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Contents

WEN-DER YU, TAO-MING CHENG, WEI-CHENG HO

A SYNERGY APPROACH FOR SUSTAINABLE CONSTRUCTION OF NON-URBAN LAND DEVELOPMENT

Building industry has been blamed for non-sustainability, not only due to its high contribution to the global Green House Gas (GHG) emissions but also due to its complicated project organization and delivery system hence, the sustainable practices of other industries cannot be effectively implemented in the building industry. To tackle this global issue, the current paper presents a synergized approach towards a more sustainable construction, which integrates a heterogeneous procurement strategy, an innovative eco-efficient construction method, and a sustainable project monitoring and control system. Principles and implementation cases have been described and discussed with a demonstrative application on the management and improvement of sustainability for a non-urban land development project.

Keywords: *Sustainability, Construction, Non-urban land development, Heterogeneous procurement, Eco-efficient innovation, Synergy approach.*

M. SHUBENKOV

NATURE-ORIENTED APPROACH IN URBAN PLANNING: ASPECTS OF THE IMPLEMENTATION

The article examines the contradictions that have developed in the field of modern urban planning, related to the growth of cities and the deterioration of their environmental situation, the growth of epidemiological danger, the lack of drinking water, the growth of specific mental disorders. The problem of replacing the ideology of anthropocentrism and technicism with the ideology of developing and implementing nature-like technologies is analyzed. Two fundamentally different axiomatic approaches are compared: anthropogenic and nature-oriented. The necessity of forming a nature-oriented technosphere associated with the recreation of natural resource turnover in accordance with the natural natural context is argued. The principles of embedding human technologies for the development of the life environment into natural ones are formed. Approaches to building a model of balanced interaction between man, society and nature are outlined, and the conditions for its construction are outlined. To describe the specifics of the urban environment, a new term is proposed - urban biotope.

Keywords: *nature-oriented approach, urban environment, natural environment, natural-like technologies, urban biotope, technosphere, urban ecosystem.*

G.A. PTICHNIKOVA

TRANSFORMATION OF URBAN FORM OF THE LARGEST CITIES IN RUSSIA IN THE POST-SOVIET PERIOD

During the last 30 years, after the socio-economic upheavals that marked the end of the socialist way of development of the USSR, the spatial structure and urban forms of the largest cities of Russia have increased dramatically. However, very little research has been carried out to determine the features of this process. The aim of this study was therefore to investigate trends of changing the physical form and architectural appearance of the largest Russian cities, the analysis of transformations of the existing historical morphotypes and the definition of characteristics of new urban units.

The author considers the density of cities as a key concept in describing the urban spatial structure of the city. The other three key characteristics of cities are the population, the total area of the city and the morphological structure. With the help of those indicators, a comparative analysis of the 15 largest Russian cities is carried out.

It was concluded that the cycle of territorial growth of cities had ended and a new cycle of compaction and the complication of their spatial structure had begun. Transformations of urban morphology are manifested through changes in the spatial organization of urban fabric, changes in the ratio of built-up and open spaces in existing morphotypes; compaction and high-rise options of new urban units.

This information may be of interest to research teams engaged in studying of development of cities and urban morphology.

Keywords: *urban spatial structure; urban morphology; morphotype; urban fabric.*

I.Y. GLINYANOVA, V.T. FOMICHEV

PHYTOMONITORING AS A METOD OF THE ASSESSMENT OF ATMOSPHERIC AIR POLLUTION BY URBAN ENVIRONMENT BY FINE DUST

The article is devoted to the search for a source of atmospheric air pollution with hydrogen sulfide in the city of Volzhskiy, Volgograd Region, the toxic smell of which periodically adversely affects the city residents and is recorded by city government services due to the multiple excess of MPCm for hydrogen sulfide in residential areas. The analysis of the results of air samples for hydrogen sulfide in the city of Volzhskiy, Volgograd Region over the past five years from official materials of state environmental monitoring, including the wind loads in this village were studied on the days of volley emissions of hydrogen sulfide, archival materials of the geological situation of the territory of the city of Volzhskiy and its environs were studied. An assumption has been put forward of a mixed source of atmospheric air pollution with hydrogen sulfide in Volzhskiy, which on the one hand is of man-made origin and, on the other hand, of natural origin, namely, hydrogen sulfide gas outflows from the solfatara field of the urban area formed by the activity of an ancient volcano in the steppe zone near Volzhskiy city, Volgograd region. The hypothesis of an existing ancient volcano near the city of Volzhskiy, Volgograd region is confirmed by the finds of numerous material of volcanic rock and minerals of magmatic origin, found by the authors in the vicinity of the city of Volzhskiy and on the Akhtuba paleo-river. The primary results of the study require further study, a comprehensive study of the entire area of the proposed solfatar field of the ancient volcano, refinement of the volcano's caldera and the development of an environmental action plan, including the reduction of hydrogen sulfide emissions from a natural source to ensure environmental safety of the population of Volzhskiy and the inhabitants of its surrounding territories .

