The Features of Zonning of Krasnoyarsk Agglomeration

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Abstract From experiences of agglomeration in developed countries we can select a few characteristics: advance increase of urban population and overtaking in suburban and rural areas; development of agglomeration based on specialization; using the progress in scientific and technological advances and in social technology; investment support and planning of territory. The system of territorial planning was changed in connection with transition to market economy in Russia. In this case more perspective and investment attractive cities become a center with concentration of industry, business and economically active population. Consequently in these centers was formed a multifunctional territory. Strategy of formation agglomeration in Russia is favor to division of city functions and suburban area and suburban settlements. The main prerequisites to formation agglomeration are: development business and market infrastructure; creation and reconstruction existent sectors of specialization; changing norm of urban planning and development territory; optimization of industry, provision of the necessary facilities for citizens and improvement of ecological environment. This article shows a prerequisites and features of formation agglomerations in Siberia. Research pointed at: explanation of creation interconnection system of industry and settlement in the east part of Russia; mark out urban territories in this system; construction zoning of territory with functional and planning complexes; assessment of backbone and super structural factors. Object of research is Krasnoyarsk agglomeration (project of Large Krasnoyarsk), which in develop now.

1. Introduction

The consequence of adopting a new master plan and the formation of project of interconnection with surrounding city of Krasnoyarsk territory is building new structural units like agglomeration of the new system of interaction. As a result of this planning unit, a new quality and communication areas should be considered. Agglomeration is bigger than a city, but not yet a region. Planning for a territorial unit requires registration as a town planning rules and regulations, along with laws of regional planning.

In Soviet times, Russia had extended the theory of the creation of clusters (Kolosovsky, 1969). This system is meant for a union of territories on the basis of industrial interconnections, ie interdependent location of certain industries in the calculation of full-cycle from extraction of raw materials to marketing finished products. At the present time, due to the transition of economic situation in the country, there is need in unification of the territory, but not so much based on the
production lines, but more on account of the complex provision of a comfortable environment for the human society, in connection with all their needs (Shadrin, 2002).

The consequence of the interaction of the city and the nature in Siberia is the penetration of the functional areas of the natural environment; the expansion of the area influences the city and it will cause a retreat of the nature after all. The reasons for this are a lack of consideration of the stability of natural areas, to anthropogenic stress, the stress on the environment in the zone of the city. This leads to the degradation of natural areas, the deterioration of the environment, both in the city and its surroundings. Therefore, based on the conditions of Siberia, which are different from western countries, there is a need for the formation of contact zones in the city.

At the level of regional planning the main task of the design is to create conditions in Siberia environmental framework of the region and other territorial units. This should be a system more stable to anthropogenic loads of landscapes, which are grouped the other zones (Bogdanov, 2011). The settlement system and the area of active industrial development should not have direct contact with the environmental framework. There is a need to provide special protection areas (the contact area) and to solve their layout organization (Mellum, 1975). The basic principle of the planning framework is to maintain over large areas of natural processes, their active life-supporting influence on other areas, as well as a limited mix of urban environment.

An analysis of the situation in the suburbs of Krasnoyarsk agglomeration in this article the author tries to assess changes in the structure of area. There we will consider changing the size of a suburban area and its effects along with changing the structure of the territory and its consequences. The author will assess the functional zoning and its relationship with the landscape and natural characteristics of the territory.

2. Study area

For the best understanding of the changes in Krasnoyarsk suburb due to the formation of the agglomeration, there is a need to provide characterization of the interaction of cities that are included in the agglomeration. The development of eastern regions in Russia is one of the goals of the Russian Federation in the twenty-first century. In order to achieve it, the Russian Federation needs to create and to protect stable urbanized zones, to concentrate the population of these regions, to utilize new resources, and to develop their infrastructure (Lappo, 2007). The best way to development the eastern regions of Russia is to create agglomerations and institute new regional planning in Siberia and the Far East. The analysis of documents regarding the development of the Siberian regions shows that all territories have the strategy of building agglomerations as a part of regional development. The best examples are: Novosibirsk, Irkutsk, and Krasnoyarsk (A look of urban-planners at the development of the Krasnoyarsk agglomeration, 2008). Such places as: Krasnoyarsk, Sosnovoborsk, Divnogorsk, Yemelyanovsky, Berezovsky, Mansky and Sukhobuzimsky area are included in this project.

