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Iyushchenko T.A. Candidat Sc. Tech.,

The edition address: 305040, Kursk, str. 50 let Otyabrya, 94

+7 (4712) 22-24-61, www.swsu.ru

E-mail: biosfera_swsu@mail.ru

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BIOSPHERE COMPATIBILITY: HUMAN, REGION, TECHNOLOGIES

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Contents

Questions of the theory of biospheric compatibility of the cities and settlements

<i>Volichenko, O. V.</i> The history of the development of eco-architecture in Central Asia.	3
<i>Gorodkov, A.V.</i> Towards a full-scale experimental assessment of the acoustic regime of small and medium-sized cities in central Russia.	19
<i>Ilyichev, V.A, Sysoeva, E.V, Kartasho, A.S.</i> Assessment of the feasibility of city functions based on the analysis of urban infrastructure.	31
<i>Kolin, K.K.</i> Modern international information space and current problems of national and global security.	46
<i>Morozova, L.V., Enin, A.E.</i> A model for optimizing the spatial development of urban planning formations in a retrospective section on the example of the Voronezh agglomeration.	61

Environmental monitoring, humanitarian balance and rationing

<i>Dushko, O.V., Barmin, P.A., Zhukova, N.S.</i> On the identification of sources of fine-dispersed emissions of oil flares on the territory of the Russian Federation by integrated cartography.	72
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Biosphere technologies

<i>Aleksanin, A.V., Ekimovskaya, V.A., Dudareva, A.Yu.</i> Increasing the efficiency of technological processes and the operation of enterprises in the industry through the introduction of technologies of the industry 4.0.	81
<i>Giyasov, A.I.</i> Urban and environmental aspects of design under conditions of low wind speed.	92
<i>Martynova, E.A., Fedorov, S.S.</i> Calculation of parameters of biosphere compatibility in the case of point construction of residential quarters.	106
<i>Tshovrebov, E.S.</i> The system of circulation of secondary technosphere resources as a mechanism for implementing the paradigm of biospheric compatibility.	116
Dear authors!	136

O.V. VOLICHENKO

THE HISTORY OF THE DEVELOPMENT OF ECO-ARCHITECTURE IN CENTRAL ASIA

The genesis of design techniques based on the principles of an environmentally friendly approach in architecture is revealed by studying the features of the regularities of the compositional solution, constructive structure and building materials of the traditional dwelling of Central Asia. Since ancient times, the experience of rational construction of buildings has been formed and developed by trial and error, taking into account the natural, geological and climatic diversity of the region. The basis for the development of traditional architecture was its organic adaptation to the natural conditions of the area. A study of the historical and architectural heritage of the region, in which nomadic and sedentary civilizations closely interacted, shows that the tasks of eco-architecture - the optimal form, reducing heat loss and keeping warm in winter and providing coolness in summer, ventilation of rooms, hygienic and aesthetic qualities of housing - were successfully solved in past. A retrospective historical and architectural analysis of the dwellings of Central Asia is given, starting from the Neolithic era, affecting antiquity and feudalism of the pre-Islamic period and ending with the study of environmental aspects in the folk dwelling of the Islamic period. The form, planning and design features of a traditional residential building, proven over the centuries, have survived to this day, were developed precisely in this historical period of time. At each stage, the main techniques, tested by centuries of practice, were singled out and emphasized, which can be the basis for the conceptual development of modern eco-buildings in the region. "Earth" architecture, which became widespread in the region during antiquity and the early Middle Ages (not only residential buildings were built, but also temples, palaces, castles, etc.), remained in demand in folk architecture of the home until the 20th century.

Keywords: eco-architecture, earthen architecture, round houses, yurt, castles, sardoba, yachkhal

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A.V. GORODKOV

TOWARDS A FULL-SCALE EXPERIMENTAL ASSESSMENT OF THE ACOUSTIC REGIME OF SMALL AND MEDIUM-SIZED CITIES IN CENTRAL RUSSIA

The acoustic regime of medium-sized (Klintsy) and small towns (Trubchevsk and Dyatkovo) located in the Bryansk region was studied under field conditions. The relevance of the study of the mainline territories is due to the proximity of the red lines of residential development, the presence of pedestrian and public spaces, public service institutions, in which a regulatory level should be provided for the factor of physical pollution of the atmosphere. Also, the conducted research actualizes the almost complete lack of data on the acoustic climate of small and medium-sized cities of the Russian Federation. The paper analyzes the impact of traffic flows, estimates the traffic intensity. The connection of acoustic pollution with the parameter of traffic intensity is revealed. Using the example of 19 streets forming the main transport framework of the research objects, it was found that for an average city with a population of about 70 thousand inhabitants, the traffic intensity values during peak traffic periods reach 1375 auth/hour. For small towns with a population of 13.5 and 29 thousand inhabitants, these values are, respectively, - 1050 and 300 auth/hour. For the instrumental assessment of the equivalent noise level, standard methods of field measurements were used in accordance with the requirements of GOST 23337-78, on the basis of which the calculation of equivalent noise levels formed at the control points of analysis and measurements was performed. Noise maps reflecting the updated state of the acoustic regime of medium and small cities are constructed. Brief recommendations are given on the normalization of the acoustic regime of territories by means of protective landscaping of mainline sections and pedestrian zones.

