Domestic urbanization in formation of comfortable urban environment

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Abstract. This article explores the interlinkages between the stages of urban development, improvement and "domestic" urbanization. The issue is considered in the context of historical, economic, socio-demographic, environmental and sanitary factors. The work justifies that the study of processes of agglomeration development of urban areas makes it possible to predict the prospects of formation of engineering and transport infrastructures, to identify the most effective and balanced solution in the context of sustainable development of urbanized areas.

1 Introduction

An important task of modern documents of territorial planning and urban zoning is always the sustainable development of the territories. By Decree of the President of the Russian Federation of 1 April 1996, the "Concept of Transition of the Russian Federation to Sustainable Development" was approved, addressing in a balanced manner the socio-economic challenges and problems of maintaining an enabling environment and natural resource capacity in order to meet the needs of present and future generations through the implementation of environmental measures in the rural areas of cities, other settlements and peri-urban areas, including sanitation, land reclamation, greening and improvement, implementation of measures to improve the population, ensure sanitary and epidemiological well-being. The way in which modern societies adopt the doctrine of sustainable development shows that the transition to sustainable development varies from country to country, depending on many factors, including the standard of living of the population, the country's GDP, and the nature and degree of urbanization of the territories. The era of globalization and the integration of Russian cities into this doctrine implies an in-depth analysis of the stages of urbanization and their conformity with the world trends in the development of large centres-megacities, which accumulate socio-economic, sociocultural and human potential. The processes of sub-urbanization, which are characteristic of developed regions of the world, allow to create comfortable conditions for residents, to eliminate contradictions of the level of service and well-being of the territories of the center and periphery, to give the population freedom to choose places of application of labor and education, to get involved in the trend of socially oriented design of the urban environment. Russia has updated the Federal Project "Formation of a comfortable urban environment" to date, which provides for the creation of mechanisms for the development of a comfortable

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urban environment, the integrated development of cities and other settlements taking into account the quality index of the urban environment. According to the Order of the Ministry of Construction of Russia of 31.10.2017 № 1494/ave. "About the statement of the Technique of definition of the index of quality of the urban environment of municipal units of the Russian Federation" the list of indicators is developed for calculation of the index of quality of the urban environment among which there is a percent of the population living in the hazardous dwelling; percentage of housing provided by centralized heating, water, electricity and sanitation services; share of street-road network provided by storm sewerage; the share of green public areas and others[1]. The calculation methodology involves the identification of indicators determining the general level of threat to the life and health of people living in the municipal area due to various risks caused by imperfections in its infrastructure or social problems; the level of domestic, everyday comfort and convenience that municipal education provides for residents; the measure of use of the territory of the municipality in accordance with the principle of preservation and improvement of the environment, as well as taking into account the state of the environment at the time of assessment [2].

However, the program documents of the federal project do not contain the most important stage for understanding the development of the functional and planning structure of the Russian city and the assessment of its role in the settlement system.

2 Materials and methods

Today the world practice of urban planning is connected with the solution of many tasks on formation of a highly comfortable city environment. According to UN research, up to 85% of the world's population will live in major and largest cities by 2050. For Russia, this forecast is of particular importance, as in most regions it is possible to observe an active movement of migration flows to the central cities of agglomerations and subjects of the Russian Federation. The ecological state of cities can no longer be considered as a regional issue, because in the context of globalization it becomes a problem of geopolitical structure of macroterritories. In addition, the measures planned by the Russian government, urban planners and urban society to create a comfortable environment of cities, innovative projects and urban development programs address the issues of a "point" view of urban territories. Meanwhile, a significant challenge for the modern city is provision of comfortable living opportunities for all categories of the population, regardless of the location in the urban environment and the total population. In this context, it is necessary to consider the modern position of the city in the system of regional relations and the basic level of improvement of its territory.

The beginning of the XXI century in Russia was marked by large-scale developments of territorial planning for the subjects of the Russian Federation, the general purpose of which was improvement of the regional framework of resettlement, which ensures the improvement of the real standard of living of the population, removing the sharp contradiction between the central and peripheral regions, improving the demographic situation in the region, strengthening its investment attractiveness and competitiveness in the Russian and international economic space, development of the infrastructure framework, using and reproduction of natural resource potential, solution of economic, social and environmental problems.

