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THE NATURAL ENVIRONMENT AND CHANGES IN POPULATION DISTRIBUTION

Abstract: A search for interrelations between natural conditions and changes in population distribution may be a significant subject of regional geography research. It is especially promising to explore this issue as exemplified by France, where we have specific statistical data from censuses carried out in administrative units which have remained unchanged for years. The paper discusses methods of searching for such interrelations on the basis of chosen examples.

Key words: population distribution, area denivelation, France.

Interrelations between natural conditions and settlement locations, population distribution and density comprise the most classical research subjects undertaken by the Warsaw Regional Geography Team. Much work has been dedicated to these issues. Most often, attempts to determine which elements of the natural environment are most closely linked with intensity the population were the. In the typical approach, at the starting point of the analysis was the comparison of subsequent maps of these elements with a population distribution map, most often a dot map. Overall, it was an issue of determining population conditions in a given time and year, usually a general census year, results of which were the source of necessary information.

Due to the fact that results of such comparisons turned out to be interesting, it was assumed that search for interrelations between natural conditions and changes in population distribution may also be promising. It is a fact that the question, if and to what extent, a population decrease or growth is associated with the character of the natural environment may be justified and interesting. There is a need to be aware, of course, that this relation, excluding extreme circumstances (floods, earthquakes) is not direct and there is no need to prescind, from numerous fundamental causes, specific demographic behaviour.

Carrying out such analyses leads to additional difficulties. Proper data must be available, obtained in a similar and comparable fashion and compiled

in the same territorial units. If we plan to carry out observations for a relatively long period of time, e.g. several dozens of years, it is especially difficult to realize the last condition. Aiming at using reliable census data, we must look for them in an area where, for a long time, there have been no administrative divisions.

France is one of the unique countries which meet this condition. For over two hundred years, the fundamental territorial division has little changed and what is equally important, comprises lowest level units. They number over 36 thousand. In 1999, in the last census year, they amounted to 36.565. It began to decrease in the sixth decade of the XXth century (in the year 1961 it was 37.962). Such a great distribution results from the fact that their overall area is small, on the average not exceeding 15 km^2. Of course, from the perspective of all statistical and geographic inquiries, it is extremely convenient. In all of these communes (corresponding, from the perspective of administrative division and territorial self-government, to the former Polish "gromada"), for the past one hundred and so years, detailed general census are taking place, in assumption every 5 years and in reality, every 7-10 years. Thus, it is a superb statistical material, allowing to witness the evolution of demographic and social behaviour of four or five generations of France's inhabitants. It is amazing that this extraordinary data are so rarely used and their detailed interpretations, if at all exist, are not more widely known. After all, accessing these data is relatively easy. It happens that they are underestimated. Even though it may be hard to believe, thoroughly real is the account of one of our students thanks to whom XIXth century population census data from Brittany were not removed from archives.

In order to carry out the comparison discussed above, it is necessary to select a characteristic or an element of the natural environment. Therefore, it must be noticed that we are dealing with a comparison of phenomena where one changes and the other remains practically unchanged. From a methodological perspective this is not a significant inconvenience. We may, however, assume that analyzing, for example, population distribution at the beginning and the end of the last century, we relate these situations to the same natural conditions. They certainly have not undergone any significant modification since, in the area being of interest to us, there are neither earthquakes nor volcanic eruptions. The assumption is most correct for, to carry out the comparison, formed surfaces were chosen and speaking more precisely, surfaces with diversified features. This selection stems from material possibilities and these, furthermore, were related to the character of data on the population, referring to particular communes. Therefore, the commune should be the natural data reference unit. These data should be detailed, in practice read on a topographic map in the scale of 1:100 000 (or greater) and easily readable because, on the regional scale in which several master thesis on these analyses were prepared, several hundred communes were used.

Even if for these operational reasons denivelation was used as measure of that diversification of surface features, even though there was knowledge of different situations (diversified surface formations) which may be hidden behind similar values.

Such comparisons are undoubtedly justified because in France relations between surface formation and population distribution are visible at first glance. The population density map, throughout most of the area, is a reflection of the above-sea-level altitude. Roughly speaking, the higher it be, the less numerous the population even though there are exceptions to this rule (sparsely populated Landes, relatively heavily populated Vosges). On the other hand, the above-sea-level altitudes correspond in general to denivelation levels (according to vol. 6 *Milieux et ressources* Atlas de France from 1996, correlation even reaches 0.95), however even here, it is not always like that. Denivelation in the Massif Central is much lower than that which results from the above-sea-level altitudes. The opposite is true of Corsica, the Alpes as well as of Brittany.

