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BIOSPHERE COMPATIBILITY: HUMAN, REGION, TECHNOLOGIES

The founders

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B.I. SHILIN, A.A. ULIANOV

IDENTIFICATION OF THE PORE STRUCTURE OF THE FILTER MEDIA FOR SEWAGE AND INDUSTRIAL WATER ENERGY SYSTEMS, URBAN SETTLEMENTS AND DETERMINATION OF THEIR HYDRAULIC CHARACTERISTICS

Human existence, without fresh water is impossible. Therefore, in recent years the question of the purity of water is most urgent. This issue of urban settlements arose in connection with the huge scale of water use. To reduce the harmful effects of industrial and municipal water use on the ecology of cities require better wastewater treatment.

In the article the results of hydraulic testing, surface and bulk filter materials to identify the pore structure and determination of their hydraulic characteristics, verification of the adequacy of the developed mathematical model of the pore structure and the real fibrous filter material, for the comparison of calculated and experimental dependence between the filtration rate (or unit bandwidth) and are created on the filter material pressure drop, because the efficiency of purification of waste and industrial waters from fine particulate pollution and delays water droplets emulsified in oil, fibrous filter materials of petroleum products largely depends on the average pore size, fiber diameter, packing density, thickness of the filtering walls, the rate of filtration, i.e. the structure of the porous partitions

The hydraulic analysis of various filter materials shows that throughout the region, operating speeds of filtration of 0.1-5 cm/s is maintained a linear relationship between velocity and differential pressure across the filter material as the surface type and a volumetric type. It is established that the theoretical and experimental direct have a good convergence and divergence between them does not exceed the values in workspaces filtering 5%, which is quite valid, and validates the model representation of the pore structure of fibrous material and the suitability of obtained by the authors according to calculate hydraulics of filter materials.

Key words: *filter material; the filter volume; pore structure; hydraulic feature, the adequacy of the mathematical model.*

A. I. GUBAIDULINA, L. A. SOLODILOVA

PROVIDING ECOLOGICALLY SAFE OPERATION OF YACHT PORTS ON THE AZOV SEA COAST

The priority trends of ecological safety in the field of yacht tourism on the Azov Sea coast are considered in the article. Currently forming objects of tourist recreational clusters of the coastal territories of the Azov Sea need the architectural and spatial organization of marines including those intended for small size vessels. Based on the comparative analysis of yacht parking development in our country and abroad, due requirements have been established in relation to their infrastructure, saving environment ecology, ensuring conditions that guarantee safe parking of vessels in the adjacent territories of the Azov Sea. Such situation in construction and operation of yacht ports becomes nowadays a matter of the state importance. The list of essential drawbacks on the coastal territories of the Azov sea was revealed as a result of researches, namely, construction of multistoried building near a coastal zone, that not always has a positive impact on conditions of specific perception of objects from the water area. Apart from it, landscaping issues are not resolved, there are no recreational and leisure buildings. At the same time it is noted in the article that the Azov coast is of undoubted interest regarding development of tourist and recreational potential, as there are rich natural resources, favorable outlines of the coastline, relative shallow water, that provide increase of vacation season in comparison with the Black Sea coast. It is necessary to ensure safe operation of yacht port for carrying out sport events, rest, travel and other kinds of activity. Conditions of ecological safety cover not only buildings and constructions, but also engineering facilities intended for location of production, storage of cargoes and materials. Special requirements are imposed to moorings' saving equipment for a descent of people on the coast and their keeping afloat, as well as to night-time lighting and means of notification of personnel and travelers in case of danger. The factors influencing safety of placement and operation of yacht ports were revealed as a result of researches. The nomenclature of the main services and additional actions was developed for service and safe parking of water sports equipment. Classification of yacht ports per comfort level defined and possibility of first stage marine parking placement established. However, the article mentions that the Azov coast is of great interest for the development of tourist and recreational potential, as there are rich natural resources, favorable shape of the coastline, relative shallow water, driven by the increase in holiday season in comparison with the black sea coast. The studied peculiarities of organization of Marin in our country and abroad. The factors influencing the location and development of marinas, in particular, noted that the organization is protected and isolated marine ports yacht with a certain range of buildings and engineering structures, with the appropriate equipment and a qualified service is becoming a matter of national importance. Developed a range of basic services and additional activities to maintain and ensure a safe Parking and water sports equipment. Defined classification of yacht ports in terms of comfort. The proposed location for one of the first marine on the Azov sea coast.

