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FRONTIER DELIMITATION OF THE NORTH IN EUROPE

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Abstract: The North of Europe characterized by unfavorable environmental conditions and small population, is a region whose frontier is variously delimited in particular countries. Northern areas in the European countries are covered by diverse aid activities, therefore, properly carried out delimitation of the frontier of the North effects establishing the area and especially the number of population living in this area. In our times, nuisances concerning the inconvenience of the climatic conditions as well as transport and information isolation are compensated in a different way in particular countries. In this article, the criteria taken into consideration when delimiting the frontier of the North in Russia and other Scandinavian countries will be presented in a detailed way and the rightness of choosing the selected features will be assessed. In order to carry out the frontier delimitation of the North it is necessary to combine the quality and quantity approach. The use of mathematical methods while abandoning the quality analysis, does not allow the delimitation to be carried out correctly. In this study the indicator of the North will be presented, enabling to map out the northern area in particular countries. The appropriate delimitation requires the knowledge of quality specificity of certain areas.

Key words: the North, frontier, Scandinavia, Russia

The North of Europe characterized by unfavourable environmental conditions and small population, is a region whose frontier is variously delimited in particular countries. Northern areas in the European countries are covered by diverse aid activities, therefore, properly carried out delimitation of the frontier of the North effects establishing the area and especially the number of population living in this area. In our times, nuisances concerning the inconvenience of the climatic conditions as well as transport and information isolation are compensated in a different way in particular countries.

In this article, the criteria taken into consideration when delimiting the frontier of the North in Russia and other Scandinavian countries will be presented in a detailed way and the rightness of choosing the selected features will be assessed. In order to carry out the frontier delimitation of the North it is necessary to combine the quality and quantity approach. The use of mathematical methods while abandoning the quality analysis, does not allow the delimitation to be carried out correctly. In this study the indicator of the North will be presented, enabling to map out the northern area in particular countries. The appropriate delimitation requires the knowledge of quality specificity of certain areas.

1. THE NORTH OF EUROPE

In physico-geographical regionalisation proposed by the International Federation for Information and Documentation (FID) the North Europe consists of:

- ♦ arctic islands: Jan Mayen, Novaya Zemlya, Spitsbergen, Bjørnøya (Norwegian for Bear Island) and Franz Josef Land;
- ♦ Iceland and the Faroe Islands (Sheep Islands);
- ♦ the Scandinavian Mountains being the greatest with respect to the area and the highest Caledonian mountain range with glaciers in Europe;
- ♦ uplands and lowlands of the Scandinavian Peninsula;
- ♦ the Kolski Peninsula and Finnish-Karelian Inter-sea;
- ♦ the Baltic islands: Bornholm, Gotland, Öland, the Aland Islands.

In the political geography the Scandinavian countries (Denmark, Finland, Island, Norway and Sweden) and the northern part of Russia constitute the region of the Northern Europe. At the beginning of the 21st century the largest population lives in the northern parts of Russia (about 7 million), in Norway 237 thousand live in Norland, 152 thousand live in Troms and 73 thousand in Finmark. In Sweden about 500 thousand people live in the North, in this 255 thousand in the Norrbotten county, 196 thousand in Findland, in Laponia and 294 thousand in Iceland.

2. METHODS OF THE FRONTIER DELIMITATION OF THE NORTH

Three different groups of concepts may be distinguished among the concepts of the delimitation of the North in particular countries. The first is based exclusively on physico-geographical factors. The subsequent method of frontier delimitation of the North assumes the need to use only socio-economic parameters for this purpose. The third approach, probably the most correct, assumes that in order to delimit the frontier line, both the physico-geographical factors as well as socio-economic ones should be considered.

Among the physico-geographical concepts the dominating are those, which suggest delimiting the frontier of the northern macro region along the southern frontier of the boreal forests (Bone, 1992), the southern frontier of the existing permafrost (Klimienko, 1995), or with the use of single or combined climatic indicators. Other physico-geographical criteria of the North may include the readings of the Bodman's and Hill's indexes describing the extremity of the climatic conditions for human life and activities (Petrov, 2003).

According to G.A. Agranat (1992) physico-geographical borderline of the North of Europe is its potential frontier, the base, which is supplemented with socio-economic conditions shaping the concrete configuration of the region. The author justifies his opinion by saying that the natural agroclimatic frontier of the North may be treated as the appropriate frontier because it reflects the natural and, to some extent, economic specificity of the region. The physico-geographical features should not be treated as the principal parameters of the North but they should be considered as conditions determining the development of the national economy.

