

The Impact of the Borderline Factor on the Population Settlement Pattern (on the Example of the Orenburg-Kazakhstan Section of the State Border)

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Abstract—As a result of the USSR collapse new state borders emerged and cut through the previously uniform space of the country. The emergence of these new borders gives scholars a chance to track their influence on social and economic space on an example of population settlement pattern dynamics. The interfaced analysis of the settlement pattern on both sides of the state border is of special interest. The uniform geographical database of the population censuses on the territory of the Orenburg region and the three bordering Kazakhstan regions (the West Kazakhstan, Aktubinsk and Kostanay) has formed the information base of the research. The population settlement pattern indicators of the region and the frontier zone were compared during the analysis. The geoinformation technologies, in particular the analysis tool of «hot» and «cold» points of the population settlements dynamics were used. As a result of the analysis similarity in the settlement pattern dynamics in the frontier zones and on the territory of the region was revealed. The study hypothesized that the advancing outflow of the population from the frontier zone as a result of the barrier function of the «new» state border and the «skeletization» of the settlement pattern is to the result of the deterioration in the conditions of economic activity and the difficulty of social contacts. This hypothesis did not find confirmation as the settlement zones with positive and negative dynamics proved to be transfrontier and symmetric in regard to the border. The opportuneness degree of natural and social-economic conditions of the territory plays a significant role in the settlement pattern dynamics nature.

Keywords—Frontier zones, population settlement pattern, settlement pattern dynamics.

I. INTRODUCTION

A. Relevance

The impact of new state borders that arose as a result of the USSR collapse, on the study of population settlement process is a stand-alone and relevant problem. A single and closely connected economic, social, and infrastructural space was reshaped in the early 90s, which marked the beginning of a painful process of formation of independent state organisms in many respects. Territory effects and consequences of this process need detailed analysis.

B. Literature Review

Study of the border factor in the social and economic sphere and, in particular, its influence on the population settlement pattern has been carried out by scientists from different fields, including geographers. A large part of these research papers are devoted to the study of borders in the post-Soviet space. Various aspects are considered, in particular, S.L. Barinov explores the impact of borders on communication of the population in the western regions of Russia [1]. The works of A. Manakov are devoted to studying the sociocultural influence of neighboring countries on the life of the population of the frontier zones in northwestern Russia [2]. Among foreign scholars topics related to the analysis of transfrontier migrations [3] - [4], cross-border conflictology [5] and the influence of borders on population settlement pattern are most prominent [6]. There are very few geography works studying the population on both sides of the border.

II. METHODS

A study of an impact of a border and identification of border effects requires formulation and formalization of the concept of "frontier zone". Despite recent great attention to studies of border and transfrontier territories, the criteria for their assignment remains insufficiently clear [7].

Research of the influence of the "new" frontier zone on population settlement pattern is complicated by the fact that a number of processes and phenomena simultaneously influence the settlement pattern, such as, for example, the current polarization of geographical space and the concentration of population in territories with favorable geographical, economic and life conditions under the influence of the transition to market relations. As a consequence, the nature of the settlement pattern dynamics in certain areas and local fragments of frontier zones, as well as on different sides of the border, can differ substantially. In this regard, it is interesting to apply an interfaced analysis of the shifts in the settlement patterns in a single frontier zone, which includes territories on both sides of the border.

The territorial object of our study is a section of the Russian-Kazakhstan frontier zones within the territory of the Orenburg region and three adjacent regions of the Republic of Kazakhstan. To perform the analysis a single geographic database for the Orenburg Region and adjacent regions of Kazakhstan - West Kazakhstan, Atyubinsk and Kostanay - was established. While population censuses typically provide the most detailed and accurately localized data, a certain difficulty for the interfaced analysis of the settlement pattern dynamics is created due to an inconsistency in the conduct of population censuses in both countries.

At the first stage of the analysis, we compared averaged data for the entire Orenburg region and the territory of the frontier zone based on the following criteria: the dynamics of the density of the rural population, the dynamics of the density of the network of rural localities and their average population (Table 1). Comparative analysis showed a significant similarity in the dynamics of these indicators between the frontier zone and the territory of the region as a whole. We can note a lower density of the rural population. It begins to grow only outside the 20-kilometer near-frontier zone. The results of the study did not support the expected outflow of population from the frontier zone and the "skeletonization" of the settlement pattern network as a result of the barrier function of the state border and, consequently, the deterioration of economic activity conditions and the difficulties of social contacts. This is probably due to the fact that within the border area there are a number of major cities, the main rivers of the region and other attractive objects for settlement. As a result, the border effect is minimized and masked.

TABLE I. INDICATORS OF THE DYNAMICS OF RURAL SETTLEMENT PATTERN IN THE ORENBURG-KAZAKHSTAN BORDER AREA

Indicator	Cen-sus year	Buffer zones				The whole Orenburg region
		5 km	10 km	20 km	50 km	
Percentage of the rural population (%)	1989	3,6	6,2	12,5	33,6	100
	2002	3,7	6,3	12,4	32,0	100
	2010	3,4	5,9	11,6	32,7	100
Percentage of the rural localities (%)	1989	3,1	5,8	10,5	28,7	100
	2002	3,1	5,7	10,4	28,6	100
	2010	3,2	5,6	10,4	29,3	100
Average population of a rural locality (pers.)	1989	602	553	618	606	518
	2002	641	595	643	607	542
	2010	543	518	554	556	497
Density of the rural population (pers. / sq. km)	1989	4,3	4,0	4,4	5,3	7,3
	2002	4,5	4,2	4,5	5,2	7,5
	2010	3,7	3,4	3,7	4,7	6,6

Complied by the authors according to [8]-[11].