It is this composition of the agglomeration territory that is the cause of economic and social indicators. The economic relations of enterprises due to interaction, exchange of goods and services, caused labor migration from the satellite towns. The structure of commuting into the core metropolitan area (average for 1999-2012 gg.) is: Divnogorsk 14%, Sosnovoborsk 10%, Berezovsky district 33%, Yemelyanovsky district 28%, Mansky district 3%, Suhobuzimsky district of 12% (Bukharova, 2012). From these data it can be concluded that the largest number of migrants arriving daily in the Krasnoyarsk region come from Berezovsky district. It is also interesting to consider the share of migrants in the total population of each settlement separately.

Economic links to united territories causes the division of labor. Suburban agricultural areas, such as the Yemelyanovsky, Sukhobuzimsky and Berezovsky districts produce food products, which is the main market in the city of Krasnoyarsk. Such a phenomena grounded cluster of population, and therefore demand, in the city center. The Yemelyanovsky district and Krasnoyarsk city are also very strongly linked due to the location of an airport in the Yemelyanovo. Satellite cities and the city center can be seen in the distribution of production of the satellite towns, and as for the main office and the company's management they stand still in the city center. The reason is the high cost of land in the city
center and its advantages of a central position in development of transport. Consumer factors played role as well. City Divnogorsk, and the Yemelyanovsky and Mansky districts edge areas have a high potential for tourism, which is closely associated with the development of tourism functions of Krasnoyarsk (Zelenskaya, 2012).

3. Result
Changes of functional zoning of suburban territory have a few reasons. First, and the most important reason, is political and economic situation in the country. It changed a new system of use of land and new rules to have business. In modern time, the market decides what type of factory or industry is needed for the city. And planning of territory should correspond not just with the government, but with the business as well.

Second reason is growth of population of agglomeration. In this case, suburban area needs to produce more food for the residents and it needs more land or considering rational use of land. Also in connection with this reason is the need to change the recreational and ecological area of suburbia.

Third reason based in the first reasons, is integration of urban and rural territories. In this case, some of function will moved from city to suburbia. That’s why we need to plan industry function and area in suburbia of agglomeration.

The author is giving the analysis and perspective changes in functional zoning of suburban area based on project of Krasnoyarsk’s agglomeration.

3.1. Agricultural sector
Judging by the landscape, the territory of Yemelyanovsky district, which is in the North-West part of the city, Sukhobuzimsky district, which is in the North-East, we can define a prosperous agricultural development. These areas are referred to Kansko-Krasnoyarskaya forest-steppe and represented by leached, podzolic and common black earth. The soils of this area have a loamy and mid-loamy mechanical structure. Also in suburban area of Krasnoyarsk agglomeration it is possible to single out parts of Mansky and Berezovsky districts as prosperous for plant growing and cattle breeding. In these areas relief is higher but mostly plain, soils are brown.

The most prosperous area for agricultural production is the area of moderate warm temperature and predominantly humid regime. This area spreads over Yemelyanovsky, Sukhobuzimsky and Berezovsky district within the agglomeration.

So, we have identified the characteristics of the landscape suitable for agriculture. They are: Yemelyanivsky, South Sukhobuzimo, Western District of Berezovsky regions. According to the plan of agglomeration in the western part of Berezovsky district on the banks of the Yenisei River and the surrounding area will be located Berezovsky boatyard. Its base is formed by the interaction of river transport hub and railway transport. In connection with the formation of the transport site, warehouses will be constructed in this area. Therefore, the territory cannot be used for agriculture.

