

The Arctic urbanization: how to get resilience in a condition of permanent disaster?

The conditions of urban development in the Arctic can be interpreted as a condition of permanent disaster both from the natural and social-economic points of view. The difficult character of the conditions stems not only from extreme absolute parameters of cold climate or transport distance. The Arctic environment results in permanent fluctuation of natural and economic conditions. These permanent instability and uncertainty is a powerful challenge itself. We mean here dramatic weather fluctuations, temporary interruptions in accessibility, destruction of permafrost (the threat of demolition for this reason is comparable to the threat of earthquakes), sudden changes in the economic conditions of the development (for example, due to changing ways of transportation or product prices) etc. The Arctic cities experience also dramatic waves of in- and out-migrations, comparable with the migration waves that accompany natural disasters. For example, during the period from 1989 (the year of the last census of the Soviet period) to 2016 dozens of cities in the Russian Arctic has lost 20 to 50% of their population, some cities (Igarka, Pevek, Bilibino) even more than 50%. At the same time 5 cities rose by more than 20% and the population of one city (Gubkinsky) increased by more than 50% reaching 25 thousand people.

Such sharp fluctuations in the population (both positive and negative) create many problems in the field of strategizing for the development of housing construction, municipal infrastructure, social sphere. For "normal" cities outside of the Arctic, such fluctuations in population (mainly caused by migration waves) could be considered as a full disaster.

However the circumpolar Arctic is a predominantly urban region and a typical inhabitant of the Arctic is a citizen of a city. The majority of the urban population of the Arctic lives in Russia. Within Russia the Arctic paradoxically is the most urban part of the country (at the beginning of 2016 in the Arctic zone of the Russian Federation 89% of the population lived in urban areas). The level of urbanization of the foreign Arctic is lower. However, the majority of the Arctic territories of the world (except the Faroe Islands, Nunavut and Northwest territories of Canada) have more than ¾ of urban population (AHDR-2015, p. 94).

However, the Arctic city is very specific. We consider the Arctic urbanization as a frontier of urbanism. Extreme conditions force to seek and find solutions to the problems of urban development. These problems are relevant to other cities in the world, but due to the lesser severity, they are being tackled slowly in them. Whereas in the Arctic the solution to these problems is the obligatory condition of stability and even survival.

The research is based on quantitative analysis of available official statistical data on the level of municipalities of the Arctic zone of the Russian Federation. The analysis is based on the comparison of the data for all the Arctic cities of Russia (more than 40 cities) with the sampling of cities in the non-Arctic area, comparable in economic specialization and population size with Arctic ones. Using geographic information system (also known as GIS) helps us to make a detailed analysis of our data and provide maps of the phenomena under consideration. Where possible, the comparison with the Arctic cities of other countries (USA, Canada, Sweden, Norway, Finland, Iceland) will be done.

The theoretical framework relies on three groups of concepts. First is the concept of remoteness developed both in the regional science (Husky, Berman, etc.) and social anthropology (Ardener, Humphrey etc.). Anthropological point of view significantly enriches the depth of understanding of the phenomenon of remoteness. The second field is just deeply developed concept of center and periphery (including modern aspects of actor-network analysis of peripherality and marginality as well as the analysis of networks of cities). The third theoretical pillow of our work is a long tradition of exploring remote territories of the Russian authors (Slavin, Kosmachev, Pelyasov etc.). The years of experience in the elaboration of official strategic documents for Northern cities of Russia helps us to interpret the statistical findings in the context of developing an optimal strategy for the Arctic cities.

The study consists of two parts. The first part (quantitative and GIS-analysis) focused on the characteristics of the specific socio-economic conditions of the Arctic cities (climatic and other physiographic parameters are not considered in this case: this field have already been sufficiently studied by international teams of researchers – see Sustaining... 2016). The second part is aimed at summarizing strategies to overcome the permanent challenges of Arctic conditions and it contains mostly qualitative statements.

The focus of the first part of our study is economic and institutional remoteness of the Arctic cities. The geographical, economic and institutional distance from the core of their countries is manifested in the formation of a number of specific features of the Arctic cities such as the rise in the cost of living and the predominance of long-haul communication over others. Remoteness, in turn, promotes the discrete character of many processes in time and space. The time-space instability and uncertainty as it was mentioned becomes an important factor in the creation of specific challenges to the resilience of the Arctic cities.

First of all we investigate the annual volume of inbound and outbound migrations to study discrete processes in time. In addition we analyze the period of life of the city and the balance of changes in its population. Seasonal variation in population number is also a very important characteristic of the Arctic cities, however, this parameter is not considered in this study due to the absence of detailed data. This aspect requires further detailed field research.

Another direction of in-time fluctuation in the Arctic cities development is the season fluctuation of interest to them (we analyze the statistics of queries in information search systems such as Google and Russian-based Yandex). Preliminary studies have shown that the Russian Arctic towns are more interesting in winter – presumably due to extreme situations.

Finally, another group of parameters associated with discrete processes in time is the dynamics of the urban space connected to the discreteness of space itself. We know that the Arctic cities have many abandoned and destroyed homes, including high-rise multifamily homes. The statistically-based study of this phenomenon is not possible, so we use indirect indicators such as population density of cities (ratio of population to the area of the city), as well as the structure of the housing stock according to the year of construction (for multifamily buildings).

