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**THE INFLUENCE OF PHYSICO-GEOGRAPHICAL  
BOUNDARIES ON SETTLEMENT AND SETTLEMENTS BORDERS**

The influence of natural conditions on location and development of settlement is commonly known and referred to in all handbooks of settlement geography. However, the research work in this domain has become recently a rarity. The question of influence of physico-geographical boundaries on the levels of human activity in the neighbourhood of these boundaries was taken up in Poland after the war by M. Janiszewski and B. Dumanowski<sup>1</sup> together with E. Kantowicz (1985), A. Gocłowski (1984, 1986). Results obtained usually confirm those relations which are theoretically postulated, but on a regional scale there appear exceptions, which are sometimes quite significant. This can result both from local perturbations and from appearance of other types of regularities which were either not included in the approach used or have not been known so far.

The essence of the studies mentioned consisted of confirmation of existence of spatial coincidence among the studied elements of appropriate relations. On the other hand, results provided the basis for performing initial hierarchization of particular components of nature with regard to their importance for the settlement-creating activity of man.

Altogether, the concept presented gives only quite a simplified approximation of the essence of actually existing relations and at present there appears a need for explaining the mechanisms at work, and determining more precise limitations on applicability of methods used.

According to Ernst Neef (1980), an outstanding scholar studying problems of physico-geographical regionalization, boundary zones between particular physico-geographical units constitute location of especially intensive exchange of matter and energy. It is there that the principal natural processes characterizing the whole of the units bounded focus, their intensity being the highest just in these frontier zones. As a result, both the zones themselves and certain parts of the adjacent geo-units undergo continuously intensive transformations, including structural ones.

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<sup>1</sup> See A. Gocłowski (1984, 1986) in references to the present paper.

These processes, existing prior to human activity, constituted probably, besides significant spatial differentiation of natural conditions within the boundary zones, the basic impetus for particular activation of man in the neighbourhood of these zones. It may also be hypothesized that more intensive settlement processes in these areas are to a significant degree related to the heightened dynamics of nature within them.

There is no doubt, therefore, that in the zones of physico-geographical boundaries there goes on an exceptionally intensive exchange of energy and matter between the environmental conditions and the human activity, with information flow playing a particular role in this exchange.

Thus the Neef's approach, addressing the matter-energy movement within the boundary zones, can be generalized to encompass the system of higher level, namely, "physico-geographical boundaries and settlement", treating it as specific natural-social system. Graphical model of a similar approach called "eco-social system" was presented for the needs of archaeological research by D. Clarke (1972). Such a model ought to be thereafter tested against concrete, possibly differentiated examples of physico-geographic boundary zones.

Problems related to the role played by physico-geographical boundaries with respect to settlement coincide with the concept of determination of natural spatial boundaries of settlement propagation, called further on in this paper "settlement borders"<sup>2</sup>.

A settlement border is, in the approach presented here, a gradient zone within the spatially expressed settlement features, appearing usually in the peripheral areas of the most dense and oldest settled territories within the given perimeter.

The primary, "hydro-morphological" version of this concept appeared in Poland already at the turn of the 18th century, as witnessed, for instance, by the views of J. Lelewel on the settlement of Polish territories, as well as the principle of construction of I. Domeyko's *Map of Polish Waters* of 1837 (see Chałubińska, 1969).

The significance of all the other components of nature in formation of the settlement border was analysed much later. These analyses indicated that each of the components of nature can in definite conditions and at definite time points take on the leading role. Thus,

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<sup>2</sup> The term "anthropogeographic border" was introduced and first used in Poland by Stanisław Lencewicz in 1935 and then developed further by J. Haliczzer and Staszewski (1939, 1959). A similar concept has been for a long time a basis for performing delimitation of the settlement and political areas in prehistorical and medieval history studies. This concept inspired also M. Janiszewski (1959) and A. Piskozub (1968) in their work on subdivision of Poland into geographico-historical regions. It is also from this concept that most probably originated determination of the so-called anthropolimits J. Tyszkiewicz (1975), applied in historical geography.

for instance, K. Godłowski states that prehistorical settlement clusters in Polish territories were divided by the belts of desolate areas characterized by such features as boggy and marshy areas, water divide locations, poor quality of soils (mainly light soils), soils heavy to cultivate (e.g. silts), etc. (see: K. Kozłowski and S. K. Kozłowski 1983, p. 304).

