

## TECHNICAL SCIENCES

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### THE INFLUENCE OF URBAN DEVELOPMENT OF THE LEFT BANK OF THE RIVER DON ON ECOLOGY OF ROSTOV REGION

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#### Abstract

The article presents the results of investigating ecological problems of development the left-side territories of the river Don of Rostov region: the effect of construction of the new football stadium "Rostov-on-Don Stadium" and some more projects, development of transport infrastructure and arrangement of the new embankment on the ecology of the region. The modern sports facilities and structures of Rostov region were designed and are constructed with regard to the preservation of the natural landscape, pure air, rational use of resources, energy efficiency, sanitary and epidemiological requirements. The huge sewage, storm water collectors and other sewage facilities for the stadium "Rostov-on-Don Stadium" were constructed in order to preserve hydrosphere of the region.

**Keywords:** influence of building process, effects on ecology, atmosphere and hydrosphere problems

The more urban territories develop, the more new man-made changes of environment appear. So on the left bank of the river Don in Rostov region new multifunctional centre including the new football stadium and number of other sport and recreation facilities somehow connected with the 2018 FIFA World Cup are being built at the moment. The new complex will become strong administrative,

business, cultural, sport and recreational centre of Southern region. According to this it is actual to investigate some factors, which can negatively affect ecology of the territory, especially ecology of the river Don due to such a huge territory development. Some ecological problems of construction of a few projects in this territory have already been investigated in the previous study of the author “Ecological compatibility of modern sport facilities of Rostov region within the context of landscape architecture”. [2] Placement of the new football stadium “Rostov-on-Don Stadium” was studied in terms of influencing the lithosphere. There were not taken into account atmosphere and hydrosphere ecological problems of construction of the stadium and urban development of the territory at all. It is necessary to define ranging of assessments for the article to call influences positive or negative and give the meaning of the term “ecology”.

The term “ecology” means the scientific analysis of the environment, “place to live”. By ecology are called interactions of organisms and their environment in the broadest sense. Negative actions are understood to be that aspects of human actions which cause abnormalities of components of the environment. It is known, that living creatures need certain temperature, light, water, air, food and etc. for normal vital activity. If the required norms mentioned above are much changed, vital functioning of a man may become difficult to support or even impossible. In the present study, under negative anthropogenic impacts on the environment are understood that impacts that change the hydrosphere, atmosphere, lithosphere, biocenosis of the Rostov region in the direction of deviation from the norms and the impacts which pollute the territory and negatively affect the health of citizens of the region. Therefore, under positive impacts are understood that impacts that convert components of the environment towards the norms and impede the negative effect of other influences.

Rostov-on-Don is a large city with a well-developed road network. There is an active exploitation of existing residential, public, administrative and industrial buildings on the territory of the Rostov agglomeration, as well as continuously construction processes are carried out and new territories develop. Urban areas are occupied by utility and transportation services. It hampers important metabolic processes of the lithosphere, atmosphere and hydrosphere. Therefore, such a global and significant events as building development of left-bank part of Rostov-on-Don, predetermine reasons (conditions) to worry about the environment of the area, particularly of the river Don. The subject of the study – left-bank part of Rostov-on-Don, where in the present time the football

stadium "Rostov-on-Don Stadium" is being constructing and for which urban development of high level is planned. Among arrangements planned to carry out are: construction of the new international airport, preparation training grounds in the left bank of Don, construction of the new energy facilities, hotels, residential estates; reconstruction of the bridge over the Don River with widening of the traffic-way to the six lanes, construction of the southern and west transportation bypass of the city. The territory of the left bank of the Rostov-on-Don, the area of which is estimated at nearly 1,000 hectares, currently is free from building, and has carried a recreational function for a long time. Pure air is in the left bank area and biocenosis is preserved. At the present time about 67 species of fish are found in the river. What comes to the landscape of left bank area, that is flat country of the flood plain of Don. In the process of designing and construction of the stadium "Rostov-on-Don Stadium" ecological compatibility was taken into consideration. Extensive mass transportation and destruction of valuable landscapes are excluded and maximum permissible landscape load is calculated. The river Don is in the immediate vicinity. Proximity to the river gives to the place a picturesque view, but also has its drawbacks: the left bank of the Don is waterlogged and flooded. In this regard, land use engineering was carried out before the construction of the stadium "Rostov-on-Don Stadium": it was poured a sand foundation about 6 meters high for the stadium, made lowering of groundwater level, organized the runoff of storm water, made bank protection, arranged pass floodwater and soil banking. Sand for construction of the foundation was mined in the vicinity of the stadium." [2] The positive fact is that the pit formed due to the removal of sand will be used to create an artificial pond "Water area", which should have a positive impact on the environment - rational use of resources. During the construction of the stadium considerable attention is paid to such an environmental component as energy efficiency. For example, it is planned to use energy-efficient glass while the glazing of the stadium. The process of the construction of the stadium "Rostov-on-Don Stadium" can be called environmentally friendly: the work is organized and performed according to the plan, occupational safety and hygiene are complies with regard to the norms, are used eco-building materials, there is cooperation with municipal services (garbage disposal and cleaning). After the completion of building terraced landscaping of the area will begin around the stadium, the left-bank area will be gradually equipped with modern conveniences. Building of a system of recreational facilities, retail, construction of parks, boulevards, wide