The world literature, dedicated to the issues of the North, gives the due tribute to the socio-economic concepts concerning the delimitation of the North. For this purpose the

Armstrong index related to transportation availability may be used. Attention is drawn to the distance of the northern areas from the main centres of the economic activity. For this purpose, the range of the operation of the railway and road transportation network is used. The common criterion is also the cost of living. The cost of living in the North is significantly higher than in the main settling strip. Economic conditions dominate in the economic development programmes of the North where the basic indicators of the North are: the distance, settlement concentration, underdevelopment of the sphere of services, increased capital-intensive nature (Petrov, 2003).

Some authors consider that the statistical approach is necessary with respect to the issue of defining the frontier of the North, this, however, requires possessing a well-developed statistical base, which allows to carry out the examination. Obtaining the quantitative documentation is possible in the case of using the data for basic units of the adopted regionalisation (these may include provinces, counties, districts). The mathematical method of delimiting the frontier of the North is calculating the indicator of the North.

Using the data concerning the location of particular places in the zone of the North and their physico-geographical features, from the perspective of inconvenience of various elements of the natural environment (including, especially the climate) it is possible to calculate the indicator (In) for the chosen point in the examined area. The indicator looks as follows:

$$In = I\varphi^{\circ} + It^{\circ}(\text{year}) + It^{\circ}(J) + I_{\Sigma r}$$

where: $I\varphi^{\circ}$ – the indicator of the North by latitude,
 $It^{\circ}(\text{year})$ – the indicator of the North by the annual air temperature,
 $It^{\circ}(J)$ – the indicator of the North by the air temperature in January (the coldest month),
 $I_{\Sigma r}$ – the indicator of the North by the sum of the temperatures above 10 grades of the place of the observation.

The indicator of the North by latitude looks as follows:

$$I\varphi^{\circ} = \frac{\varphi^{\circ}(N) - \varphi^{\circ}n}{\varphi^{\circ}(N) - \bar{\varphi}^{\circ}}$$

where: $\varphi^{\circ}(N)$ – latitude of the extreme northern point in the region,
 $\varphi^{\circ}n$ – latitude of the place which is examined,
 $\bar{\varphi}^{\circ}$ – average latitude of the whole region.

The indicator of the North by the annual air temperature looks as follows:

$$It^{\circ}(\text{year}) = \frac{t^{\circ}n(\text{year}) - t^{\circ}\text{min}(\text{year})}{t^{\circ}(\text{year}) - t^{\circ}\text{min}(\text{year})}$$

where: $t^{\circ}n(\text{year})$ – annual air temperature of the place being examined,
 $t^{\circ}\text{min}(\text{year})$ – minimum annual air temperature in the region,
 $t^{\circ}(\text{year})$ – average annual air temperature in the region.

The indicator of the North by the air temperature in January looks as follows:

$$It^{\circ}(J) = \frac{t^{\circ}n(J) - t^{\circ}\min(J)}{t^{\circ}(J) - t^{\circ}\min(J)}$$

where: $t^{\circ}n(J)$ – air temperature in January of the place being examined,
 $t^{\circ}\min(J)$ – minimum air temperature in January in the region,
 $t^{\circ}(J)$ – air temperature in January in the region.

The indicator of the North by the sum of the temperatures above 10 grades of the place of the observation looks as follows:

$$I_{\Sigma t^{\circ}} = \frac{\Sigma t^{\circ}n > 10^{\circ}}{\Sigma t^{\circ}n > 10^{\circ}}$$

where: $\Sigma t^{\circ}n > 10^{\circ}$ – sum of air temperatures above 10° for the place being examined
 $\Sigma t^{\circ}n > 10^{\circ}$ – the sum of the average air temperatures above 10° in the region.

Each of the factors may reach the level of above 0, and if it is lower than 1.0, it indicates the location of the given point in the North and when it is higher than 1.0 then the point exists in the South. The reading, which equals to 1.0 means, that a given point of observation is located exactly at the North-South frontier, according to the examined indicator. The combined value of the indicator of the North raises doubts of some researchers as it shows the equivalence of each of the four above-mentioned factors. However, after calculating the values for the given number of points necessary to draw up a map of the analyzed region by the value of the combined indicator, it is possible to specify the variation which will in turn allow to delimit the frontier of the Far and Right/Main North and the South zones in turn (Gladkij et al., 1999).