Keywords: *environmental safety, urban areas, natural pollution, solfatar fields, hydrogen sulfide, MPC for hydrogen sulfide, sulfate ions, chloride ions, paleovolcanoes, caldera, products of volcanic eruptions, post-volcanic activity, ore formation, ore occurrence, thermal waters*

V.A. ILYICHEV, V.I. KOLCHUNOV, V.N. AZAROV, A.A. KUZMICHEV

BUILDING LIKE AN AIR CLEANER, A MARKER OF ITS CONTAMINATION AND A VIDEO ECOLOGY FACILITY

Due to the low quality of atmospheric air in the urban environment caused by ecological factors and deteriorating annually mainly due to anthropogenic processes, such as transport, industry, housing and communal services, buildings, structures and architectural monuments need protection. One of the main ecological factors that negatively affects the air, and, as a consequence, the objects of the urban environment, is dust. The article presents an analysis of foreign experience on the effects of atmospheric pollution on unique buildings and structures, as well as methods for dealing with them. The authors developed methods and a program for calculating current pollution, as well as predicting dust pollution of the vertical surfaces of buildings and structures located in an urban environment. They are applicable both for civilian objects and for unique buildings and structures at the stage of their design and operation. A comprehensive assessment of the condition of the facades of buildings and structures was carried out, allowing us to make a conclusion about the frequency of their cleaning, based on a joint study of the physical and visual aspects of pollution of objects. Thus, the conducted studies contribute to the solution of a number of problems related to improve the ecological safety of construction and municipal economy.

Keywords: *unique buildings and structures, pollution of buildings, atmospheric air, dust, particulate matter, dust adhesion, urban vertical surfaces.*

N.M. VETROVA, E.E. MENNANOV

EXPERIMENTAL STUDIES OF THE ECOLOGICAL CONDITION OF THE SEASIDE URBANIZED RECREATIONAL TERRITORIES IN THE APPLICATION OF BIOPOSITIVE PROTECTIVE PROTECTION FACILITIES

The paper considers approaches to solving the problems of stabilization and improving the level of environmental safety of coastal urbanized recreational areas in terms of ensuring the environmental parameters of beaches. The current problems of increasing anthropogenic pressures on coastal territories as a result of a high density of development of these territories under recreational facilities that have been emerging over a long period of time have been analyzed by specialists from various branches of science. In many respects, this is what determines the increase in the level of pollution of the atmosphere, water resources, lands, beaches, the decrease in both the comfort of the zone, and the violation of natural coastal landscapes. In general, there is a deterioration in the ecological state of the territories used for recreation (in particular, a set of problems of the coastal recreational zones of Crimea is considered).

Considering the peculiarities of the pre-project substantiation of engineering solutions for coastal protection structures, which should ensure not only integrity, but also their environmental friendliness, the authors presented an analysis of the results of experimental studies to refine approaches to the development of environmentally friendly biopositive solutions for the reconstruction of coastal protection structures in the coastal urbanized recreational territories of Crimea using the example of a coastal urbanized recreational area of the village. Sandy of the western coast of Crimea in the area of the boarding house "Volna".

The article presents the results of numerical and physical studies of the ecological state of coastal urbanized recreational zones of the western coast of Crimea with the use of biopositive coastal protection structures. Two series of experimental studies in the wave basin are considered. The dynamics of the level of environmental safety of the beach area of the coastal urbanized recreational territory of the village was studied. Sand on the western coast of Crimea during experiment No. 3, which confirmed a decrease in the level of environmental safety of this territory. In experiment No. 4, the effectiveness of the engineering-ecological biopositive solution proposed by the authors for the reconstruction of coastal protection structures for the studied section of the beach area of the coastal urbanized recreational territory of the village was confirmed. Sand of the western coast of Crimea in the form of "a wave breaker from the gabion system" made of a draft of a large rubble weighing 2-4 tons in a frame made of fiberglass materials.

Keywords: *coast, coastal zone, bank protection, coastal protection, beach, coastal zone, recreation zone, physical modeling, environmental safety, experiment.*

V.S.VOROZHNIN

INFLUENCE OF URBAN BUSES ON THE TRIP AVERAGE MICROENVIRONMENT CO CONCENTRATION IN A PASSENGER CAR AT A CITY, ON THE EXAMPLE OF EKATERINBURG

Air pollution in the microenvironment of cars is life-threatening. At the same time, the study of air quality of drivers and passengers is not given due attention.