embankment are planned while preserving natural landscapes and green areas. Thus, the improvement of the embankment not only should not do harm to the environment, but will create a comfortable recreation area and help to expand the "green lungs" of the city in order to help it cope with the increasing workload of the projects under construction. Despite all the positive aspects of the development of the left bank of the Don, the negative impact of the construction of such a powerful multifunctional complex should be noted. The created complex will have the administrative, business, industry and commerce, education, and sports and recreational functions. It is known that there are plenty of water areas pollution sources in any urban agglomeration. Important factors of affecting the hydrosphere are the following: power industry of the city, transport, including railway, air, water transport and sewage pollution. Rostov-on-Don permanently affects the Don River. It is polluted by wastewater of the right bank areas and by the city transport. The river Don is rather rapids, so it has constantly fluctuating course of the river. In some parts of the river the flow may almost completely disappear and in certain parts it is up to 1 m / sec. Moreover, the average depth of the river is 10 meters. The above mentioned leads to the fact that in certain areas the Don River has a low self-purification ability. That is to say, the waters of the river in these parts stagnates. Add to this the pollution of the river by left-bank sewage of the developing territory, a huge recreational load, which will appear on the eve of the World Cup in 2018, the use of water resources for irrigation and improvement of the left-bank areas. Besides, it is planned to bring the left bank of the Don to the right 20 meters to create a new wide and comfortable embankment. Mentioned above also implies a reduction of water resources of the Don. Though all these measures are necessary for effective development of urban areas, they will do harm to the Don River and will contribute to the reduction of fish stocks of the river.

Pollution by sewage is considered to be the most dangerous for the hydrosphere. It should be pointed out that this issue was taken into account by the city administration - "construction works of the sewer number 62 in Rostov-on-Don were completed recently and on 27.10.2015 was received permission to enter the facility. Also to ensure the reliability of the stadium sewerage effluent and receiving part of the right-bank area of the city, under the bulk of the stadium was designed duplicating part of the sewer "[3].

Significant contribution to the pollution of the hydrosphere is making by urban transport and the main sources of pollution are cars. Contamination process occurs predominantly through

exposuring of storm water from urban areas contaminated by oil products, oils, rubber and asphalt dust, metallic trace elements. A potential source of contamination of groundwater and soil are gas stations. Thus, the development of the transport network of left-bank part of the city can be attributed to the negative impact on the ecology of the Rostov region, and particularly the river Don. It should be mentioned that according to the official portal of the Rostov Region Government, it was decided to build storm sewers and wastewater treatment plants from the football stadium "Rostov-Arena" for 45000 seats. This will affect positively on the environment, reducing the level of pollution that will be systematically applied by the structure of mass visiting - the stadium with an adjacent area designed for 2250 parking spaces. In addition to the development of land transport of Rostov-on-Don and the left bank area, which should become a full-fledged urban area, the development of water transport of the river Don is planned. According to the post of chief architect of Rostov-on-Don, Yuri Dvornikov, it is planned to make an intercity highway from the Don, as well as landscape the left bank, creating new embankment. Turning the river Don to the transport route can also be attributed to the negative factors for the environment due to the pollution of river waters with hydrocarbons, lubricating oil, ballast water, household and human waste water, etc.

Speaking about the atmosphere of the Rostov region we can not forget air transport. In some cases air transport may also have a negative impact on the environment. «This is due to the leakage of the liquid fuel during refueling aircraft, and if fuel transportation and storage conditions are incorrect. A great number of liquid and gaseous fuels combustion products is released during takeoff and landing an aircraft» [1]. Therefore, the atmosphere of the area where are directly located runways also suffers from pollution. According to a progress report at the time of 1 December 2015, on the left bank of Rostov region was built "Helipad for the football stadium of 45,000 seats, what allows to speak about possible increase of atmosphere pollution of Rostov region by air transport of the left bank as well as land transport » [3], that allows to speak about possible increase of the atmosphere pollution of Rostov region by air transport as well as land transport.

The study leads to the following conclusions: urban planning processes of the Rostov region can be regarded as productive subjects for the study of the effects of building processes on ecology. In the present study we revealed some positive to environment impacts associated with the use of eco-friendly building

materials and building of the facilities that perform sanitary and epidemiological requirements for the placement, arrangement and maintenance of sports facilities, specifically the construction of sewage and storm water collectors and other sewage facilities for the stadium "Rostov-on-Don Stadium". Among the positive effects it can also be mentioned creation and landscaping of parks, boulevards, building of the new comfortable embankment. At the same time there were established some negative impacts on the environment of the Rostov region due to the development of transport infrastructure of the left-bank part of the city, water transport of the river Don, as well as increasing the number of parking spaces, construction of the new utilities. However, despite the fact that urbanization relates to be one of the global environmental problems, the development and construction processes of the territory has been conceived and carried out in accordance with basic environmental standards. However, the true impact of the complex on the environment will depend on the correct operation of the complex of buildings and structures.

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