Keywords: medium city, small city, traffic flows, acoustic mode of the mainline territories, traffic intensity, updated noise map.

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ASSESSMENT OF THE FEASIBILITY OF CITY FUNCTIONS BASED ON THE ANALYSIS OF URBAN INFRASTRUCTURE

The article provides an assessment of the functions of the city on the example of the city of Tambov, satisfying some human needs. The study was carried out on the basis of the principles of the transformation of the city into a biosphere-compatible and developing person. Published statistical reporting data for the last ten years were used for the analysis. As the infrastructure of the city was evaluated, recommendations for improving the situation were also proposed in the form of infrastructure facilities.

The city of Tambov is a fairly typical representative of the cities of the middle zone of the European part of Russia with a population of less than 300 thousand people, i.e. a large city according to urban planning classification. The main criterias are the ecological situation in the city and the main life support functions of the city of Tambov (average salary and per capita income of the population, health care system, distribution of the population by major age groups, construction, entertainment, emotions, power and management, fire protection system of the city, mercy, education, knowledge of the world, creativity, communication with nature).

According to the obtained statistical data, an assessment of the implementation of the functions of the city, which should meet human needs, is made. It was concluded that the feasibility of some of the main functions of the city of Tambov is on average at the level of similar cities in Russia, and for some functions (for example, caring for orphans) even at a higher level. However, there are functions that are not being performed at the moment. This is charity, education and life support which leads to the outflow of the younger generation from the city. In addition, according to the results of the general assessment of the ecological situation, the city of Tambov belongs to the Central European Ecological Region of Russia (rank VII), which is characterized by high environmental tension, where healthy human habitation is impossible.

The city of Tambov is a fairly typical representative of the cities of the middle zone of the European part of Russia with a population of less than 300 thousand people, i.e. large city according to urban planning classification.

Keywords: *city functions, Tambov region, principles of transformation of the city into a biosphere-compatible and developing human, ecological situation.*

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K. K. KOLIN

MODERN INTERNATIONAL INFORMATION SPACE AND CURRENT PROBLEMS OF NATIONAL AND GLOBAL SECURITY

The analysis of current trends in the structure and content of the international information space is carried out and it is shown that these changes entail new challenges and threats to national and global security. This calls for a broader understanding of the problem of information security, in which it is necessary to take into account its geopolitical and humanitarian aspects. The political science aspects of the activities of mass media and the functioning of social networks, as well as linguistic problems of cooperation between the BRICS and SCO countries are considered. Threats to Russia's national security in the information sphere and measures to counter these threats have been identified. The necessary measures are presented to ensure the national security of Russia, related to the information sphere, to the activities of the central banks of the CIS, BRIC and SCO, to national electronic payment systems, to the psychological and ideological impact on the population of various countries and, in general, to the information policy of the country.

Keywords: *global security, geopolitics, humanitarian problems, information security, international information space*

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L.V. MOROZOVA, A.E. ENIN

A MODEL FOR OPTIMIZING THE SPATIAL DEVELOPMENT OF URBAN PLANNING FORMATIONS IN A RETROSPECTIVE SECTION ON THE EXAMPLE OF THE VORONEZH AGGLOMERATION

The urban agglomeration is an important system that promotes urbanization towards optimization and forecasting, solves the problems of uneven development and is a promising form for creating spatial planning in the new time. Urban agglomeration is a compact and relatively developed set of complementary urban and rural settlements, grouped around one or more core cities and united by diverse and intense ties. The urban agglomeration is a product of new industrialization at a high level of development, and is also a highly integrated and urbanized cluster of cities that are formed and developed as a result of a natural, gradual process, as relations within the structure are transformed (from a competitive position to assimilation). In this study, an optimal urban land distribution model was proposed that provides a modeling tool for optimizing the quantity and formation of the overall spatial structure of an urban agglomeration, and this article discusses a theoretical approach to the formation, development and expansion of urban agglomerations. The optimal distribution of urban land optimizes the structure of the city in accordance with the current urban development situation and its potential development. The optimized quantity structure is then assigned to the geospace with the spatial land use optimization model. Since cities and other settlements in agglomerations have strong links with each other, the joint optimal distribution of urban areas can significantly reduce the burden on the part of developed central cities, as well as contribute to the growth of degrading peripheral territories. Optimal distribution can indefinitely reduce the trend of unbalanced development of the urban agglomeration, which in itself is more efficient than traditional urban planning models.