For a more detailed study of the impact of the border on the settlement pattern, namely the study of its possible local effects, we used a method of "hot" and "cold" points analysis from the arsenal of geoinformational technologies. The method allows to reveal statistically significant spatial clusters of high values ("hot" points) and low values ("cold" points) of certain parameters of spatial objects. The tool calculates values and analyzes each object of a single data set in the context of neighboring objects and answers the question in which area of space the objects with high or low values of the phenomenon of interest to the researcher cluster. Within the framework of this analysis, an object with a high value is not considered to be a statistically significant "hot" point. To become a statistically significant "hot" point, a spatial object with a high value should be located next to other objects with high values of the analyzed indicator. Thus, in the course of the analysis, random emissions of values of the analyzed phenomenon are excluded, as a result of which, clusters of objects with similar values of the attributes under consideration are detected, rather than individual objects. . The use of this analysis tool in our case allows us to identify trends and shifts in the distribution of population and the settlement pattern system.

Based on the specific conditions of the Russian-Kazakhstan frontier zones, we decided to conduct a survey on a 50-km-wide zone on either side of the border.

In order to make the data comparable and to conduct an interfaced spatial analysis of the frontier territories of Russia and Kazakhstan, the data on population dynamics of localities on the Kazakhstan side of the border were calculated as yearly averages of censuses between 1999 and 2009. For the Orenburg region, data on the average annual population size dynamics of localities in the period between the censuses of 2002 and 2010 were used.

III. RESULTS AND DISCUSSION

As a result of the analysis [8] - [11], a map was constructed (see Fig. 1). Red and pink "hot" points on the map mark zones of, respectively, high and less positive settlement pattern dynamics while dark blue and light blue "cold" points indicate zones of high and moderate depression and population reduction.

The conducted analysis allowed us to make a number of conclusions. No significant gaps or gradients are observed in the settlement pattern dynamics. The zones of positive and negative settlement pattern dynamics are transfrontier and symmetrical on both sides of the border in those cases when the natural and socio-economic conditions of Russian and Kazakhstan sides of the border are symmetrical. Thus, in the east of the Orenburg region and in the adjoining territories of the east of the Atyubinsk region, as well as in the Akbulak and Sol-Iletsk districts of the Orenburg region and the adjacent territories of the Aktobe and West-Kazakhstan regions which share a similar unfavorable geographic location, common transfrontier clusters of negative population settlement patterns and reduction in its number were formed. On the contrary, in the territories stretching along the Orenburg-Uralsk axis, a single unified continuous zone of positive population settlement and growth dynamics is formed, connected with the advantages of the geographical location.

Contrary to popular opinion, the low barrier function of the border is demonstrated also by the fact that the cluster of "hot" points of the positive population dynamics of localities, created by the influence of Uralsk, extends to the territory of the Pervomaisky district of the Orenburg region without any distortions and gaps. Asymmetric clusters in relation to the border are apparently not connected with its influence, but are a consequence of eccentrically located cities (Aktobe, Aksay, Orenburg), which act as the main "concentrations" of the population.

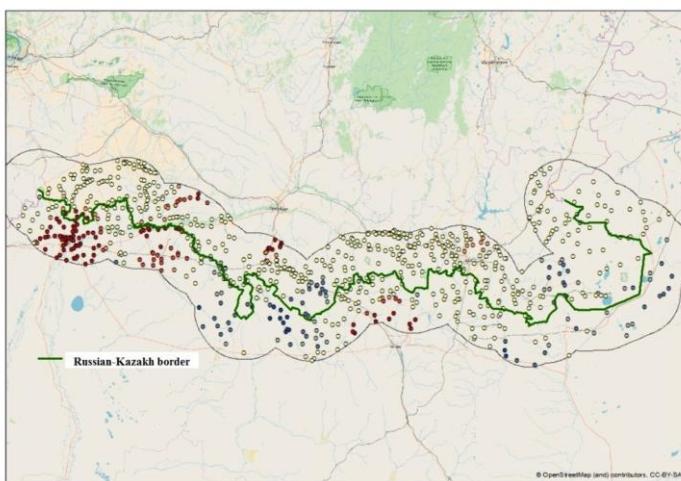


Fig. 1. Analysis of the "hot" and "cold" points of localities population dynamics of the Russian-Kazakhstan frontier zones.

IV. FINDINGS

Thus, on the example of the Russian-Kazakhstan border the study indicates that the new Russian frontier zone, which was formed a quarter of a century ago, does not have a marked oppressive effect on the population settlement pattern. In addition, the processes occurring in the settlement are, as a rule, transfrontier.

The authors consider the analysis of the impact of the border on the population settlement pattern presented above as a pilot phase. The study is planned to continue in the future with expanding its territorial framework.

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