Identification of ecologically disadvantaged territories in the city-center of agglomeration, forecasting of its functional and planning development are inextricably connected with analysis of the settlement system, stages of its development, loads on the infrastructure framework and determination of reserves for the development of territories. One the one hand, Russia 's entry into the stage of market economy development interrupted the progressive development of polycentrism of the settlement system, on the
other - increased the attractiveness of the largest cities of a number of Russian regions for powerful flows of migrants at the all-Russian and regional levels. Unregulated migration pressure on central regions has caused a number of socio-economic, demographic, functional-planning and environmental problems. The flows of irrevocable and pendulum migration occupied the central cities, which deserted the province, destroying the economic and cultural potential of medium and small cities, distorting their functional and planning structure. Growing urban trends have contributed to supercentration in cities-centers of agglomeration of power, capital, service functions, places of labour application, population, complicating the environmental situation and contributing to degradation of peripheral territories of the region and the city [3].

In considering urbanization as a process of changing the stages of development of the settlement system, specialists highlight their continuity. Thus, the comparative analysis of Differential Urbanization models has highlighted the most characteristic stages of the evolution of settlement systems, including: 1) urbanization - the active growth of urban centres and the overconcentration of population and resources in the central city of agglomeration; 2) reverse urbanization - leadership of medium-sized cities of agglomeration against the background of active growth of small cities; 3) contrurbanization - migration attractiveness of small settlements, development of the city-center, medium and small settlements is closer in pace [4,5]. Today, in territorial planning and urban planning, specialists are content-based with the following definitions: "urbanization" (from lat. urbanus - urban) as a process of increasing the role of cities, concentration of resources and population in the city-center of agglomeration; "Rurbanization" (rural) and urbanization as a process of spreading urban lifestyles in rural areas, with urban migration to rural settlements where industrial facilities and services are being developed; "suburbanization" (from lat. sub - under, about and urbanus - urban) as a process of active development of suburban zones of large cities, and small cities of agglomeration with increase of their investment and consumer attractiveness [6]. This scientific view of the type of model of regional development of the city allows to characterize with a high degree of correctness the level of urbanization and well-being of the territories of the city, considering a further assessment of the development of its engineering and transport infrastructures, which provide a balanced solution to socio-economic problems and issues of maintaining a favourable environment and natural resource potential in order to meet the needs of present and future generations of citizens through the implementation of environmental measures in residential territories.

The analysis carried out by the authors showed that the historically active process of agglomeration of the city of Samara was evident by 1913, forming two density belts of settlement relative to the city-center within a radius of 15-20 km and 10 km with the dominance of farms of the non-peasant type. Agglomeration of territories took place due to the active growth of Samara that was the central city of agglomeration. Since the middle of the XIX century, in accordance with the general plan of the city, approved by the Senate on November 19, 1853, the city developed north and east with a continuous quarter development. In the southern direction the Zasamarsky settlement (the territory on the left bank of the river of Samara) which according to the general plan of the city was intended for placement of objects of industrial production - factories, mills and elevators.

In the period from 1870 to 1890, 59 large industrial enterprises were built in Samara [7]. Favorable social and political conditions, growth of the city economy, population size (120,000 inhabitants), regular tax revenues to the city budget, effective management policy, successful land reform determined the stage of territorial growth of urbanized territories [8]. The city grew, involving in the growth processes edge and suburban lands, characterized in general by qualitative increase in the level of improvement and engineering equipment [9]:
1. Water supply. In 1887, according to the project of the head of Moscow water pipelines engineer N.P. Zymin, a water pipeline was built in Samara, thanks to which the city managed to cope with frequent city fires. The Samara domestic fire-fighting water pipeline with its special fire fighting devices was an exceptional structure of this kind not only in Russia, but also in Europe. The Samara water supply networks were laid on a closed ring system with three main magistrals. By 1917, its length had exceeded 69 kilometers, covering 46% of the length of all streets in the city. Water supply was provided to houses not connected to the network but in the vicinity of the water line through water columns. 1,388 households were connected to the city water network. In terms of water consumption per capita, Samara ranked first among the provincial cities of southern and southeastern Russia for several years after 1897.

2. Sewer of the city territory. In 1898, a special government commission found the city of Samara to be in a hopelessly unsanitary state: outbreaks of contagious diseases took the size of epidemics, with more than 40 deaths per thousand. Many industrialists and bath owners began to construct the first private drainage channels by then. By the end of the 19th century, the Samaro-Zlatoust Railway, the Zemsky Hospital, the Chakovsk, Shishkin, Sapunkov baths and the alcohol treatment plant already had underground drains that were headed to the Volga or Samara rivers. The city needed a common network, and in 1908 from V. G. Lindlei Samara received a project of general alloy urban sewerage (rain and household runoff combined). The sewage system was a closed system of water ducts and sewers, removing waste water from the central part of the city into two main collectors passing along the Volga and Samara slopes. By 1918, 35.4 kilometers of sewage network had been built in Samara. At that time, only 11 cities in Russia had a similar communal system [10].