The western part of Berezovsky region and the north-western part of the Mansky region can be used for the development of dairy and beef cattle. This kind of industry is labor-intensive and the products are perishable, therefore, its location is in close proximity to the suburbs improved the market. This area is represented in the relief of the Central Siberian Plateau to the transition from low mountains to the plains. In the above map area is characterized by the sum of the 1400-1600 degrees with sufficient moisture. This condition is agreed with the project of the development of agriculture.

There is Yemelyanovsky transport hub which will be an air center hub, according to the concept of agglomeration. It will also lead to the development of logistics’ infrastructure in this area, also suitable for agriculture in northern part of it. Climatic characteristics are good both for agriculture and for livestock.

Therefore, in the author’s opinion, the most rational solution from the perspective of the landscape and the concept of agglomeration will be the location of the agricultural sector represented on the map (Fig.1).
3.2. Recreation sector
The location of recreational zones should meet the demands of natural attractiveness, transport opportunities and available space. According to the developed plan of Krasnoyarsk’s agglomeration development, the South-East will be mainly a tourist and recreational area. It has enough recreational objects, and for its development it is highly recommended to invest into transport infrastructure and to create tourist package of services. Also it is mandatory to form Divnogorsk town as the centre of tourism with a developed tourist infrastructure. Industrial facilities in this town saw better times and practically only Krasnoyarsk hydro-electric power station works fine at this time. This object of industry is also a place of interest of the agglomeration. The location of the city on the banks of Yenisei river with a beautiful view over mountains, presence of mountain skiing tourism facilities within the territory of the city is advantageous. Not far from the city there is a beach on the bank of Mana river, which is popular among the citizens of the whole agglomeration. All this favors are the formation of a tourist center. There is a lack of hotels and camp sites and advertisement of this tourist product.

The author thinks that it is possible to locate recreational zone in the south-west direction. In Mansky district there are natural conditions for creating sport complexes, camp sites. Also this direction has a quite developed transport connection. In winter it is possible to form routes along Bazaikha river. In winter – skiing and mountain skiing. Creation of tourist complexes in this area will provide local citizens of near villages with workplaces. Right now the majority of population of these villages goes to Krasnoyarsk city to work.

Yemelyanovsky district is already overloaded with functions. If the project of an international hub station is launched now, one more function of infrastructure of such a large object will be added to the existing ones. That is why location of recreational zones here is not efficient. There are forest areas of Studgorodok and Akademgorodok in the North-West, which are recreational zones with a developed infrastructure.

The North-East sector is not suitable for recreational zones because of its ecological situation.

The given map (Fig.1) shows the location of recreational zones according to the project of Krasnoyarsk agglomeration and suggested by the author places of location of these zones. The proposed location of the author of a recreational zone corresponds to the functional zoning. For a more careful planning of recreational areas should be considered recreational load on a particular area of the zone in accordance with the landscape characteristics. This zone can be placed as free access zones for protected areas. Zoning recreational sector should be carried out in accordance with the regulations.

3.3. Ecological sector
A necessary condition in solving ecological problems is creation of a green belt around cities. The sizes of green belts are determined by the number of population. For cities with population over 250-1200 thousands an average radius of green belt is recommended to be 25-40 km, the minimum width of green belt is 3.5-5 km. The agglomeration consists of several settlements and each of them should have a green belt, corresponding with its size (Guide to landscaping in populated areas, 1967; Moiseev, 1990). Also in terms of suburban area it is necessary to plan ecological zones, which can be combined with recreational zones, but on condition that natural landscape will be preserved.

