

The Problems of Defining the Development Directions for the Territories Comprising a Large Urban Agglomeration*

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Abstract—The article studies the issues of evaluating the economic role of individual territories comprising a large urban agglomeration. By the example of the Krasnodar urban agglomeration and its constituent entity — the Dinskoy District, the authors attempt to identify the processes, threats and opportunities caused by the agglomeration’s influence on the rural area.

Keywords—*agglomeration; agglomeration development processes; rural district development; urban and rural interaction*

I. INTRODUCTION

One of the most acute problems of rural territories is their development in the close proximity with large cities. Under urban influence, traditional villages focused on agriculture and their “traditional” way of life gradually transform and integrate into the system of socio-economic relations of the city. The structure of rural economy also transforms, new city-oriented enterprises emerge, the composition of labour force changes, etc.

Due to limited space within cities, the rural territories surrounding them are considered as development zones. The possible options and development scenarios include using their land for housing development, transferring city production and business centres to the periphery, and creating recreation zones for urban residents. In their turn, rural areas may react differently to the proximity of cities and their influence.

*Fund: The study was carried out with financial support from the Russian Foundation for Basic Research in the framework of the scientific project No. 18-410-230026 p_a “The model of public network management of the strategy for socio-economic development of Krasnodar Krai”.

The purpose of the article is to study the impact of cities on the development of rural territories and identify the approach to framing the policy for rural territories development focusing on exploiting city potential.

II. THE CONCEPT OF RESEARCH

The term “agglomeration” in relation to settlement was introduced by the French geographer M. Rouget. According to him, agglomerations emerge when urban activities go beyond the administrative boundaries and spread to neighbouring settlements.

According to Russian researchers G.M. Lappo and P.M. Polyani, the main criteria for identifying the boundaries of urban agglomerations are the presence of an urban nucleus with the population of not less than 250 thousand people, at least two urban settlements around the nucleus, circular migration, accessibility by transport (within 1.5 hours), and well-developed urban infrastructure.

Applying such criteria as accessibility by transport, population, established industrial communication, and the presence of territories with recreational potential, the structure of the Krasnodar urban agglomeration can be described as follows: the city of Krasnodar - the nucleus of the agglomeration, the Dinskoy District, the Krasnoarmeyskiy District, the Severskiy District, the Ust-Labinskiy District and the city of Goryachy Klyuch.

The Dinskoy District, for instance, is located in the centre of Krasnodar Krai, 30 km. to the north-east of the city of Krasnodar. Most part of the Dinskoy District borders with the territory of the Krasnodar city district. The rest of the Dinskoy District borders with five districts of Krasnodar

Krai - the Ust-Labinskiy, Korenovskiy, Timashevskiy, Kalininskiy and Krasnoarmeyskiy. The total area of the district amounts to 135196 ha or 1.8% of the total territory of Krasnodar Krai [1].

The Dinskoy District consists of 10 rural settlements: Dinskoye, Novotitarovskoye, Vasyurinskoye, Novovelichkovskoye, Staromyshastovskoye, Plastunovskoye, Pervorechenskoye, Michurinskoye, Yuzhno-Kubanskoye, and Krasnoselskoye. In total, there are 27 inhabited localities in the district: the Vasyurinskaya stanitsa, the Severo-Kavkazskoy Zonal'noy Opytnoy Stantsii VNIILR settlement, the Zheleznodorozhnogo razyezda Redutskiy settlement, the Zheleznodorozhnoy stantsii Vasyurinskaya settlement, the Dinskaya stanitsa, the Ukrainskiy settlement, the Krasnoselskoe village, the Agronom settlement, the Zarozhdeniye settlement, the Kochetinskiy settlement, the Yantarnyy settlement, the Vishnyaki settlement, the Novovelichkovskaya stanitsa, the Vorontsovskaya stanitsa, the Naydorf settlement, the Dal'niy settlement, the Novotitarovskaya stanitsa, the Karla Marksa khutor, the Primaki khutor, the Osechki khutor, the Pervorechenskoe village, the Plastunovskaya stanitsa, the Staromyshastovskaya stanitsa, the Vostochnyy khutor, the Gorchachivka khutor, the Novyy khutor, the Yuzhnyy settlement. The regional centre is the Dinskaya stanitsa. The total population of the district is 141.4 thousand people [1].