Hence, settlement borders are such zones in which natural conditions influence clearly disadvantageously the settlement process.<sup>3</sup> Thus, these borders stop human expansion directed towards them from the adjacent human settlement clusters. This phenomenon is reflected in a rapid decrease of settlement density along the borders and appearance of accompanying phenomena, such as changes of types and dimensions of centres etc. The border zone, with low population density, may either divide two highly populated areas or one highly populated area from another one in which settlement density is low or which is completely desolate. Together with population development in the vicinity of the border zones, the tendency of settlement towards breaking through the borders increases. Many border zones play their barrier role only temporarily, that is, when "populational saturation" of an area considered is, as a whole, relatively low. When, however, the process of diffusion of settlement to less populated areas proceeds sufficiently effectively, the borders get gradually less and less visible to disappear finally.

When starting to define settlement borders on a map one can first determine these features of the nature within a given area which in the light of studies carried out so far appear as playing the role of "barriers" to the settlement development process. Examples are provided by valleys with very steep slopes (i.e. "canyons"), rivers with inaccessible, marshy shores or changeable current, cliffs, rocks, swamps and large forests, areas of soils useless for cultivation, and so on, and so forth.

Certainly, for each period and for each settlement type the analysis of these barriers will give different results.

Further, the image thus obtained should be complemented with distribution of settlement, and particular consideration of these features which allow grasping of the change gradient sought.

The analysis of the map ultimately obtained should make it possible to determine the settlement gradient conditioned by the nature (or at least spatially correlated with changes of environmental conditions) and to eliminate those whose anthropogenic origin is doubtless.

Thereby, it is possible to establish the cartographic image of relations studied. Now it becomes necessary to explain this image on the basis

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<sup>3</sup> It should be noted here that relative and absolute settlement borders ought to be well distinguished. It is only the first type of borders that is considered here. Absolute borders form outer limits of the biological oikoumene of man, and therefore they appear in extremal natural conditions (deserts, high mountains etc.).

of source materials concerning the origin and the evolution, both of the natural environment conditions and of the settlement system.

As can be concluded from what has been said, the fundamental weakness of this method is the necessity of reconstruction of the past natural conditions and settlement configuration within the whole of the space considered which sometimes forces a scientist to make extrapolations on the basis of, obviously, incomplete data, and which opens up a possibility of introducing excessive subjectivity. On the other hand, however, one can never be sure of having identified all the motives and barriers essential for shaping the settlement process, either of the objective (natural and social) or of the subjective (e.g. psychological) origin.

Thus, by application of the "border method" one cannot obtain a complete and faithful image of the really existing relations either. It seems, though, that this situation can be significantly improved if the two methods are used simultaneously. They are namely based upon opposing assumptions and lead to different goals, although they are, in spite of that, quite similar.

The first method, starting with physico-geographical boundaries, that is with spatial differentiation of nature, considers the studies of relations between their outline and the settlement system within the areas rather more densely populated.

The second method, after having determined the settlement gradient zones, aims at determination of natural conditioning of relative settlement „gaps" or depressions.

Thus, it is obvious that courses of these two types of boundaries not only do not necessarily follow the same outline, but, in fact, quite often diverge from one another.

Hence, from the point of view of capacities for a more complete studying of relations between natural environment and settlement, these two approaches are to a significant degree complementary. Both concern undoubtedly the same macrosystem and can be treated via the concept of Neef, mentioned before, since its assumptions refer to the regularities of the matter-energy dynamics which are sufficiently general to allow for the use of this concept not only with regard to natural processes. It is also not without significance that an ultimate outcome of such an integrated study can be synthetically presented in the form of a common map, constituting a model of the relations sought in their spatial aspect.

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