The scope of research comprises the Massif Central, Brittany, Alsace and Provence. The starting point of the analysis was the processing of data on the basis of chosen censuses conducted from 1858 (Provence), 1866 (Alsace), 1872 (the Massif Central) and 1901 (in Brittany) up to the year 1999. Among these extreme periods of time, years characteristic from the historic perspective were chosen, i.e. 1890, 1921, 1946, 1975. Painstaking, very laborious calculations on particular communes permitted the creation of data bases which allowed for:

- execution of area denivelation maps, values of which, due to existing differences in the commune areas, were calculated in km^2 (Fig. 1), even though such an operation must be regarded as being questionable for it leads to an artificial reduction of the existing area denivelations,
- presentation of population density in the chosen years (Fig. 2), as well as changes of this density between these years (Fig. 3) using the same class segmentation values, which allowed to check differences which came into being in a given time period,
- presentation of the change types which emerged following investigation of their course (Fig. 4), which was also compared with the mean area denivelations,
- comparison of the area denivelation values with the population density values in chosen years (Fig. 5) and changes in population density between these years (Fig. 6), placing appropriate cartograms executed by using equipotent divisions, so that subtracting particular commune class ranks and later on its interpretation, be justified.

This research, conducted with the application of statistical methods (correlation coefficient, linear regressions) gave answers to questions posed at the beginning of this paper, in which the general assumption was that there is an reverse correlation between the denivelation values and the population number (the higher the denivelation, the lower should be the population

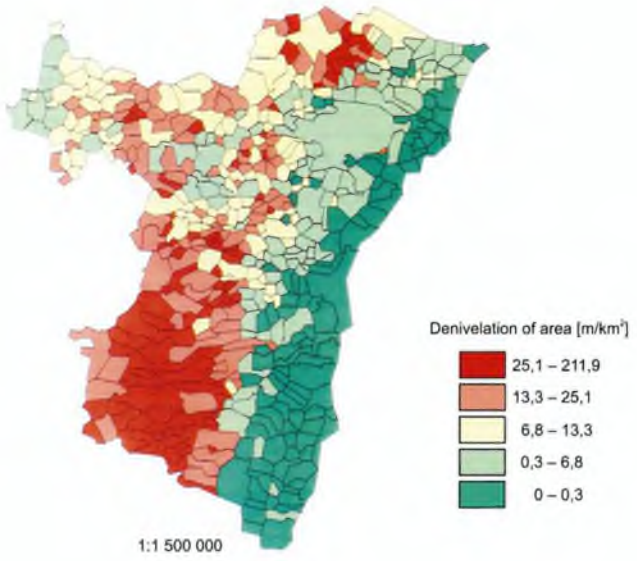

Fig. 1. Denivelation of area in the Bas-Rhin Department in Alsace

Source: P. Anduła, 2003, *Gęstość zaludnienia a zróżnicowanie rzeźby terenu w departamencie Bas-Rhin w Alzacji*, [Population density and the diversification of relief in the Bas-Rhin Department in Alsace; in Polish].

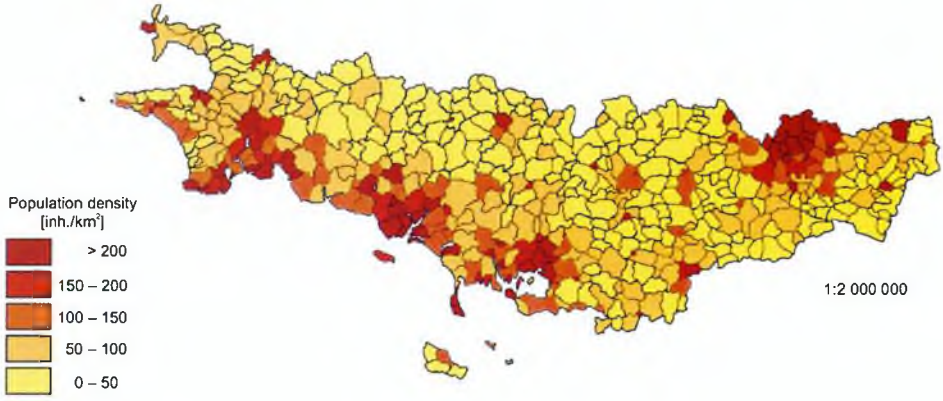

Fig. 2 . Population density in southern Brittany in 1999

Source: M. Bilska, *Gęstość zaludnienia a zróżnicowanie rzeźby terenu wpołudniowej Bretanii*, 2003, [Population density and the diversification of relief in southern Brittany; in Polish].