Transport accessibility of each inhabited locality of the Dinskoy District and their proximity to main highways are the factors that have influence on the population level, the general pattern of settlement and the attractiveness of localities for residents.

Having a closer look at the most actively populated settlements, we can conclude that stanitsas and settlements closest to the highways and main roads are characterized by sustainable population growth (for instance, the Dinskaya stanitsa, the Yuzhnyy settlement, the Agronom settlement, the Plastunovskaya stanitsa, the Novotitarovskaya stanitsa).

Thus, rural settlements with well-established transport communication with the city have more development advantages. The availability of direct public transport routes of local and suburban communication is also of utmost importance for residents [2]. The routes of local and suburban transport are predominantly available in large localities, the centres of rural settlements. Meanwhile, a significant number of the settlements of the Dinskoy District lack transport infrastructure, therefore their population have limited opportunities for travelling by local or suburban transport [1].

III. EVALUATING THE EFFECT OF THE TRANSPORT FACTOR ON RURAL DISTRICTS' DEVELOPMENT IN ZONES DIRECTLY INFLUENCED BY THE AGGLOMERATION

The assessment of transport accessibility allows identifying three zones according to transport communication between the city of Krasnodar and rural settlements of the Dinskoy District.

The first zone, nearest to the city, is comprised of rural settlements located within the distance of 10-21 km from the city; the average travel time is 17-25 minutes, without traffic conditions affecting time. This zone includes: the Yuzhnyy settlement, the Agronom settlement, the Primaki khutor, the Yantarnyy settlement, the Vishnyaki settlement, the Zarozhdeniye settlement, the Novotitarovskaya stanitsa, the Karla Marksa khutor.

The second, medium zone includes rural settlements located within the distance of 22-33 km from the city; the average travel time is 27-40 minutes, without traffic conditions affecting time. The zone includes the following localities: the Vasyurinskaya stanitsa, the Severo-Kavkazskoy Zonal'noy Opytnoy Stantsii VNIILR settlement, the Zheleznodorozhnoy stantsii Vasyurinskaya settlement, the Vorontsovskaya stanitsa, the Dinskaya stanitsa, the Krasnoselskoe village, the Kochetinskiy settlement, the Novovelichkovskaya stanitsa, the Osechki khutor, the Pervorechenskoe village, the Plastunovskaya stanitsa, the Staromyshastovskaya stanitsa, the Gorchachivka khutor, the Novyy khutor.

Finally, the third, farthest zone includes rural settlements located within the distance of 34-46 km, with the average travel time of 45-60 minutes, without traffic conditions affecting time: the Zheleznodorozhnogo razyezda Redutskiy settlement, the Ukrainskiy settlement, the Dal'niy settlement, the Vostochnyy khutor, the Naydorf settlement.

IV. CHANGES IN THE SYSTEM OF RURAL SETTLEMENT IN ZONES DIRECTLY INFLUENCED BY THE AGGLOMERATION

A more detailed analysis indicated that the development of inhabited localities of the Dinskoy District is characterized by both their active development and resettlement, and the decrease of population in small localities of the district, which are far from rural settlements centres or the regional centre, Krasnodar. This process is uneven and differs with each rural area. It leads to the conclusion: residents find some localities more attractive for living than others; some localities have better conditions that affect the influx of residents than others.

