Setting-up of ecological settlements to promote sustainable development of urban areas

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Abstract. Urbanization has a dual effect on the opportunities of sustainable development. On the one part, urbanization gives rise to favourable living conditions for the population, on the other part, man-induced impact on the environment and humans themselves grows because of the increased urban infrastructure and population density. Taking into account the diversity of land resources and regions in a country, it is necessary to work for the highest possible population distribution throughout the country. The adverse urbanization effect might be reduced and, consequently, sustainable development will be supported. Besides, land resources might be developed more effectively, the fact having a positive effect on the sustainability as well. The highest potential is seen in developing ecological settlement types based on rural settlements. The article demonstrates the statistical analysis of ecological settlements designed as a sustainable territorial unit. Such type of settlement contributes to the region’s economic base development while the environment factors are taken into account. Thus, in general, it facilitates the sustainable development of urban areas by means of making the population less concentrated and the man-induced impact reduced.

1. Introduction

Urbanization is an integral factor of the development of town settlement types. The process of urbanization has both positive and negative features. The positive impacts on town settlement types are: social, economic and administrative development [1, 2]. The social development means the improvement of public services (education, health care service). The economic development includes creating opportunities for the growth of household and city’s incomes due to setting and developing companies making the level of economic and social welfare of the city. An administrative factor assumes the city territory growth, status change and involvement of more resources for improvement. The negative factors of urbanization are environmental abuses and impairment. Urbanization results in increased man-induced impacts on the environment [3-8]. Such impacts include noise, electromagnetic fields, vibration loads and etc. All these factors have a direct influence upon people, the fact being proved by a lot of investigations [9]. Consequently, the quality of life of urban residents changes. Thus, on the one part, as a result of urbanization the quality of life of urban residents improves due to the enhancement of social and economic indicators of an area, on the other part, the life quality might go down as the environmental features of the urban settlement change. Therefore, aimed at sustainability, one should seek to cut the adverse effect (negative characteristics) of urbanization. As a rule, the most part of the man-induced impact arises from the overload of urban territories. So, said
impact can be reduced if the overload, which usually emerges because of a high density of residential areas, becomes loose.

2. The notion of the ecological settlement

One of the consequences of urbanization is the appearance of suburban areas. Urban population strives to move to residential parts away from the central districts, having lower man-induced impact, but with transport means to reach the downtown. It is possible to solve this problem, while preserving the available economic base and even developing it further, as the authors believe, by building up rural settlements. It has been established, that about 90% of the territory is accounted for by rural types of settlement. At the same time one of the types having potential might be an ecological settlement. The analysis conducted for the experience of the ecological settlement construction has allowed discovering that the interpretation of the term “ecological settlement” is determined by the stage of development and the country where such a settlement has been made. An ecological settlement may be considered as an eco-village, agro-town, ancestral settlement [10-14]. Such types of settlements can be taken as a basis for the planning of territorial dispersion of urbanized environment. And they also can help to reduce the population density of urban areas.

The advantages of ecological settlements are generally common and not dependent on the basis of their creation [15,16]. The following advantages can be mentioned as the main ones:

- the absence of anthropogenic factors, mainly the development of agriculture and downstream agro processors,
- free plan, the population being up to 5000 people and the central area of the settlement being kept accessible,
- a recreation area available in the neighborhood.

Disadvantages of ecological settlements are determined by the type of settlement. The most common type at present is an agro-town. It is a small sustainable rural settlement designed to ensure a high life quality through a well-developed social, engineering, transport and economic infrastructure, provided that high environmental indicators have been achieved [17]. This type of settlement has a good potential and it is most developed now. The main drawback of such ecological settlements as an eco-village or family estate is a poor regulatory framework applicable to these forms of property. And some more disadvantages may be mentioned, such as: the low-grade development of transport and social infrastructure and in some cases the lack of it at all. These are the drawbacks which become major deterrents lowering the rate of development of such types of settlements. The main principles of this sort of settlement are: environmental friendliness, careful soil management not leading to exhaustion, energy efficient building, and alternative energy source usage. These principles will promote sustainability within an ecological settlement. The application of distinctive features of this type of settlement and taking the measures aimed at the socioeconomic and sociocultural development of ecological settlements will contribute not only to the rise of the settlement but also to the enhancement of its economic base. The sustainability of the area, where such types of settlement emerge, is considered subsequently to improve as well.

Based on the findings of corresponding data analysis it has been established that the share of agricultural land exceeds that of urban land in Tsentralny, Yuzhny, Severo-Kavkazsky and Privolzhsky federal districts (Figure 1). So, the development and construction of ecological settlements makes the most sense in these territories. Moreover, the highest potential is seen in setting such ecological settlements as eco-villages on the basis of existing agro-villages.
3. Determination of factors influencing the ecological settlement development

There has been conducted a statistical analysis of ecological settlements designed as a settlement based on environmental conservation and the use of alternative energy sources. While investigating the number of ecological settlements registered in the territory of a federal district, the district’s population rate, the area of the district, the highest correlation dependence was identified between the population rate and the number of ecological settlements in the district. This figure is 96%. That’s what accounts for the impact of the urbanized environment on the population. Namely, as the population rate and density are increased in the urbanized environment, the population increasingly moves to more environment-friendly and less urbanized residential area. The comparability of the indicators of the settlements’ quantity and the population rate is presented on Figure 2. The indicator trends are clearly seen.

If one compares the federal district area and the number of ecological settlements, based on the sustainability principles, such trends are not traced. However, in the districts having a larger share of farming lands (Tsentralny, Yuzhny, Severo-Kavkazsky and Privolzhsky districts), the number of ecological settlements is larger if compared to the average rate. An exception is Severo-Kavkazsky district, owing to the peculiarities of the local way of life and territorial dispersion of the population. The largest quantity of registered ecological settlements is located in Tsentralny, Yuzhny and Privolzhsky districts. According to the data displayed in Figure 3, 4, it can be noted that the highest density of population is registered in the same districts.
4. Conclusions

Summing up what has been said, based on the presented analysis data, it may be concluded that if the population density in the urbanized environment is high, the number of people wishing to live in environment-friendly places with the corresponding way of life increases. But the above mentioned disadvantages are a major setback for the development of such type of settlement. Taking into consideration the diversity of Russia’s territory and the fact that there are a lot of rural settlements in reserve, that have a well-developed infrastructure, the authors’ opinion is that it is necessary to develop the existing rural settlements and make ecological settlements out of them. The promotion of sustainable way of life with respect of the infrastructure development is considered to encourage people to move to such eco-settlements. And therefore the population of the urbanized environment might be dispersed. If the urbanized population density becomes looser, the anthropogenic impact on the environment within a given urbanized territory may be reduced.

The main advantages of ecological settlement development include the following: development of agricultural industry, opportunity to elicit the tourism potential of the area [18-20], the development of cultural and historical centers, preservation of the environment and encouraging friendliness to nature, opportunity of territorial development and efficient land management. The development of a sustainable ecological settlement, the introduction of alternative energy source technologies, preservation of cultural traditions and ethical values are thought to promote not only the preservation of the environment but also the improvement of the territory economic base. All the mentioned factors in general are considered to contribute to the sustainability of the urbanized environment of a given area and the territories adjacent to it.

Figure 3. Federal district area and number of ecological settlements.

Figure 4. Number of registered ecological settlements in the district and population density.
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