unit in this way. Thus there is a conclusion that both procedures may not be treated as parallel. In both methods there is a certain level which is difficult to pass but possible to reach both "from above" and "from below". Therefore, regionalization or typology of large areas should be conducted with application of deductive methods, and induction methods can be used to make the divisions more detailed and to verify borders.

Below the typological system was contrasted with the regional system. There are various opinions on this issue. An assumption that both systems exist independently of each other seems most convincing. In both systems small and large units of low and high rank can be

distinguished, though it is true that in the regional system very small units are not usually delimited. This results from practical reasons. It is useless to study individual features of very small areas though theoretically even facies or ecotopes may be treated individually. The situation is different in the typological system. Here units of low rank are used more frequently but typology may be applied both to mountains and lowlands as well as for instance to geographical zones. Also in this case practical aspects are decisive. Most often typological units are mapped in the field and typology of very large units does not have much sense as they are characterized by a very high degree of individualism.

A similar viewpoint can be found in K. Gierentchuk and S. Kukurudza's work (1977). They single out 7 following levels of organization of the natural environment:

Table 1

Regional and typological taxonomic systems according to K. Gierentchuk and S. Kukurudza (1977)

Level of a unit	*Regional system*	*Typological system*
I	geosphere	landscape sphere
II	continents and oceans	landscape sections
III	geographic countries	types of landscape
IV	geographic areas	classes of landscape
V	geographic districts	sorts of landscape
VI	geographic regions	landscape
VII	terrains, "*uroczyskos*" facies	morphologic parts of a landscape

A description of regularities that are leading for differentiation of the whole globe is a starting point here. The authors speak about continental and oceanic landscapes as examples of landscape section. Further differentation, both typological and regional is due to differences in the relief of continents and macroclimatic peculiarities. Particular properties of ground and water conditions as well as soil and plant differentation are next to play an important role.

However, it is necessary to stress that there are no logical reasons due to which particular levels of the typological system should correspond to certain levels in the regional system.

Also D. Armand was in favour of an independent character of both systems. He argued (Armand 1975) that typological regionalization (that is typology), being more accurate, should be made "from the top downwards" and after reaching a certain level (not necessarily the lowest), individual regionalization begins (that is regionalization as we undertand it). This procedure is illustrated by Fig. 2.

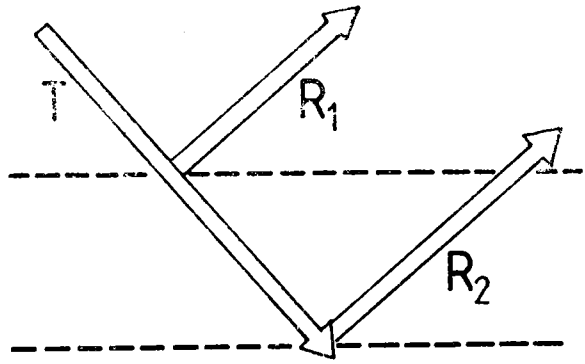

Fig. 2. Regionalization and typology according to D. L. Armand (1975 — modified; T-typology, R_1-small-scale regionalization, R_2-large-scale regionalization

According to the above, typology and regionalization are two independent systems, governed by separate principles. However, they have two points in common. The first one is the topological level, that is the level of elementary units which afterwards are joined with application of typological or regional procedure. The second point uniting both systems is the entire epigeosphere (see Fig. 3).

Typology of regional units is a separate issue. Regions are typologized by A. Marsz (1974) in order to pass to a higher level in regionalization with the dendrite method. G. Haase (1979) stressed scientific and practical values of typology of chorological units. He proposes to form inde-

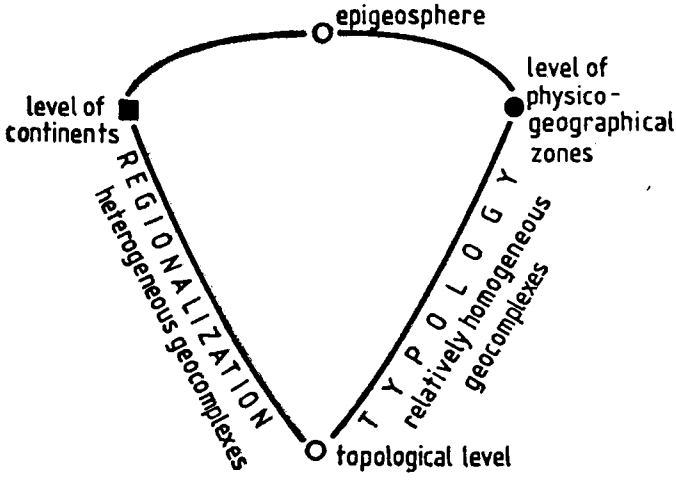

Fig. 3. Relation between regionalization and typology

pendent typological systems concerning nanochores, microchores or mesochores. According to Haase, at different levels, different factors should be decisive for association of individual units into subtypes, types, groups of types, subclasses and classes.

The same procedure has been used in detailed physicogeographical regionalization of Suwałki and Płock voivodships. The aim was to generalize the characteristics of the distinguished microregions and thus to facilitate the use of information on the natural environment by planners and other users. Instead of evaluations of a few dozen microregions, they have received a characteristics of a much lower number of microregion types, characterized by similar usefulness for various forms of man's economic activity.

However, typology of heteregeneous regions is much different from "pure" typology. In the first case, the typologized geocomplexes contain foreign fragments and are characterized only by a domination of certain features. In the other case, when typology covers homogeneous units, their higher associations maintain relative homogeneity which is extremely important, particularly when evaluating natural conditions.

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