Master plans of cities and settlements are not adjusted either in terms of new environmental or economic conditions or new problems for urban development. When planning of development of the territory is necessary to create ecological framework. The concept of ecological framework is a system of distinct character of green space environment protection, which provides a good ecosystem services in the city. Also included landscape and territory historically included in the planning structure of the city. To preserve the ecological balance streamlining of operations and preserving the integrity of more than 30% of the territory is necessary. Also in the planning of the territory of the ecological framework is necessary to develop planning schemes in the areas of the most dangerous polluting industries.
As with zoning suburban area of Krasnoyarsk city, it is mandatory to form an indissoluble green ring around each of the logged-in agglomeration. It is necessary to consider the imposition of these rings and the organization of a special protection area around particularly polluting industries. As a result of blending all these areas together the picture becomes obtained by such environmental sector, as represented on the map (Fig. 3). That is, the indissoluble ring throughout the metropolitan area and specific areas around the cities. For detailed design is necessary to consider placement of industrial facilities.

3.4. Residential sector
As a result of the executive plan of the Krasnoyarsk’s agglomeration 2 new districts with a residential area are going to be built around the city of Krasnoyarsk. Both of the districts will be located in the suburbs of the city of Krasnoyarsk. These settlements are Shuvaev and development of territory of Kuznetsovsky plateau. On the basis of the Shuvaev village there will be a residential district constructed. But because of lack of housing, suburban settlements will combine multi-storey and cottage construction. The village will be located in forest area, which creates comfort and attractiveness. Ecologically this location is under the influence of Aluminum plant, which is caused by prevailing direction of western winds in the city. The village is located remotely from the plant, at the distance of about 15 km north-east. Also forest area and absence of large settlements decrease the harmful influence of the emissions. A future development area is situated in Kuznetsovsky plateau, an elevated area in the southern part of town. From an environmental point of view, this area is more secure because it is surrounded by forest and dominated by north-westerly wind. Also, the positive side of this residential area is the proximity to the city, making it easier to transport accessibility. But in order to ensure sufficient transport infrastructure a construction of additional roads should be planned in advance. There are housing estates, airport, and recreation center in this area at the moment. When planning the development of this area is necessary to solve the problem of moving people or changing the housing estates in the cottage for permanent residence.

From the perspective of the analysis the author considers the logical location of the residential area along the railway and highway in the direction of Mana district. The area in the basin Berezovka now settled along the roads. The location of existing settlements with the existing infrastructure is a prerequisite for the development of cottage construction in the area. The area has the necessary transport infrastructure, is located 10-20 km from the city center. The natural attraction is due to the presence of the river and forests, mountainous terrain. In accordance with the landscape characteristics this area is not suitable for agriculture. From the standpoint of the recreational resource this area can be used. But from a historical point of view, the location of low-rise villages makes more sense.

Also, a plan supported by the location of the Krasnoyarsk agglomeration cottage communities is closer to the city of Yemelyanovsky area. This area has been populated for ages. As a result of human activities, many of the land area cannot be used for agricultural purposes, or require a thorough restoration. Therefore, the author is also located in the residential suburb of the function of the area. There are several reasons: the location in close proximity to the city, transportation infrastructure, a good environmental situation, and the natural attractiveness.

As a result, the author has highlighted some areas for residential accommodation in the suburbs of Krasnoyarsk agglomeration (Fig. 1). The largest residential sector is located in the southern part of Yemelyanivsky district, the other one is in the eastern part of Berezovsky district.
4. Conclusions
Consequently, analyses of changes in suburban area in connection with project of agglomeration can help to improve this area, and to plan it more rational and sustainable. The analysis of functional zoning of Krasnoyarsk agglomeration author has highlighted some essential requirements for sustainable planning as:

1. The interaction of different functional loads on the territory of the suburbs
2. The location of the functional areas must comply with the landscape zoning, environmental zoning, physical characteristics, geographic area
3. One or another functional area must be available to every citizen of agglomeration
4. It is necessary to consider the imposition of the functional areas of individual settlements and the entire metropolitan area as one
5. Placement of the functional areas of the suburb, in accordance with historically zoning.

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