"Table I" provides the overview of current settlement processes in the Dinskoy District [3]:

TABLE I. POPULATION OF THE DINSKOY DISTRICT AND ITS GROWTH OVER THE PAST 5 YEARS

| Inhabited localities/ cities | 2014 | 2015 | 2016 | 2017 | 2018 | Growth |
|--|-------|-------|-------|-------|-------|--------|
| stanitsa Vasyurinskaya | 13246 | 13615 | 13733 | 14045 | 14210 | 964 |
| settlement Severo-Kavkazskoy Zonal'noy Opytnoy Stantsii VNIILR | 66 | 69 | 66 | 67 | 65 | -1 |
| settlement Zheleznodorozhnogo razyezda Redutskiy | 29 | 34 | 31 | 30 | 29 | 0 |
| settlement Zheleznodorozhnoy stantsii Vasyurinskaya | 100 | 117 | 113 | 110 | 112 | 12 |
| stanitsa Dinskaya | 35220 | 35425 | 35938 | 37539 | 38219 | 2999 |
| settlement Ukrainskiy | 1685 | 1769 | 1838 | 1910 | 2009 | 324 |
| village Krasnoselskoe | 3417 | 3504 | 3559 | 3652 | 3842 | 425 |
| settlement Agronom | 3892 | 3906 | 3966 | 4424 | 4517 | 625 |
| settlement Zarozhdeniye | 859 | 866 | 779 | 712 | 653 | -206 |
| settlement Kochetinskoy | 568 | 574 | 584 | 603 | 609 | 41 |
| settlement Yantarnyy | 440 | 443 | 484 | 501 | 510 | 70 |
| settlement Vishnyaki | 631 | 646 | 677 | 692 | 698 | 67 |
| stanitsa Novovelichkovskaya | 9109 | 9130 | 9118 | 9883 | 10099 | 990 |
| stanitsa Vorontsovskaya | 1409 | 1442 | 1364 | 1345 | 1310 | -99 |
| settlement Naydorf | 1154 | 1102 | 1110 | 1117 | 1129 | -25 |
| settlement Dal'niy | 204 | 204 | 202 | 200 | 191 | -13 |
| stanitsa Novotitarovskaya | 25333 | 25359 | 25360 | 27285 | 27594 | 2261 |
| khutor Karla Marksa | 1287 | 1290 | 1291 | 1368 | 1410 | 123 |
| khutor Primaki | 229 | 232 | 232 | 231 | 232 | 3 |
| khutor Osechki | 235 | 232 | 234 | 233 | 235 | 0 |
| village Pervorechenskoe | 3211 | 3218 | 3211 | 3009 | 3067 | -144 |
| stanitsa Plastunovskaya | 10217 | 10360 | 11288 | 11544 | 11886 | 1669 |
| stanitsa Staromyshastovskaya | 10742 | 10742 | 10742 | 11205 | 11352 | 610 |
| khutor Vostochnyy | 51 | 49 | 49 | 50 | 50 | -1 |
| khutor Gorlachivka | 62 | 64 | 64 | 65 | 67 | 5 |
| khutor Novyy | 36 | 37 | 37 | 38 | 40 | 4 |
| settlement Yuzhnyy | 5536 | 5686 | 6183 | 6748 | 7307 | 1771 |

According to the presented information, in absolute figures, the most substantial population growth over the past 5 years was recorded in the Dinskaya stanitsa - 2999 people, the Novotitarovskaya stanitsa - 2261 people, the Yuzhnyy settlement - 1771 people, the Plastunovskaya stanitsa - 1669 people. The mentioned localities are the centres of the largest rural settlements of the Dinskoy District.

The medium population growth is observed in the following localities of the district: the Novovelichkovskaya stanitsa - 990 people, the Vasyurinskaya stanitsa - 964 people, the Agronom settlement - 625 people, the Staromyshastovskaya stanitsa - 610 people, the Krasnoselskoe village - 425 people, the Ukrainskiy settlement - 324 people, the Karla Marksa khutor - 123 people.

Less considerable growth is characteristic of the Yantarnyy settlement - 70 people, the Vishnyaki settlement - 67 people, the Kochetinskoy settlement - 41 people, the Zheleznodorozhnoy stantsii Vasyurinskaya settlement - 12 people, the Gorlachivka khutor - 5 people, the Novyy khutor - 4 people, the Primaki khutor - 3 people.