3. Electric networks. In 1898, a factory power plant with an initial capacity of 150 kilowatts was built at the Zhigulevs Brewery, which began to power the electric lighting system in the production shops, in the apartments of the factory staff, as well as in the drama theatre and in the public Strukovsky Garden. In November 1900 there was a trial launch of the I queue of Samara’s first public power plant.

4. Visual lighting. In 1860, the first 30 street alcohol-turpentine lights were installed on Dvoryanskaya Street, and from 1887 in the city lights powered by electricity - a fundamentally new source of energy.

5. Heating. In the residential and public buildings of the city there was mainly a furnace, but in the late 1980s at the enterprises of industrialists A.F. von Wakano and M.M. Faber for the first time in Samara a steam heating system was arranged, powered by hot water from the factory boiler house. With its help the residential building and numerous workshops of the enterprise were heated during the cold season.

6. Street improvement and transport development. In the second half of the 19th century, a serious obstacle to the intensive development of urban and suburban areas was the acute lack of paved roads in the city. The first in the history of Samara paving was started in 1856 under Governor K.K. Groth, by 1863 it was possible to partially cover only some of the central streets of the city with a cobble [7]. Panskaya, Dvoryanskaya, Zavodskaya, Saratovskaya, Leo Tolstoy, Voznesenskaya, Alekseyevskaya, Ilinskaya and some other streets in Samara were completely or partially paved with cobble only by 1917. Lack of good roads slowed the development of suburban areas. A six-track horse-railway opened in Samara in 1895 and a tram was launched in the city in 1915. In addition to the passengers, freight trams were launched, carrying goods from the railway station to the factories, serving, among other things, military needs. In 1919, passenger tram traffic ceased, and trams remained on freight traffic because of lack of electricity. The beginning of the 20th century was marked by the appearance of the first self-propelled crews on the streets of cities. In 1912, two taxi offices were established in the city, and permanent routes
"Railway Station - Hotel" National", Troytsky Market - Provincial Zemsky Hospital" were launched. According to statistical data of A.P. Nagel, by 1913 in Samara there were about 200 cars (for comparison in Moscow the same year this indicator was – 225 cars). During the period about 1909-1914 in Samara worked six motor shows, two interiors of car tires, two taxi offices, and that distinguished Samara from the cities of the Volga region.

7. Installation of telephones. In 1887 in Samara the first urban telephone exchange on 10 subscribers was built. The phones connected four fire units, a water station, the governor's office, the city administration, the governor's apartments and the city head, as well as the city theatre [7].

It should be noted that the level of improvement and engineering equipment of areas of the agglomeration belt was much lower than that in the city center, and was discrete. Some suburbs were partially equipped with urban water supply (others used mine wells), sewerage and electricity supply were brought to Polevaya Street. Some suburbs were gradually equipped with autonomous engineering systems. Gusar Barracks village was supplied with water from the water supply of the pipe factory, Tomashev Kolok had its own autonomous water supply system for reasons of considerable distance. The transport framework developed after development of suburban territories: the railroad, the horse railroad, the tram, river Volga transport helped to connect the remote suburban settlements located along the coast of Volga to the historic center of the city, but unpaved roads did not allow to adjust effective transport connection on the periphery of a suburban belt.

The progressive movement of urbanization processes in the future would evolve the emerging model of agglomeration development of the city (improvement of the quality of life in the central agglomeration city and development of agglomeration belts), but political crises, change of state order in the country, change of urban elites and urban governance patterns, the civil war, catastrophic consequences of the short-sighted policy of the state in reforming agriculture led to the worst socio-economic situation in the region, the slowdown and regression of urbanization, which lasted until the mid-1930s.

A feature of the urbanization of Kuibyshev (Samara) of the mid-20th century is the over-concentrated industrialization of the city, the significant growth of urban areas, the dual-nuclear development of the city-wide center: in the historical part of the city and in the peripheral urban areas, in the location of a giant industrial complex with an autonomous system of industrial-type settlement (working settlements at enterprises), accommodation between two centers of weakly urbanized residential areas. The inclusion of residential settlements in the city line in 1942, which previously constituted the agglomeration belt of pre-revolutionary Samara, led to a significant increase in the area of urban land, the size of the population, the length of intra-urban transport and engineering communications [11].