Keywords: urban agglomeration, urban planning, sustainable development, spatial optimization, land use models, urban growth boundary.

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O.V. DUSHKO, P.A. BARMIN, N.S. ZHUKOVA

ON THE IDENTIFICATION OF SOURCES OF FINE-DISPERSED EMISSIONS OF OIL FLARES ON THE TERRITORY OF THE RUSSIAN FEDERATION BY INTEGRATED CARTOGRAPHY

Emissions generated during the combustion of associated petroleum gas are considered to be a very important component of atmospheric dispersion modeling, since their impact directly reaches the level of large-scale environmental problems. Existing emission monitoring methods are capital intensive, so only large or well-developed enterprises can afford them. Accurate and transparent determination of the environmental consequences of the combustion and discharge of gas associated with oil production is seriously hampered by the lack of publicly available data on the amount of natural gas removed by flaring. Reporting is often optional, inconsistent or unreliable, and information on accumulated emissions is scarce. To obtain the most reliable information about flare emissions, it is necessary to use other methods, such as satellite remote sensing and integrated mapping. Processing and analysis of the data obtained will make it possible to compile a global overview of the effect of flaring on the dispersed composition of the atmosphere. The article discusses one of the ways to detect sources of fine-dispersed flare emissions on the territory of the Russian Federation by correlating various publicly available cartographic data. In the course of the study, it was revealed that oil and gas producing regions with a high density of developed fields differ significantly from others in terms of aerosol composition, namely, they have relatively high PM10 values.

Keywords: soot, PM2.5, PM10, flare emissions, atmospheric air pollution, black carbon, settled dust, cartography.

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A.V. ALEKSANIN, V.A. EKIMOVSKAYA, A.Yu. DUDAREVA

INCREASING THE EFFICIENCY OF TECHNOLOGICAL PROCESSES AND THE OPERATION OF ENTERPRISES IN THE INDUSTRY THROUGH THE INTRODUCTION OF TECHNOLOGIES OF THE INDUSTRY 4.0

Throughout history, one of the main principles of human development has been the principle of improving the surrounding world. Man has always sought to make his life easier and improve the conditions of his existence, which is clearly manifested, among other things, in the development of the production sector. Once upon a time, all processes were carried out with the help of physical force, but after the appearance of various types of engines, machines began to be introduced into production wherever possible. The improvement of the production sphere is carried out in our time, which is primarily associated with the emergence and development of digital spaces, which include sets of digital infrastructures, information processes, resources, digital interaction tools, etc.

Enterprises of the industrial sector have the properties of production and technical unity, consist of technologically homogeneous and heterogeneous production workshops, auxiliary, service and administrative units, have on their balance many buildings, structures and equipment that require constant maintenance. In this regard, the issues of increasing the level of security and improving communications between departments, increasing the speed of technological processes and the quality of products, and the issues of economic efficiency of production as a whole will always be relevant.

This article presents possible ways to improve the efficiency of technological processes and the operation of industrial enterprises through the introduction of industry 4.0 technologies.

Keywords: *fourth industrial revolution, industry 4.0, information technology, industry, manufacturing, robotization, digital interaction.*