Zero or negative trend is demonstrated by the following localities: the Zheleznodorozhnogo razyezda Redutskiy settlement (none), the Osechki khutor (none), the Severo-Kavkazskoy Zonal'noy Opytnoy Stantsii VNIILR settlement (1 person), the Vostochnyy khutor (1 person), the Dal'niy settlement (13 people), the Naydorf settlement (25 people), the Vorontsovskaya stanitsa (99 people), the

Pervorechenskoe village (144 people), and the Zarozhdeniye settlement (206 people).

According to the dynamics of natural population growth and decline, the highest growth rates over the past 5 years were observed in 2016 and amounted to 163 people. In general, there is a positive trend in natural population growth, which reflects a favourable demographic and socio-economic situation in the region.

The migration gain in the Dinskoy District is also positive, the corresponding figures are high. The most sufficient migration gain was documented in 2016 (2685 people) and 2018 (2683 people). The comparison of the figures of natural and migration population growth in the Dinskoy District demonstrates that the population growth in individual localities of the district (the Dinskaya stanitsa, the Novotitarovskaya stanitsa, the Yuzhnyy settlement, the Plastunovskaya stanitsa, etc.) and in the region in general, is predominantly due to migration influx of the population rather than to its natural increase.

Therefore, it may be concluded that population growth in the inhabited localities of the Dinskoy District is mostly provided by migration. The Novotitarovskaya stanitsa, the Yuzhnyy settlement, the Agronom settlement, the Dinskaya stanitsa, the Plastunovskaya stanitsa, the Novovelichkovskaya stanitsa, the Vasyurinskaya stanitsa, the Staromyshastovskaya stanitsa, the Krasnoselskoe village, the Ukrainskiy settlement are considered most attractive for living by residents. Most of these inhabited localities are

centres of rural settlements, which explains their increasing development. [1].

V. CONCENTRATION OF INDUSTRIAL AND OTHER TYPES OF ENTERPRISES IN ZONES DIRECTLY INFLUENCED BY THE AGGLOMERATION

As stated by V.N. Leksin and A.N. Shvetsov, one of the major qualities of urban agglomerations is their ability to

concentrate different types of enterprises [4], with no exception of social enterprises. Currently, the Krasnodar agglomeration is the largest centre of educational services in the region. The territory of the agglomeration concentrates key higher education institutions, secondary specialized educational institutions, general education institutions and pre-school institutions of Krasnodar Krai (See "Table II") [3].

TABLE II. TYPES OF EDUCATIONAL INSTITUTIONS AND THEIR NUMBER IN THE KRASNODAR URBAN AGGLOMERATION, 2018

| Types of educational institutions | Number of educational institutions | Employees | Students |
|--|------------------------------------|-----------|----------|
| higher education institutions, including branches | 21 | 11725 | 94722 |
| secondary specialized educational institutions, including branches | 12 | 7302 | 43822 |
| general education institutions | 107 | 5861 | 112938 |
| pre-school institutions | 144 | 8433 | 129811 |

The Krasnodar urban agglomeration has leading positions in the region in terms of the number of educational institutions and their students. So, the Krasnodar agglomeration comprises up to 87% of all Krasnodar Krai university students, 43% of all secondary specialized educational institutions students, up to 48% of all pre-school children in the region [3].

The level of educational institutions concentration raises the issues of the presence of the educational cluster in the Krasnodar agglomeration. According to the AV Group developing the Strategy for the socio-economic development

of Krasnodar Krai, the core of the educational cluster in the Krasnodar agglomeration is formed by three universities: the Kuban State Agrarian University (18.5 thousand students), the Kuban State Technological University (18.4 thousand students) and the Kuban State University (8.1 thousand students) [3].

The health sector should also be mentioned with respect to social enterprises. In fact, the Krasnodar urban agglomeration concentrates the most important medical institutions of the region (See "Table III") [3].