Key words: *marina, infrastructure, yachting, urban planning model, the coast of the Azov sea.*

O.M. BLAGODETELEVA

BASES OF SPATIAL DEVELOPMENT OF THE RUSSIAN NORTH AS A TERRITORY OF BIOSPHERE COMPATIBILITY

The high-latitude regions of the North and the Arctic have always been of particular strategic importance for the Russia, - as a spatial resource, the location of the country's raw materials base, as well as the zone of the most important intercontinental transport routes. Thanks to the widespread development over the centuries, the northern territories of Russia have become the most highly urbanized and technologically developed among the circumpolar states. However, the transformations that occurred after the collapse of the USSR in various spheres of the state structure of the country entailed the strengthening of the socio-economic and environmental problems of this region. Thus, the question of determining the general paradigm of the spatial development of the northern territories of Russia is particularly topical today. At the same time, urban development processes should be given a key role in ensuring a balance between the technosphere, nature and human.

The purpose of this article is to substantiate a new course for the development of the northern territories of Russia, based on the concept of the biosphere compatibility of the elements of the "human-nature-society" system. Proceeding from the set goal, were set the following tasks: identifying factors that affect natural ecosystems and humans in the North; Analysis and classification of previous models of development of the North; Definition of contemporary problems of development of the region under consideration; The identification of directions for the further spatial organization of the northern territories of the Russia.

In the course of the study, it was found that special climatic and social conditions determine the extreme vulnerability and instability of the development of the northern territories. This fact confirms the unacceptability of the unilaterally oriented industrial model of the North, as a result of which were appeared various conflicts in the areas under consideration. Today it is necessary to move on to the complex sustainable biosphere-compatible development of the northern territories, on the basis of the symbiosis of the postindustrial and traditional social order. Urban development should serve as an instrument through which it will be possible to implement a new paradigm for the development of the North.

Key words: *Russian North and Arctic, spatial organization, development paradigm, "nature-society-human" system, biosphere-compatible development.*

Z.Z. ZIYATDINOV

URBAN PLANNING FUNKTION OF SECOND HOMES

It shows the extent of the territorial expansion of second homes in Russia and in the world. The definition of "second dwelling" and "village of second homes". Intensive expansion of second homes may not reflect the most essential tendencies of modern urban planning. The functions of the second home divided into three groups: socio-economic, natural-ecological and structural-planning. Gradofree identified as second homes: impact on the formation of settlement systems through the emergence of new settlements of a seasonal nature; to promote the development of transport infrastructure due to the emergence of circular migration flows of owners of second homes; reformatting system services; changing priorities among the components of the recreational system in connection with the preference of many gardeners to relax in the second housing; revitalization of rural settlements, the transformation of the engineering infrastructure – engineering support settlements of second homes; the decline of compact forms of urban planning – due to the inclusion in their structure of the garden and suburban areas; influence on residential development by the shift from multi-family housing, determine the development of the horticultural arrays of single-family farmsteads, not causing the mass requirements of the second housing; the facilitation of globalization through the development of cross-border second home, a constant increase over time of the number and the proportion of second homes owned by non-residents; suburbanization is leading (compared with regional centres) increased population density and construction in the suburbs by transforming the permanently increasing share of Sadovo-country houses in the first housing; a reflection of the real, the actual, boundaries, cities, regional settlement systems, the relevant border areas of everyday life of the citizens. The second housing reflects the beginning of a new urban era: there are prerequisites territorial growth of urban and rural settlements, development of suburbanization, intensive formation of agglomerations and conurbations, increasing globalization.

Keywords: *second home; garden houses; dachas; cottages; suburban area, settlement system.*