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A.I.GIYASOV

URBAN AND ENVIRONMENTAL ASPECTS OF DESIGN UNDER CONDITIONS OF LOW WIND SPEED

The article discusses the aerodynamic characteristics of the future at low wind speeds in order to improve the environment in an urban environment. The cities of the southern latitude of foreign countries and the republics of Transcaucasia, Central Asia with unfavorable low-wind climate conditions and important methods of planning and urban planning methods for predicting and regulating the aeration regime during insolation of energy-active active layers of the regions are identified. The direction for improving the planning of the territory of cities, volume-spatial and planning structures of development has been identified. The heat-wind regime is taken as the basis of the study. A certain method for the rational use of the mechanism of thermophysical processes that improve the environmental characteristics of the surface air layer. At the same time, negative atmospheric impurities are removed in the upper macroclimatic layers. Based on the results of a study of the state of the problem of detecting the most characteristic factors that have a negative impact on the ecological state of the surface air layer in the places of detection and in mountainous and hollow areas. Certain prerequisites for the systematization of the problem of correct planning of engineering, technical and urban planning facilities for residential and industrial areas on the slopes of complex terrain. A prerequisite has been developed for improving the planning of structural urban developments, volumetric and spatial solutions of buildings and their complexes, depending on which it is necessary to lay the processes of the heat and wind regime, creating islands of heat and cooling, formed under the observed radiant energy of the sun on the active surface of cities and their structural elements - buildings and buildings. It has been established that the natural use of the mechanism of exposure to insolation with the active surface of urban buildings and areas of increased density of environmental characteristics of the surface layer of air, by transferring atmospheric negative impurities to the upper macroclimatic sectors of coverage by ventilation of the territory behind the structures and features of quarters, building premises. It has been established that knowledge of the characteristics of the heat and wind regime of the microclimatic air layer, caused by insolation of the geographical area of observation and complex relief, makes it possible to predict and regulate the occurrence of harmful phenomena in the water area in a territory with a limited wind speed and a calm state.

Keywords: city, building, ecology, insolation, aeration, wind, relief, basin, heat island

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E.A. MARTYNOVA, S.S. FEDOROV

CALCULATION OF PARAMETERS OF BIOSPHERE COMPATIBILITY IN THE CASE OF POINT CONSTRUCTION OF RESIDENTIAL QUARTERS

The analysis of the principles of biosphere compatible technologies in relation to the reconstruction of urban development of residential quarters with a quantitative assessment of the implementation of these principles on the example of the design of a residential building and the reconstruction of a building block in the central district in Kursk is given. It is shown that the currently normalized criteria of urban planning decisions in the conditions of point development of urban neighborhoods do not always meet the creation of a safe and human-developing urban environment. Development programs, monitoring methods and algorithms for calculating integral indicators of biospheric compatibility of urbanized territories of these territories should be based on the principles of their biospheric compatibility and take into account all components in the reconstruction of socio-techno-natural systems of the city.

The results of the analysis of the design urban planning solution of a residential building with a point construction of the central part of the city carried out by the design organization according to the current norms of the positions of the paradigm of a biosphere-compatible city are presented. It is shown that the use of the principles of the transformation of the city into a biosphere-compatible and developing person can significantly improve the components of the safety and comfort of the urban environment in the implementation of the functions of the city.

Keywords: biosphere compatibility, comfortable urban environment, city functions, living environment, human.

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E.S. TSHOVREBOV

THE SYSTEM OF CIRCULATION OF SECONDARY TECHNOSPHERE RESOURCES AS A MECHANISM FOR IMPLEMENTING THE PARADIGM OF BIOSPHERIC COMPATIBILITY

The purpose of this work is to form the theoretical foundations for the creation of an environmentally safe system for the circulation of secondary technosphere resources, from the standpoint of compliance and harmonization with the paradigm of biosphere compatibility and aimed at achieving favorable living conditions for the population, the state of protection of the natural environment and humans from environmentally hazardous technosphere impacts.

Tasks: formation of the concept of a resource-restoring system of environmentally safe interaction of the technosphere, society and nature, based on the circulation of secondary technosphere resources, ensuring the achievement of a resource-saving technological way of sustainable socio-economic development and aimed at fundamentally changing the existing environmentally hazardous system of regulation of technosphere; assessment of compliance of the proposed concept of the system with the provisions of the ideological paradigm of biosphere compatibility, modern strategies, doctrines of sustainable development; construction of a conceptual model of a resource-restoring system of environmentally safe life support of technosphere territories.

The research strategy is based on the idea of preventing the occurrence of negative factors of technospheric impacts as a result of the structural and functional transformation of the existing system of regulatory and technical regulation, accounting for technospheric pollution, leading to environmental degradation - to a preventive system with respect to environmental hazards based on the circulation of secondary technospheric resources, and not hazardous waste, emissions, discharges.

The scientific and methodological solution of the actual problem was carried out on the basis of the development of conceptual, set-theoretic models of environmentally safe life support of technosphere territories within the framework of the proposed concept of the circulation of secondary technosphere resources using logical and analytical methods, conceptual modeling.

Testing of the new system is proposed in the most waste-intensive sectors of the economy: construction and municipal complexes. In these spheres of life support, the resulting technosphere objects, primarily waste, have both a low level of environmental hazard and the greatest resource potential, causing acceptable technical and economic conditions for involvement in economic turnover. An important factor is the need for construction, urban economy in materials produced using various types of recoverable recyclables. This predetermined the study of life support technosphere safety systems, aimed at developing effective scientific and technical solutions for environmental protection, as an actual scientific direction.

Keywords: *environmental safety, biosphere compatibility, resource conservation, sustainable development, secondary technosphere resources*

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