TABLE III. TYPES OF MEDICAL INSTITUTIONS AND THEIR NUMBER IN THE KRASNODAR URBAN AGGLOMERATION, 2018

| Types of medical institutions | Number of medical institutions | Number of medical personnel | Number of hospital beds |
|--|--------------------------------|-----------------------------|-------------------------|
| Krasnodar agglomeration | | | |
| polyclinics | 65 | 721 | - |
| hospitals | 24 | 3158 | 2517 |
| special treatment and prevention medical centres | 5 | 587 | 318 |
| sanatoriums | 8 | 124 | 514 |
| maternity hospitals | 12 | 412 | 277 |

VI. THE PROBLEMS OF URBAN AGGLOMERATIONS' SPATIAL DEVELOPMENT AND THEIR SOLUTIONS

Nowadays, agglomerations can be considered as an important resource for regional economy development. One of essential effects of agglomerations' development is spatial development of their constituent elements, which spreads the influence of agglomerations on new territories. This results in new patterns of socio-economic interaction and gradual transformation of new territories of agglomerations.

However, analysing the Krasnodar urban agglomeration, we can conclude that presently, the opportunities for its further spatial development are rather limited.

Mainly, we mean spatial factors that impede exchange processes within agglomerations. Thus, the development of the Krasnodar urban agglomeration is seriously limited in the south. The Kuban River, shaping the administrative border between Krasnodar Krai and the Republic of Adygea, is actually the border of the agglomeration's spatial development. The interaction is established through three areas with river crossings.

Nevertheless, these transport corridors are no longer enough for further development of the agglomeration. New agglomeration territories located to the south of Krasnodar (Abinsk, Severskaya and Goryachy Klyuch) experience serious problems accessing the agglomeration nucleus. Even though they still lean towards Krasnodar, the nucleus, they may alienate from the city and shape their own centres, unless transport communication improves [5].

The cities of Enem, Yablonovsky and Adygeisk, the potential agglomeration territories located in close proximity to Krasnodar, are faced with even a more significant challenge: under the conditions of limited traffic flows, they have to look to the neighbouring large cities: Maykop, Goryachy Klyuch, Apsheeronsk, Slavyansk-on-Kuban. If these problems remain and transport communication declines, the Krasnodar urban agglomeration may disintegrate, acquiring a multi-nucleus structure; the socio-economic effect of the agglomeration on regional development processes will not last.

The implementation of large-scale investment projects on constructing additional transport crossings may become a

possible solution to the problem. New river crossings over the Kuban River can be built, while the existing ones can be expanded.

The construction of such crossings will ensure solving the problem of communication with the territories located to the south and east of the Krasnodar urban agglomeration. It is likely to increase the exchange of goods, resources and people flows in the agglomeration, create the conditions for spatial development of the agglomeration.

The second creative solution is the construction of the Krasnodar circumferential road. This project was proposed by the Consortium Leontief Centre - AV Group within the development of the Strategy for the socio-economic development of Krasnodar Krai until 2030.

The idea behind the project is to create a constant flow of goods, resources and services around Krasnodar, based on existing and newly built traffic arteries. The purpose of this flow is to provide improved communication within the agglomeration and involve new territories in the agglomeration activity [6].

Another interesting solution to the problems of spatial development and transport communication within the Krasnodar urban agglomeration is the introduction of the above-ground subway system [7]. A similar project was implemented in Moscow when constructing the inner-city ring road. The idea is to organize electric railway traffic both in and around the city of Krasnodar, based on the existing railway infrastructure.

The above-ground subway system will employ railway lines of two directions: Tikhoretskaya - Krasnodar and Timashevskaya - Krasnodar. Both lines actually run through the city of Krasnodar and are convenient from the perspective of their potential use as a system of city transport. Meanwhile, these railway lines go beyond the city borders, which makes them suitable for transport use all over the agglomeration.

VII. CONCLUSION

To conclude, it should be highlighted that modern development of agglomerations in Russian regions is rather controversial. Today, being traditional regional economic centres, when affected by internal problems, agglomerations may lose their potential to the advantage of new regional economic centres formed by medium cities and towns. Such disintegration of the agglomeration nucleus may result in decreasing opportunities for attracting economic resources and the need to transfer enterprises to the periphery, to new economic areas. This is likely to lead to serious social processes associated with changes in the regional settlement system.

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