QUANTITATIVE OF ECOLOGICAL SAFETY OF OBJECTS REAL ESTATE EVALUATION BASED ON THE «GREEN BUILDING» CONCEPT

The article deals with environmental safety real estate assessment and its quantitative criteria. The concepts of «comfort» and «security» were studied both in a broad sense and in a narrow sense - in the aspect of environmental assessment of buildings on the basis of the «green building» concept. The basic methods of a score-rating assessment of the environmental safety of real estate used in international and national green standards are considered, as well as the main criteria that are typical for all existing environmental assessment systems. Authors identified the shortcomings of the Russian green standard GOST R 54694-2012 «Conformity assessment. Environmental requirements for real estate» in terms of completeness and content of the basic criteria and methodology of real estate assessment. Authors determined the specific weights of comfort and safety criteria in the structure of the Russian green standard. Authors presented proposals for improving the Russian system of environmental assessment of real estate by introducing a group of criteria «comfort and complex security». The main factors influencing the formation of a comfortable and safe environment are investigated and described. As a result of the research, proposals for building a hierarchy and formalized description of the criteria for the environmental safety of real estate objects from the standpoint of complex security and comfortable living conditions were presented in this article. In future studies, it is planned to systematize the quantitative and qualitative criteria for environmental safety real estate assessment, as well as the determination of their weight coefficients using expert evaluation method and pair comparison. As a result, a complex criterion for an overall environmental safety real estate assessment will be built. It will take into account these criteria and their weight coefficients in the overall assessment. This indicator of the «greenness» will allow to make a quantitative assessment of the real estate ecological safety. It will also allow to compare options for choosing the most effective option for management of real estate objects at all stages of their life cycle. The practical importance of this study is due to the possibility of applying its results to systematize and formalize environmental requirements for real estate and to formulate a methodology for the environmental safety real estate assessment based on the «green building» concept as part of the Russian system of environmental assessment.

Key words: green building, green standards, certification, rating systems, real estate, quantitative evaluation, criteria.

S.G. SHEINA, A.A. FEDOROVSKAYA, A.A. SHEVELEVA

COMPLEX ASSESSMENT OF THE TERRITORY: CLIMATE-FORMING FACTORS FOR ELECTION OF THE ALTERNATIVE SOURCE OF ENERGY

The article considers the significance of an integrated assessment of the territory to ensure its sustainable development and use of its results when choosing a particular type of alternative energy source for a particular built-up area. Renewable energy sources (renewable energy sources) are types of energy that are continuously renewed in the Earth's biosphere (solar, wind, water, tidal energy, waves of water objects, including water bodies, rivers, seas, oceans, biogas, gas produced by waste products and consumption in landfills of such waste, gas generated from coal mining). Multi-criteria evaluation is used in this case to determine the level of sustainable development of the territory of municipalities. The main factors in the selection and introduction of renewable energy sources in housing construction are the natural parameters, i.e. the wind region, the average annual number of sunny days, the speed of water flow in rivers, the strength of waves, and the amount of biomass for use in bioenergy. But it is worth noting that without certain technological facilities, renewable energy technologies, as well as ways of implementing renewable energy sources, their use in housing construction is impossible. Climate-forming factors of territory estimation are presented, as well as their dependence on climatic conditions. This system of territory assessment has been tested on the example of the Rostov Region in three areas: solar energy, wind energy and hydropower. The potential use of biofuel sources of raw materials on the territory of the Rostov Region is also considered. Based on the maps built in ArcGIS ESRI, the territory of the Rostov Region is visually represented and its suitability is estimated for the introduction and development of all types of alternative energy sources.

Key words: territorial planning, town-planning, sustainable development, integrated assessment of the territory, climate-forming factors, alternative energy sources.

V.P. SHELUKHO, T.Yu. SIMONOVA

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE STATUS OF GREEN SPACES OF THE TOWN BRYANSK

Green plantations play different roles in an urbanized environment: habitat forming, sanitary, aesthetic and person's health-improving. Due to the change in the town environment into the unfavorable for the plants side, they reduce resistance, durability, efficiency of performing their functions and are damaged by insects and diseases.

Three main factors influence on the vegetation in urban areas the most. They are: the complex impact of urbanized environment; soil and air pollution; recreational impacts. The bioindication of environmental conditions by means of the fluctuant asymmetry leaves definition in the city of Bryansk proved its critical deformation for the vegetation growth at the city zone border. The city flora decreases its stability and it is damaged by insects and pathogens.

A comprehensive survey of green plantations of the town Bryansk was carried out for the first time to determine the occurrence and role of pests and diseases in reducing the resistance and ornamentality of plants. The most widespread among dendrobionts are damages caused by leaf miners, gall producers and leaf pests. However, necrosis-cancerous and rot diseases predominate in the reduction of plantations resistance and durability especially on native tree species. The main pathologies of urban vegetation are necrosis and spottings of the assimilation apparatus, cancer and rot diseases, lesions by wood-destroying fungi, mechanical injuries, crown and trunks pathologies, damage of leaves, needles, trunks and branches by insects. The occurrence and role of pests and diseases in the resistance reduction of tree and shrubby vegetation in the town of Bryansk have been determined in this paper. There have been proposed measures to increase the resistance and conservation of the town green plantations.