Seasonal work is typical for the Arctic. It increases the demand for warehousing services and storage (Pelyasov 2017). That's why one of the studied characteristic is parameters of the fixed assets of small and medium Arctic cities.

We also use the basic settings of cities (sectoral structure of the economy, total population, the block of indicators of economic well-being) as another set of variables.

The second part of our research is more ambitious: we aim to identify mechanisms to compensate negative conditions for the development of the Arctic cities.

The study of literature and extensive experience of field research on socio-economic development of Northern cities allows us to bring the hypothesis about the three groups of mechanisms that compensate for the remoteness and the associated characteristics of the spatial-temporal instability:

- temporal proximity (Torre), which is expressed at a higher level of development of short forms of communication in business, information, contacts; relatively frequent trips over long distances;
- the spread of universal solutions, the multi-tools features of places and even persons;
- increased creativity, adaptive capacity, forced openness to experiment.

A temporary form of proximity is the most obvious "answer" to the challenge of the remoteness. However, Arctic gives us unusual forms of its manifestation, in addition to the classic forms of temporary proximity.

One form of temporal proximity is the temporary nature of life in the Arctic itself. We mean the strategy of living in Arctic cities for several years or even decades and then returning to the more southern parts of the country. The important feature of such strategy is a tendency to maintain close social ties with the more southern areas, helping to maintain powerful channels of knowledge flows through social networks (read more: Zamyatina 2017). One of the specific Russian forms of maintaining of the social ties with more southern areas is an institution of long vacation trips which is at the same time paradoxically used as powerful tool to enable knowledge flows and innovation feeding to the Arctic. Residents of the Arctic cities use vacation not only for leisure but also to collect information on various aspects of life – from technical innovations to the analysis of the real estate market or training opportunities for their children (Zamyatina 2016).

Concerning universality (or flexibility), we are talking about the universality of both places and people. The latter manifests itself in the wider dissemination of the strategy of combining of the places of work (Pelyasov 2017) and mastering of many professions. The universality of places is caused by two reasons. First, the severe climate makes it almost impossible the creation of public open spaces, as it is customary in the practice of development of creative cities. Therefore, public space should be placed indoor in Arctic – and every space under the roof should combine the functions of, for example, social services, recreation, places of communication etc. Secondly, many Northern cities exist in the context of mass inbound migration flows for a long time which cause an acute shortage of housing and premises. In this regard, there occurs the spontaneously practice of universal use of the premises, when for example museums, medical facilities and even schools were organized in office-spaces. Formally, the Arctic city was ahead of the mainstream of development of urban studies and planning (although, of course, the quality of these universal premises was very bad). With the improvement of the situation in the housing market such universality gradually disappears from the practice of Northern cities, and this can be seen as the loss of their capacity for resilience. The practice of universal use of the premises must obtain a new breath, speaking in deliberate planning for a comfortable communication platforms indoors.

The creativity of the Arctic communities is now the least studied area in the field of ensuring the resilience of the Arctic cities (Petrov, Pelyasov), so we pay more attention to this aspect. In the absence of adequate statistical data, we analyze the statistics of scientific publications, performed in the Arctic cities in terms of per capita. Of course creativity is manifested not only in scientific work but in everyday, routine practices related to the search of solutions about strategies of insulation of dwellings, vehicles, strategies moving around the city and keeping the warmth of his own body. The Arctic city is, in fact, a collective laboratory of innovation search of technical and institutional solutions in the field of combating the cold (for example, the strategy of behavior of owners of shops for those strangers who walk in to the store not to buy but to get warm), in the sphere of ensuring rapid adaptation of migrants, and ensuring tolerance, etc.

One of the forms of creativity that make the Arctic city a real frontier of urbanism is a specialized Arctic architecture. The Arctic conditions have given rise to the whole direction of architectural searches (Jull). However, all these school was conceived, essentially, in the industrial time (while the search was in the Soviet Union, Sweden, Canada) and this is reflected in the specific directions of that search. Almost all the "Arctic" architectural projects were focused on a strategy of strengthening of the discreteness of space. It had a form of the extreme concentration of population in the place for walled cities (Ralph Erskine and followers) or in the form of constructions of the giant building complex, in fact, contained the whole city (unrealized project of Alexander Shipkov for Norilsk). These projects have completely ignored the challenge of discreteness in time – they are absolutely inadequate to the situation of population fluctuations. Obviously, the modern Arctic city should become the place of experiment in the development of architectural and planning solutions, focused on instability in time and space (may be even in the sequel to the innovative search of constructivism like "living cells" of Ginsburg).

In conclusion we put forward three main directions of overcoming distance (or remoteness) as the main and permanent disaster of the Arctic cities: *mobility* (especially temporary mobility, provide temporary

proximity), *flexibility* and *creativity* (mobility of mind). The three areas should form the basis of strategies for sustainable development of the Arctic cities. For many cities in the world these problems are unexpected or have low force. But these problems are permanent for the Arctic settlements. So the Arctic cities are forced to develop new solutions in these areas and thus become the frontier of the urban area development.

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