INTERDISCIPLINARY INTERACTION IN THE RESEARCH AND DEVELOPMENT OF A HUMAN LIVING ENVIRONMENT THAT HEALS RATHER THAN KILLS

INTERACȚIUNEA INTERDISCIPLINARĂ ÎN CERCETAREA ȘI DEZVOLTAREA UNUI HABITAT CARE MAI DEGRABĂ VINDECĂ DECÂT UCIDE

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A synthetic review for a conceptual solution of not only socio-economic, but, above all, environmental and health problems of research and development of the environment for daily, educational, and professional human activity. The determining effect of environmental factors can and must be used to ensure the harmonization of the coexistence of people in the ecosystem, based on its sustainable development and biodiversity. It is proposed to plan and design the urban and rural environment through interdisciplinary interaction of researchers and developers in the fields of Natural Sciences, Landscape Science, Agriculture, Physical Culture and Sports, Regenerative Medicine, Architecture, Design and Construction, Transport, Energy, Water Supply, etc.

***Keywords**: interdisciplinary, environmentally friendly, biophilization, rural and urban environments*

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Strategically, we start from the postulate “Our Strength is in Unity”. Consequently, all the most interesting things in the field of Research & Development will be born at the crossroads of sciences, i.e. interdisciplinary. Another postulate is that the environment of our daily household, educational, professional, and recreational activities has a determining effect on our vitality; the environment is capable of healing and killing. Many Republics of the former USSR show similar trends in the development of the

urban and rural environment for human activity, the extinction of villages and small towns against the backdrop of the expansion (urbanization) of republican or regional centers. Most often, such development trends are assessed from a socio-economic point of view. However, people, first of all, coexist as a biological species (*Homo sapiens*) in various ecosystems, on which they have the most powerful impact, thanks to their intelligence. The present and future design of urban and rural environments must be interdisciplinary and, above all, natural science and environmentally friendly. Any design, artistic or engineering solution will be untenable if it has a destructive effect on the Ecosystem and Biodiversity. The acute socially and economically significant problem of preserving and increasing the working capacity of citizens, increasing labor productivity, and ensuring the competitiveness of the final finished product can be solved in such a not yet popular way. This way of solving the problem is characterized by Bioinspiration of production and any other daily human activity [1].

Bioinspiration is the research, development and production of new materials, devices and structures inspired by engineering solutions formed in living systems during biological evolution and improvement of physiological mechanisms that have occurred over millions of years. It is necessary to introduce Bioinspiration into human activities in order to improve the technology of modeling and simulating biological systems in order to better understand the critical structural features of wildlife. However, Bioinspiration will also be useful for bringing all human production activities into an environmentally friendly and harmonious form. The creation of bioinspired means of mechanization, automation and robotization will provide a breakthrough in expanding the limits of human adaptation to production processes, service and educational activities, increase the level of safety in the workplace, and labor productivity. Bioinspiration differs from biomimicry in that biomimicry aims to accurately reproduce the designs of biological materials.

Bioinspired R&D is a return to the classical origins of science based on observing the amazing functions that living organisms perform and trying to abstract and mimic those functions. Indeed, since ancient times, nature has been a source of inspiration not only for poets, writers and artists, but also for engineers, planners and designers. In fact, the structures and functions of biological objects at different levels of organization are a huge storehouse of amazing engineering solutions and ideas that provide the vital activity of the organism in an optimal way. Health cannot be viewed as something independent, autonomous from the environment. The body of any person is an integral part of the ecosystem. Therefore, any change in the environment will invariably lead to appropriate adaptive reactions of the human body and, possibly, to a change in the state of human health. Moreover, the individual and social health of people is an indirect indicator of the state of the environment. Environment created by us is our Best Healer.

Obviously, at present, the distribution of the human population on a global and regional scale is increasingly determined by the geography of cities, i.e. urbanization

becomes dominant. The influx of new residents is observed especially in the capitals (megacities) and large regional centers, not only from rural settlements, but also from other cities. This rapid, unmanaged, but provoked influx of people into cities puts increasing pressure and strain on the infrastructure of the city, thereby creating significant socio-economic, environmental and health problems. Thus, the thoughtful and designed management of the process of urbanization and the migration of the population from rural areas to urban centers becomes a key priority for national development. As you know, urbanization is the most important socio-economic process of our time. Three stages are distinguished in its development: the 1st in the 19th century marks the initial stage, which is characterized by the initiation of the process of urbanization in Europe and North America; the 2nd in the first half of the 20th Century is characterized by an acceleration in the growth of the urban population and the spread of urbanization to almost all regions of the world; The 3rd in the second half of the 20th Century is characterized by an even more rapid acceleration of urban population growth, the development of large cities, agglomerations (a territorial grouping of cities and rural settlements), as well as the formation of megalopolises (the merger of urban agglomerations), which leads to the spread of urban lifestyle to rural areas terrain [2, 3].

The conditions of the urbanized environment are characterized, first of all, by the isolation and alienation of the human population from wildlife (natural ecosystem) and the creation of an artificial environment. Under the conditions of urbanization, a high population density and all its detrimental consequences have an adverse effect on a person. Against this background, the level of social and alimentary security drops significantly, and the likelihood of conflict and stressful situations increases.