Key words: *urban plantations; state of the environment; state of plantations; reduction of plants resistance; plants pests and diseases; role of dendrophilous biota.*

V. T. SHALENNYI, K.A. LEONENKO

COMPARATIVE ANALYSIS AND THE SUBSTANTIATION OF THE PURPOSE METEOROLOGY OF THE EVALUATION OF THE GRAIN OF LABOR WORKERS-BUILDERS FOR IMPROVEMENT OF ERGONOMIC INDICATORS OF STONE-INSTALLATION WORKS

*Labor is the basis of the society formation. The progress of labor can be achieved both: as the multiply the resources that produce it, or as the expense of their qualitative modernization: a reduction in the severity of labor. In the work we previously set the actual scientific and applied ergonomic task of increasing productivity and reducing the cost of stone-and-assembly works, by increasing the efficiency and improving ergonomic indicators by justifying and applying the most appropriate method for assessing the severity of labor of construction workers. The purpose of the work is to increase the productivity and reduce the cost of stone-and-assembling works, by increasing the efficiency and improving ergonomic indicators by justifying and using an appropriate method for assessing and reducing the severity of the work of construction workers. The task of the study: analysis of known methods and norms for determining the severity of labor; selection and adaptation of the most suitable for use in the analysis of technology of stone-assembly works. The object of research is the technology of stone-and-assembling works for the erection of concrete construction objects. The subject of the study is the labor intensity and severity of labor in the manufacture of stone-assembling operations in the process of erecting these objects. The most suitable for analyzing the technology of rock-and-assembly works – **ergonomic integral grading of the severity of labor**. An addition to it can be an energy cost estimate using prof. **Travin's formula** (heart rate). Having determined the severity of the labor of workers at the pre-construction stage of building, it is possible to organize a construction process by minimizing the fatigue of construction workers, and, consequently, increasing productivity and reducing the cost of stone-and-installation works. Reducing the severity of labor can be achieved through the organization of the work process, taking into account the Sechenov criterion and the introduction into the work process of the previously patented means of small-scale mechanization.*

Keywords: *energy efficiency; the severity of labor; method of energy and labor costs count; ergonomics; the Sechenov effect.*

T.F. ELCHISHCHEVA, E.N. MIRONOVA

OPTIMIZATION OF THE PROCESSING OF EXPERIMENTAL DATA OF ECOLOGICAL MONITORING

External walls of buildings and structures in the course of construction and operation are exposed to adverse environmental factors, such as pollutants in the form of industrial gases, dilute solutions of acids, inorganic salts and their mixtures, as well as suspended solids (dust). Such substances cause the formation of salt solutions on the surface of the enclosing structures, in the pores and capillaries of the wall material. Salt solutions increase the sorption properties of building materials, which is caused by a decrease in the partial pressure of saturated water vapor over solutions in comparison with the value above water. This contributes to an increase in the moisture content of materials and the inflow of new portions of salts. At the same time, the sanitary condition of the external walls and the humidity regime of the building premises deteriorate. The crystalline salt, which falls from saturated solutions inside the pores of the material, and its high humidity change the composition of the intraporous substance, its thermal-physical and mechanical properties. Pollutants have different effects on the properties of materials. In the process of experimental studies of saline wall fences and environmental monitoring, it is often necessary to classify pollutants into groups according to the degree of influence on the studied characteristics of wall materials. Optimization of the processing of experimental data of environmental monitoring of external enclosing structures is proposed by software classification of the observed values of the characteristic. Classification is made on the basis of methods of mathematical statistics with the application of the law of uniform probability distribution. To test the hypothesis that the analyzed sample belongs to a uniform law, the program uses a number of special criteria specifically designed for this, and classical nonparametric acceptance criteria. The program can also be used to classify characteristic values calculated using mathematical modeling techniques and to classify man-made hazards when monitoring them in natural-industrial macrosystems.

Keywords: law of uniform probability distribution, characteristic values, classification, mathematical statistics, hygroscopic salts, external enclosing structures .