The study is devoted to investigating the influence of urban buses on the concentration of carbon monoxide (CO) in the vehicle microenvironment on three street routes in the city of Ekaterinburg. The study took into account trolleybuses, buses of large, medium and small class, including engines powered with natural gas. The measurements were carried out during six days for four modes of the vehicle moving at the streets by an Elan CO50 gas analyzer with an electrochemical cell. The measured CO levels were as follow: 0.53–7.60 mg/m^3 for buses with gas; 0.31–2.74 mg/m3 for other buses; 0.49–1.52 mg/m^3 behind the trolleybus; 0.04-3.50 mg/m^3 in the free flow; 0.04-2.10 mg/m^3 at the edge of the carriageway. The highest mean concentrations were obtained after gas powered urban buses (1.57 mg/m^3), and the lowest at the edge of the roadway (0.74 mg/m^3). Using the Fisher's Least Significant Difference method, a statistically significant difference was found between geometric mean concentrations for gas-powered buses and other buses, as well as between measurements in the stream and at the edge of the roadway. This study showed that gas-powered public buses form the highest levels of CO concentration.

Keywords: *vehicle, microenvironment, CO, exposure, bus*

O.A. PCHELENOK, A.V. ABRAMOV, N.M. KOZLOVA, M.V. RODICHEVA, S.N. YAKOVLEVA

ESTIMATION OF THE INFLUENCE OF Cs137 RADIONUCLIDE MIGRATION PROCESSES ON THE QUALITY OF AIR OF THE URBANIZED TERRITORY

It is shown that low air quality in the atmosphere of large cities is associated, among other things, with an increased concentration of dust generated as a result of aeolian processes during the rapid degradation of suburban areas as a result of human activities. It was found that damage to human health depends on the composition and structure of dust. It is shown that in areas affected by the Chernobyl accident, dust may contain radionuclides Cs^{137}. As a result, an increase in the volumetric radioactivity of the surface air layer is recorded in the air of the city.

As a result of our own research, it was found that during the thermal period of the year the mechanisms of the movement of Cs^{137} radionuclides from deep soil words to its surface are formed in the soil. Under the influence of these mechanisms, alternating zones of increase and decrease in radioactivity are formed in the soil profile. As a result, it was shown that the level of radioactivity of the upper soil words during the thermal period of the year increases from about 0 Bq / kg in April to 16 - 18 Bq / kg in October. With an increase in the concentration of Cs^{137} radionuclides in the upper soil layers, conditions are formed for their entry into the air along with dust and an increase in the activity of surface air.

Keywords: *air quality, radionuclides, Cs^{137} radioactivity, residential area, dusty air pollution, soil-plant system.*

O.E. SADKOVSKAYA

BORDERS OF NATURAL-ECOLOGICAL FRAMEWORK OF URBAN PLANNING SYSTEMS OF ROSTOV REGION

Recently, the preservation of natural diversity and the sustainability of the landscape has become increasingly urgent. The comfort of urbanized areas depends on the well-being of the environment stabilizing landscapes that form the basis of the natural and ecological framework. In conditions of steppe agrarian landscape of Rostov region valleys of rivers and beams form the planning basis of natural-ecological framework. In order to improve approaches to planning of natural-ecological framework the methodology developed on the example of landscapes of Rostov region is proposed. Natural landscapes of Rostov region experience uncontrolled anthropogenic impact, there is no coordinated system of regulated nature management and urban development of the territory, which can lead to loss of natural balance. The article considers urban planning aspects of construction of borders of natural-ecological framework on the example of landscapes of Rostov region. The purpose of the study: to justify the urban planning methodology of construction of borders of the natural-ecological framework, within the boundaries of which the legal regime of regulated environmental management in the conditions of the Rostov region is established. The study was carried out on the basis of: analysis of the regulatory framework defining the list of regulated environmental management zones with restrictive regimes of environmental management and other economic activities; Comparison of regulated environmental management zones and other economic activities for their regulatory impact on urban development of the Territory. The application of the results of the study is envisaged in the process of preparation of the territorial planning scheme of the Rostov region, as well as preparation of data for entry into the Unified State Register of Real Estate. The method of using the current provisions of the Federal Legislation in the formation of new urban planning mechanisms in the design of the natural and ecological framework of the territory in the regional conditions of the Rostov region is proposed.

Keywords: *borders of natural-ecological framework, planning elements of the natural-ecological framework, Ecological models of urban fabric, natural and ecological framework of territories, forest-park green belt.*