3 Results

The analysis showed that urbanization of the Samara region of the early 20th century passed the first stage of agglomeration with the active growth of the city-center of agglomeration. The work of the centripetal vector of development of the city is obvious. It was aimed at the gradual growth of development in suburban territories (settlements, barracks, villages, large industrial enterprises, manors, dachas, medical institutions), forming the agglomeration belt of the city. Within the urbanized territory itself, there was an increase in the density of development, the equipping of the territories with modern engineering systems of water supply, water disposal, electricity supply, and an increase in the level of improvement of the urban environment. Indicators of supply of tap water to citizens, level of motorization of residents, which were among the highest in the country, existence of a fire water supply system with electric signaling, installation of telephones, security of the city with the sewerage (household and storm) speak about the true nature of
an urbanization which provided not only growth of urban and suburban areas, but also the city standard of living of the population.

The territorial and planning development of the city of Kuibyshev in the middle of the 20th century was accompanied by the implementation of the most important measures to provide the territories with engineering infrastructure. These include: development of electric power and water supply, mass gasification of power facilities, residential districts, settlements. The existing urban sewage networks and storm sewerage were expanding at a minimal rate, owing to the significant areas of urban environment preserved in the city with private buildings and the lack of engineering equipment. Intracity and suburban transport links were actively developing. It should be noted that by 1959 two distinct density belts were formed relative to the center of agglomeration - Kuibyshev with radii of 20 and 30 km. During the period from 1959 to 1984 zone differentiation of a framework of resettlement became complicated and was presented by three density areas: 1) agglomeration kernel (radius of 30 km), 2) periphery of a kernel of agglomeration (radius of 40-60 km) and 3) periphery of agglomeration (radius of 60-90 km). The phenomenon of this urban development situation also consists in the active formation from the end of the 70s of the XX century of a polycentric settlement system with the central cities of Kuibyshev, Tolyatti. The transition from the monocentric to the polycentral agglomeration structure was accompanied by the intensification of ties between the city-centers, increasing population flows to the conglomerate of the economy, culture and places of labour application.

4 Discussion

Accumulation of social and economic capacity of the city on the example of Samara and development of a transport framework generated a dialectic contradiction between development of the city and the suburb, the downtown and its periphery, between a city and semi-rural way of life in limits of city line. The historic part of the city over the subsequent decades of development to this day has many neighborhoods with an unfit housing stock and lack of central sewage. Thus, according to official sources, today only in the territory of the Leninsky district of Samara there are 227 cesspools serving 415 apartment buildings [12]. This confirms the transition of the modern stage of development of the city and adjacent territories - the moment of choosing the most effective way of development of domestic urbanization. At this stage, it is obvious that the doctrine of sustainable development should be adopted as the main vector of the evolution of engineering and domestic comfort of the modern cities environment [13].

5 Conclusions

Sustainable urban development, design, modeling and planning of large Russian cities on the example of Samara as the center of agglomeration is complicated by the fact that the return to the stage of urbanization occurred against the background of low level of improvement of a number of urban areas, in most cases located in the central part of it. The assessment carried out by specialists in 2000 of the level of improvement of the housing stock of a number of Russian cities with a population of more than 1 million people showed that the level of sewerage of the city territory and provision of hot water supply amounted to no more than 82% (in relation to the residential area), and the real "domestic urbanization" of sewerage of residential buildings in terms of their population in the Volga region was 57% [14,15,16]. At the same time, the current state of cities in terms of electric power, gasification and the development of transport links can be attributed to the prosperous. The authors' comparative analysis of the stages of urbanization and the nature of the development of urban engineering has led to the conclusion that such indicators are of priority for the calculation of the urban quality index as the level of physical condition of
the housing stock and the percentage of its provision with centralized services of heat, water supply and sanitation. At the same time, the authors found that the characteristic loss since the late 1990s by the Samara agglomeration of the progressive development of urbanization with the transition to the stages of "rurbanization" and "suburbanization" turned the dialectical trend towards the concentration of density zones of settlement around the most developed cities-centers, Complicating the processes of deconcentration of production functions, centrifugal development of service functions and places of labour application, Sharply exacerbated socio-economic contrasts in living standards in the central and peripheral areas of the central cities and the region as a whole.

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