Among many concepts regarding delimitation of the North these, which are of a complex nature and which simultaneously analyze physico-geographical, socio-geographical and ethnical factors of the North are really worth a significant notice. The Slawin's method (1982) is a complex approach to the issue of delimitating the frontier of the North, in which the author differentiated four primary features of the North: geographical location to the north from traditionally populated and economically developed regions of a given country, unfavourable natural conditions, creating difficulties for the economy development, low density of population and greater amount of social work in projects carried out in these areas.

The next example of the complex approach to delimitating the frontier of the North is a scheme of Hamelin (1971) who, for this purpose, suggested using a system of 10 features of the North: 6 physico-geographical (latitude, number of days within a year with temperature higher than 5.6°, number of days with a negative temperature, freezing of lands, volume of nature of flora) and 4 socio-economical (availability of overland and sea transportation, availability of air transportation, population, level of economic activity). The maximum "indicator of the North" has the North Pole (1000). The southern frontier of the North runs there, where the number of degrees amounts to 200.

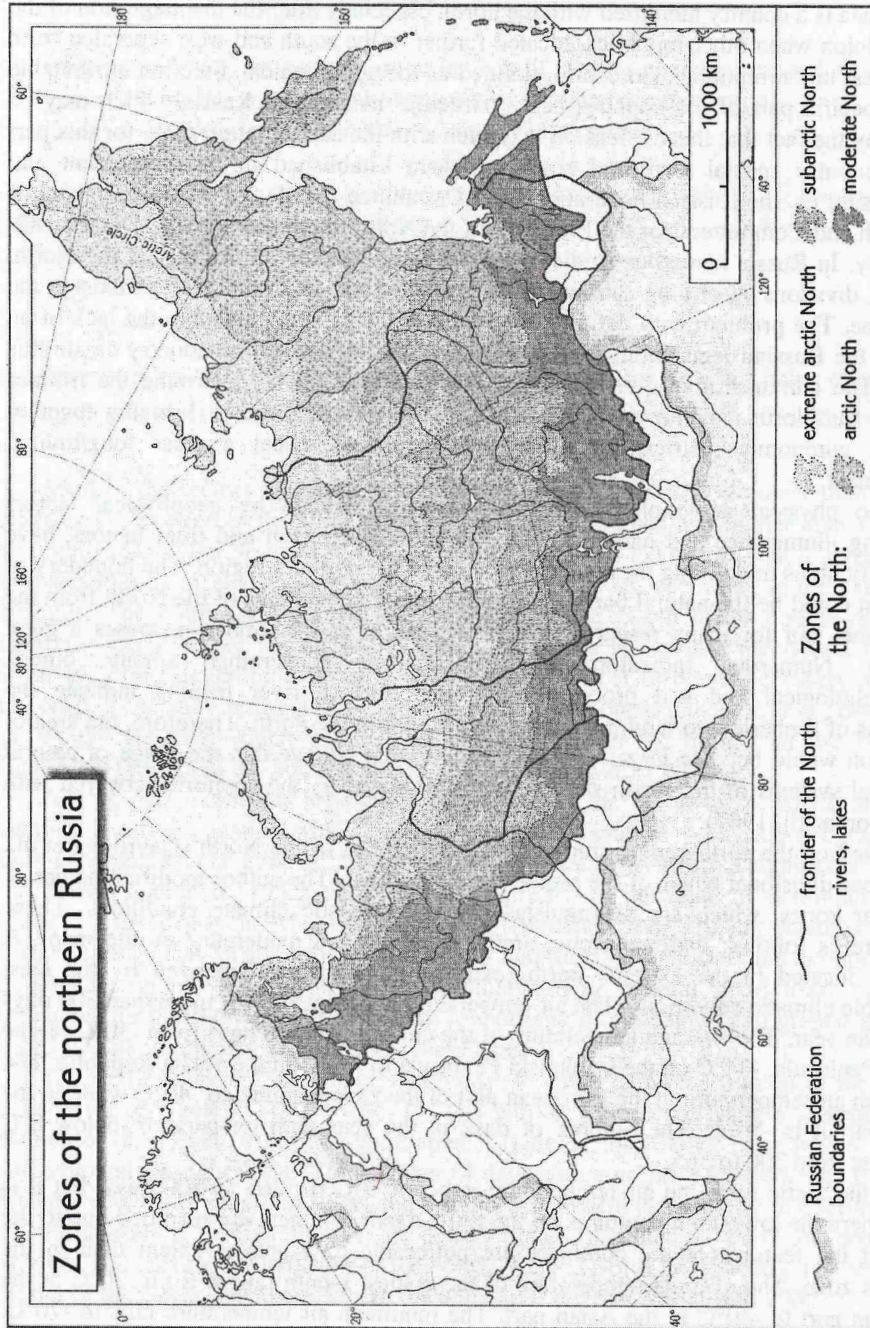
3. THE NORTH OF RUSSIA

Russia is a country identified with the north, especially after the disintegration of the Soviet Union when other republics, located further to the south and west separated from this largest union republic. The North, defined as the geographical direction attributable to the specific part of the country, has a particular meaning in Russia, which may be proved by the fact that this expression is written with the capital letter. Only for this part of the country special territorial structures were established in the parliament and government, i.e. the Russian Federation State Committee for Matters of Development of the North and Committees for the Problems of the North in both chambers of the Federal Assembly. In Russia numerous studies were written dedicated the nations of the North, whereas, divisions describing nations of the east, west and south do not even exist at the same time. The problem with defining the North as a region results from the lack of an entry in the Russian legislation, saying precisely, which parts of the country create this region. The administrative division also makes it impossible to determine the frontier between the North and the rest of Russia because federal districts, bringing together districts, autonomic districts, countries and republics, reveal a clear longitudinal arrangement.

Also physical geographers, who are primarily guided by geophysical factors (including illuminance and nature of lighting) and climate, soil and flora factors, have great difficulties in defining the southern frontier of the northern region. The boundary of the forest could be the natural barrier separating arctic geosystems of the North from the boreal ones but for many researchers a classification of the timberline poses a great problem. Numerous indicators on these areas concerning, among others, geomorphological and soil processes and conditions of river feeding indicate the closeness of timberline to tundra neighbouring with it in the north. Therefore, the area of the region would become larger. Other scientists even believe that the range of natural and zonal systems of the North should be still enlarged by the territories covered with taiga (Gorbackij, 1967).