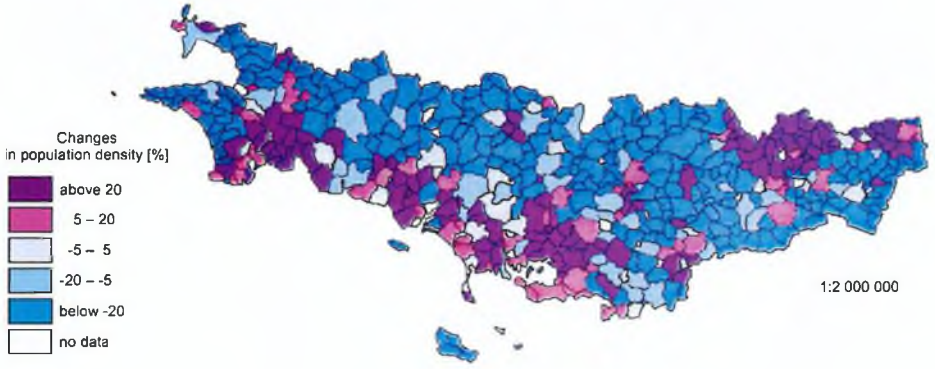

Fig. 3. Changes in population density in southern Brittany in 1901-1999

Source: M. Bilska, *Gęstość zaludnienia a zróżnicowanie rzeźby terenu w południowej Bretanii* (2003) [Population density and the diversification of relief in southern Brittany; in Polish].

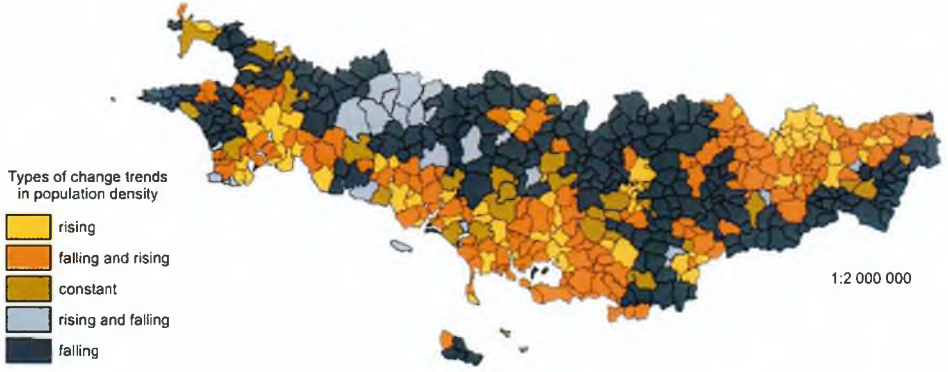

Fig. 4. Types of changes in population density in southern Brittany in 1901-1999

Source: M. Bilska, *Gęstość zaludnienia a zróżnicowanie rzeźby terenu w południowej Bretanii* (2003) [Population density and the diversification of relief in southern Brittany; in Polish].

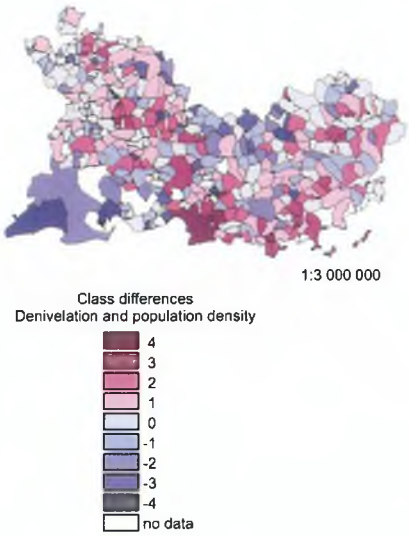

Fig. 5. Interrelations between area denivelation and population density in Western Provence in 1876

Source: K. Krzemińska, *Gęstość zaludnienia a zróżnicowanie rzeźby terenu w Zachodniej Prowansji* (2005) [Population density and the diversification of relief in Western Provence; in Polish].

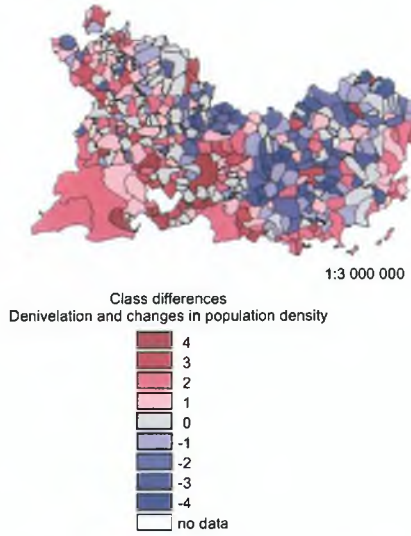

Fig. 6. Interrelations between area denivelation and population density in Western Provence in 1876-1999

Source: K. Krzemińska, *Gęstość zaludnienia a zróżnicowanie rzeźby terenu w Zachodniej Prowansji* (2005) [Population density and the diversification of relief in Western Provence; in Polish].

density and its potential growth). Therefore, an attempt was made to establish whether theses interrelations indeed exist (generally, they were better confirmed by using cartographic methods rather than statistical methods), when (in which years and in what timeframes), as well as under what circumstances (in which part of the analyzed area) they were most distinctive.

Not all undertaken tasks have been completed. Therefore, it is too early to present a conclusion. Undoubtedly, they are classical examples of searching for interrelations between natural conditions and human activity.