Maintaining an environmentally friendly environment is much more difficult due to the increase in traffic and the amount of industrial and domestic waste polluting the atmosphere, soil, water with various toxic compounds. Aerosol air pollution leads to an increase in cloudiness and the formation of smog, disruption of heat transfer in such a way that cities become a kind of “heat islands”. As a result of seasonal shifts in air temperature, extreme conditions are often created for representatives of various risk groups: people with exacerbations of chronic diseases, cardiovascular diseases, stroke patients, those suffering from obesity and diabetes, etc. Increased building density, high cloudiness and fogging lead to a significant decrease in natural lighting during daylight hours and artificial lighting at night [3]. Increased exposure to noise and vibration can cause damage to the hearing aid and nervous disorders. Excessive noise of an urbanized area can cause nervous exhaustion, mental depression, depression, anxiety, disorders of neuroendocrine and endocrine regulation of homeostatic functions, cardiovascular diseases and peptic ulcer. The impact of noise and artificial lighting at night forcibly shifts the phases of the circadian biorhythm, provoking sleep disturbances and a decrease in the working capacity, productivity and quality of work of citizens. The high pace of life is associated with chronic stress and increased levels of anxiety. Being in a sitting position or in an uncomfortable position in combination

with a diet with a high carbohydrate, lipid and protein index contributes to the development of the metabolic syndrome and its consequences [4].

Violation of the diet, the use of a high content of preservatives and a reduced level of various vitamins in natural products creates favorable conditions for pathogenesis in the digestive and absorption system. Thus, the Concept of "Diseases of cities" appeared, which include allergies; tuberculosis; neuropathology and cardiovascular disorders, immunodeficiency and weakening of nonspecific resistance of the organism [3].

In general, the concepts of urban planning put forward in the 20th century can be divided into 2 large groups: 1. The concept of continuous urban planning, based on the construction of a Linear City (developed by Soria y Mato, Le Corbusier, C. Doxiadis, the NER group, etc.), is the most dangerous for the environment due to its dismembering effect on natural landscapes, which breaks ecological ties, deprives the ecosystem of the ability to reproduce and maintain Sustainability and Biodiversity. 2. The concepts of discontinuous urban planning are characterized by a "Granular" Structure of urban planning (expressed in the ideal schemes of E. Howard, V. Kristaller, E. Gloyden). Such concepts are considered environmentally more attractive. The advantages of discontinuous urban planning are substantiated in the theory of decentralization by Eliel Saarinen, as well as in the London redevelopment project by P. Abercrombie and others. P. Abercrombie compared the growth of continuous (tape) cities with the "growth of a cancerous tumor". In general, such a conceptual approach is clearly dezurbanistic [5].

Regarding the type of cities that was formed in the 20th century, pessimistic remarks were made even by famous architects, creators of modern architecture. F.L. Wright, who believed that "modern civilization can not only survive the city, but also benefit from its death." The concentration of the Earth's population in huge cities upsets the balance of the planet. Therefore, humanity should be more evenly distributed over the globe [6]. The well-known researcher of modern architecture, Michel Ragon, noted at one time that cities in the 20th century. very quickly become obsolete and become "dead cities" - the heavy legacy of the people of the 3rd Millennium. The validity of this statement, made in the 60s, was fully justified by the end of the century, when the problems of reconstruction and ecologization of modern cities arose [2].

It turns out that the city is the main form of settlement of modern human being: on the one hand, it is not a natural habitat for people, so it negatively affects their health; on the other hand, it displaces the natural landscape, causing a violation of ecosystems and the biosphere as a whole, which has an even more detrimental effect on the health of the human population (Fig. 1).



Figure 1. An illustrative example of Biophilization of the urban environment

Obviously, urbanization has a negative impact on the health of citizens living in large cities, which means that the only way out of this situation is a radical revision of urban planning technologies. Thus, a new direction appeared at the intersection of Biology and Architecture-Eco-Urban Planning. A social approach to creating a friendly environment became the norm for Europe in the 2000s. The most famous example of new urbanism is the Superkilen landscape park in Copenhagen, which uses elements of different cultures in its design. The public zone, laid out on the site of the former railway tracks, became the center of attraction for the northern outskirts of the city and immediately reduced the social and racial contradictions of the previously unfavorable area.

Biomedical Sciences are the 21st Century and Urban Planning is another area of application of biological knowledge. When building or modernizing cities, we must take into account the Physiological characteristics and needs of the Human Body, as well as the general laws of Nature, and make the most of the achievements of science and technology.

Thus, in order to preserve Nature and our Health, we must build modern green, smart cities, high-tech and harmonious, with a low level of negative impact on nature, with an improved quality of life for our citizens [7, 8]. The Ecological Balance, Sustainability, Biodiversity in urban and rural zones are central to the survival strategy.

On the one hand, on the level of consumption of natural resources and the harmful effects of elements of the urban environment on nature, and on the other hand, on the productivity of the natural systems themselves.

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