Based on the cartographic study of the frontier line of the North (Gavrilova et al., 2004) four divisional zones of the region were separated. The author modified names of particular zones, which are distinguished by characteristic climate conditions. These zones are as follows: extreme arctic, arctic, subarctic and moderate (see the map). A subzone located in the extreme north (extreme arctic) is characterized by the least favourable climatic conditions. The air temperature is below 5°C for more than 300 days during the year. The average temperature of the coldest month ranges from -30°C on the Kolski Peninsula, -34°C on the Czukotski Peninsula to -38°C in the Sakha Republic. The minimum air temperature in the European part of the zone amounts to -40°C while in the Asian part it is -50°C. The number of days in the year with temperature below 8°C fluctuates from 300 to 365.

In the arctic zone the air temperature is below 5°C for 265 to 300 days, but it is there where the lowest temperatures on the Euro-Asian continent are recorded due to the fact that the features of the continent are noticeable to a greater extent than in the previous zone. The average temperature of the coldest month ranges from -20°C in the European part to -40°C in the Asian part. The minimum air temperature falls to -70°C. The average number of days with the positive temperature is 70 days per year in this zone.



Source: Gavrilova M.K., Fedorova E.N., Lazebnik O.A., 2004, *K voprosu o granice Severa Rossii i ego zonirovaniu*, "Izvestia RGO", Vol. 136.

Figure 1 Zones of the northern Russia

The third zone (subarctic) is characterized by 250 to 265 days with the temperature below 5°C. The lowest temperature of the coldest month, i.e. January, fluctuates from -12°C in Karelia to -40°C in the central part of the Sakha Republic. However, the summer is much warmer than in the two previously mentioned zones, as the maximum temperature may exceed 30°C.

The next zone whose southern frontier constitutes the frontier of the North in Russia is characterised by the most favourable living conditions, namely, the number of days per year with the temperature above 5°C amounts to 240 – 250 days. The average temperature in January ranges from -12°C in the European part to -26°C in the Asian part (Gavrilova et al., 2004).

There are also opinions propagating that it is not necessary to attach too much significance to the characteristics of the geographical environment and that the frontier of the North should be delimited geometrically, at variance with natural conditions. According to one of them all territories located beyond the polar circle constitute the areas of the North. Critics of this allocation point to a relatively small area, which does not correspond to the part of the country identified with the North in any way. The opposing concept of defining frontiers of the region is proposed by those who believe that the Russian North consists of the entire area of Siberian and Far Eastern Federal Districts in the Asian Russia and the North-Western Federal District in the European part of the country.