M.I.AFONINA, A. S. MARSHAL KOVICH

RESOURCES' ECONOMY OF NEW SPORT AND RECREATIONAL COMPLEXES

Demands of providing resources' economy are the most important factors in determining ecological, architectural planning and technological solutions of large scale construction sites for sport activities. Development of winter sports forces specialists to adjust standard modern projects to the new types of sports promptly. Comprehensive analysis along with classification of these projects is to be the goal of the research. It's offered to reckon recreational and sport complexes for winter types of sports as the sites with high level of consumption of various resources which influence considerably on its sustainable development. There were suggested complexes' classifications allowing to estimate these complicated technical systems objectively. Resources taken for building sport and recreational constructions (for winter kinds of sport) are proposed to divide onto natural and anthropogenic. Offered typology determines means of natural terrain elevations' changing by embedding of buildings with added functions (gyms, offices, cafes, stores etc.), special constructions and ground facilities (in the form of loading and extraction) etc. There the data of working projects is given which helps to estimate the scale of realized projects, their main characteristics, appointment, and attendance. The structure of energy consumption at ski resorts "Sorochany" and "Puzhalova gora" is shown. Here is an example of urban children's tubing site "The Gorka" within the borders of motorway near Sokolniki city park which illustrates the possibility of using specially protected natural territories for sport and recreational structure. The peculiarity of the track is its temporary character. Its form and technical equipment changes herewith the rod structure Layher Allround is the foundation of the construction. Multifunction, high speed of installation and dismantling, the use of reusable items are the advantages of the system. Using new building polymeric materials as snow substitutes is considered to be the technological way of the resources' economy. The article contains conclusions determining the way of resources' economy at sport and recreation sites to be topical and prospective.

Key words: winter sports facilities, ski resorts, resources, electricity, artificial snowmaking, Layher Allround, construction.

A.T. DVORETSKY, K.K. KLEVETS

ESTIMATION OF ENVIRONMENTAL SAFETY OF DEVICES FOR DIRECT SOLAR HEATING

The purpose of this article is to quantify the effect of direct solar heating, which applies in residential buildings, on the environmental safety of urban areas. In the work was maiden the calculation of the solar energy heat incoming to the building, which allows saving organic fuel for heating during the heating season. The saved on heating energy was recalculated in kg of carbon dioxide, which was not thrown into the atmospheric air, and money equivalent. For this purpose, the indicators of the saved gross emissions of carbon dioxide during the burning of gaseous fuels under direct solar heating from the translucent structure of the southern orientation were determined. It is concluded that the passive solar strategy not only not only leads to a saving of money in the operation of the building, environmental safety, but also to provide the demanded qualities put forward to housing: attractive interior and exterior appearance of the building, natural lighting, view from the window.

Keywords: direct solar heating devices, reduction of CO₂ emissions, reduction of consumption of organic fuel.

T.I. LEVKOVICH, T.V. MASHCHENKO, Z.A. MEVLIDINOV,
R.S. SINYAVSKIY

ON THE DISPOSAL OF SLAG AND THE LIBERATION OF OCCUPIED TERRITORIES IN THE CITY INDUSTRIAL ZONES, THE USE OF SLAG IN ROAD CONSTRUCTION

With the development of cities the industrial area is often on site. No exception is the iron and steel industry, by-products are slag. On the territory of Russia has accumulated huge deposits of slag obtained in the production of cast iron and different types of steels. At the same time, the construction of roads, in particular, in the construction of roadbed and the device of the bases of road clothes, in some regions of the country there are no suitable and melkosopchnik coarse-grained soils. The most common cohesive clay soils with a plasticity number more than 12, not suitable for consolidation.

The authors aim to use slag in road construction at the device of road clothes with the purpose of utilization of slag and the release of these occupied territories of industrial zones of cities. The research was conducted to reduce the number of plasticity clay soil by adding clay soil blast furnace slag. For these purposes we have used blast furnace slag Bezhitsk steel plant of the city of Bryansk and blast-furnace slag Novolipetsk metallurgical combine. Also addressed issues of comprehensively strengthening clay soil in Bryansk and Lipetsk regions. The task was to choose the composition of the reinforced clay soil with a compressive strength (after 28 daily kit) is not lower than 8.0 MPa. The primary binder was appointed Portland cement grade 500 with addition of the hydrated lime. The results of testing of samples of slag-clay soil reinforced by cement with and without addition of lime. Also the variant of recycling of slag in road construction with the use of them in the form of slag aggregates (sand) in the device of the bases of road clothes and in the preparation of asphalt and cement concrete mixtures for pavement of highways.

Key words: city, urban area, industrial zone, steel mills, slag, recycling, road, road pavement, strength, core, soil, clay, the number of plasticity, metallurgy, slag, lime, study, moisture content, samples, physico-mechanical properties.