Yet another frontier was proposed by Golubčikov (1999), who suggests that a line joining Arkhangelsk with Khabarovsk should be drawn on the map of contemporary Russia, thus dividing the state territory into two roughly equal parts: southern and northern. The frontier delimited in this way divides the territory of the country into two areas strongly diversified in terms of their population. Unlike the south, which is inhabited by 95 % of the Russian population, the North is populated by only 5 % of the entire population, i.e. approximately 7 million people. The distribution of population in this area is characterized by a strong spatial dispersion. Rare colonist units demonstrate a distinct spot nature and evoke a connotation of small islands on the ocean. In many cases it is impossible and certainly very difficult to cover the distance between them overland.

Notwithstanding many studies on the North written by representatives of various disciplines, it is still possible to argue and wonder over defining the frontiers of the region which has existed in the Russian consciousness for centuries. The consequence of the border delimitation is the inclusion within the region of an appropriate number of people who await support from state authorities in order to facilitate the existence in the areas with extremely unfavourable natural conditions. Subsidies for the population of the North were provided in the times of the Soviet Union and after 1991 a debate commenced, in which scientists also participated, raising a question whether areas of the North are still worth funding. In the conflict of pros and cons the eternal problem of choosing the direction of the country development plays a very important role. Some of the authors, including J.L. Pivovarov, S.B. Šlihter, put forward theses on the destructive influence of the process of taming the North, which has lasted for decades and on the necessity to limit the adaptive area (Pivovarov, 1997).

On the other hand, thesis on the harmfulness of developing these areas were severely criticised by V.M. Kotlâkov, M.K. Bondman, G.M. Lappo, A.N. Pilâsov among others. Arguments raised in this discussion are based on both theories worked out decades ago, as well as on contemporary research. In both cases a number of logical conditions, which affect undertaking certain activities is presented. However, there are

also opinions, which are based on unreasonable, even incorrect assumptions to prove the propagated thesis. For example, Klimenko (1995) has suggested that the areas with average annual air temperature lower than -2°C and those located above 2000 m above the sea level should be displaced. This author believes that the values indicated by him make the living conditions in Russia so difficult that maintaining the population on the said areas is economically unjustified. If one were to agree with Klimienko, the population should be evacuated from, among others, Nikolajevsk at the river Amur (where the average annual air temperature is $-2,4^{\circ}\text{C}$), Bratsk ($-2,6^{\circ}\text{C}$) and Chita ($-2,9^{\circ}\text{C}$) whereas stations such as Ozernaja on the Kamchatka Peninsula would have to receive funding since the average annual air temperature in that region is $1,3^{\circ}\text{C}$. People in Russia who believe that the displacement of the areas of the North is necessary, argue that this will allow to release significant state funds because the annual costs of living of the habitants of this region in the second half of the 1990s amounted to RUB 12 – 13 million (Russian rubles). It should be pointed out that these amounts are not accompanied with any calculations indicating how much a statistical inhabitant of the North, the region which provides 60 % of the state foreign currency revenues, contributes towards the national budget (Starikov, 1997). The frontier line of the North in Russia causes the most distinct consequences for both people inhabited on these areas as well as for the whole state economy.

4. CONCLUSIONS

In the Scandinavian countries, the frontier line of the North does not arise so many doubts because these territories are inhabited by a significantly smaller group of people with a stable financial situation. In Russia, several years after the disintegration of the Soviet Union, the North finds itself at dangerous crossroads. The more its future is decided by the temporary policy and not by development strategies and opinions developed by the scientists: economists, geographers, sociologists, the greater the anxiety about its fate will be. A selection of diversified conditions determining the rationale for drawing the frontier of the region in a specific manner facilitates a wide interpretation of the rightness of the delimitation carried out.

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Delimitacija granici pólnoci w Ewropie

Resume

V škandinávskych krajinách hraničná čiara severu nevyvoláva tak veľa pochybností, keďže tieto územia sú obývané značne menej početnou skupinou ľudí so stabilnou finančnou situáciou. Niekoľko rokov po dezintegrácii Sovietskeho zväzu sa v Rusku nachádza sever na nebezpečnom rázcestí. Čím viac sa o jeho budúcnosti rozhoduje dočasnou politikou a nie rozvojovými stratégiami a názormi vedcov (ekonómov, geografov, sociológov), tým väčšmi znepokojivý bude jeho osud. Výber rôznorodých podmienok determinujúcich polozenie hranice regiónu v špecifickej podobe umožňuje široká interpretácia správnosti uskutočneného vymedzenia.