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Unity of Natural and Architectural Space in Landscape Design of Komsomolsk-on-Amur

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Abstract. The problem of nature and architecture interaction is examined in the article. The possibilities of using natural forms as constructive and aesthetic solutions in the design of urban realm are considered. One of the ways to link the architectural and natural environment into one whole and continuous space, while preserving nature and organizing the optimal space for human survival is the architectural and landscape bionics. The article discusses the similar foreign techniques as exemplified by. The article presents the student experience of the department "Design of the architectural environment" of Komsomolsk-on-Amur State University used in term papers and degree theses. Elements of architectural bionics and geoplastics are used in the student work in the landscape development of public space in the landscaping project of the "Enthusiasts" public garden, in the "New Lenin" building estate.

The project developed hard landscaping, which flowing silhouettes were borrowed from natural objects. Piece of natural are used to design the paving pattern. These techniques allow us to change the rigid, geometric structure of a typical development consisting of panel building and make it more flexible and comfortable. The article concluded that the organization of public urban spaces and spaces courtyards of residential apartment buildings, their comprehensive improvement can solve not only the architectural and landscape issues, but also to create a comfortable place for the rest of the townspeople.

1. Introduction

The human desire for nature and the natural landscape is its biological and aesthetic need. None architectural object does not exist outside of nature, which is why now particularly urgent becomes the problem of interaction between architecture and the natural environment. In its activities, the architect-designer should look for the most effective ways of converting natural landscapes, meanwhile maintaining as closely as possible.

2. Purpose

One of the ways to connect the architectural and natural environment into the inseparable space preserving nature and organizing the optimal environment for human existence is architectural and landscape bionics. Architectural bionics is a new phenomenon in architectural science and practice, it



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studies the laws of developing and structuring the living tissues, analyzes structural systems of life on the principle of saving material, energy and ensuring reliability. [1 Architectural and building structures. Architectural bionics for residential, commercial and office buildings https://m.studme.org/54917/tovarovedenie/arhitekturnaya_bionika_dlya_zhilyh_torgovyh_ofisnyh_zdaniy].

Architectural bionics is capable of solving a wide variety of architectural issues: revision the basic architectural questions concerning the fundamental aspects of its development; improvement of the system theory; differentiation of the functional structure of architectural forms and space; extension of compositional techniques - tectonics, proportions, equilibrium, symmetry, rhythms, light, color, etc.; approach the problem of environment conditions; development engineering of existing designs and the implementation of new structural forms, etc. Its subject is the study of the laws of functioning and shaping the objects of living nature in order to apply them to improve architectural solutions, the formation of integrated architectural and urban planning systems, and harmonize the relationship between the architectural and natural environment. [2, 89] Sherstyukova E.L. Features of morphogenesis in architecture (bionic and geonic approaches) / E.L. Sherstyukova, E.I. Prokofiev; General architecture. Creative concepts of architectural activity. - Izvestiya Kazan State University of Architectural and Engineering, 2015, No. 2 (32) - p. 267-273

3. Methods

Since ancient times, man has used natural forms as a source of inspiration for creating architectural objects. The process is the use of shaping wildlife laws changed its character and boundaries, depending on the objective and subjective factors.

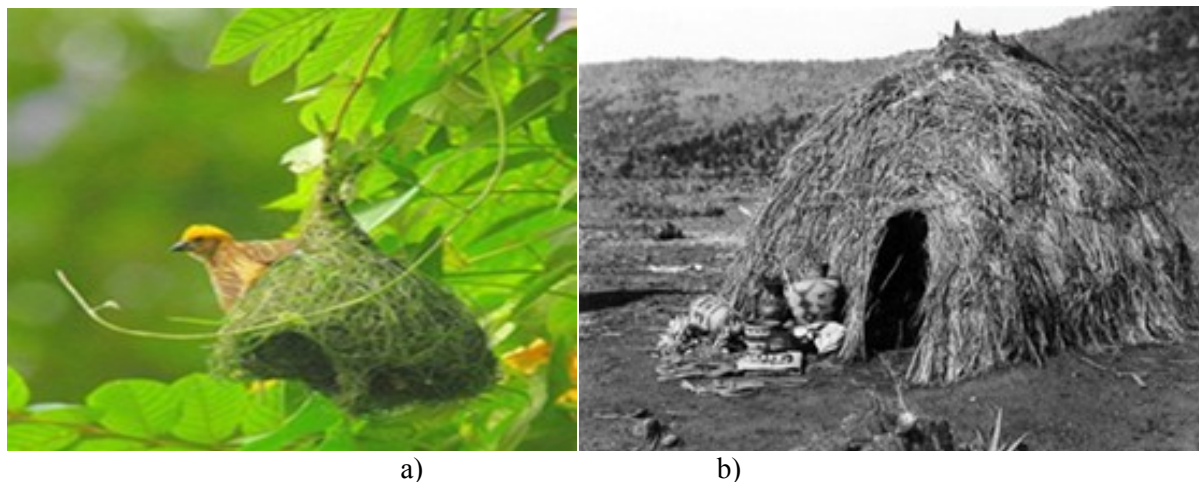


Figure 1. a) an ox-bird nest; b) a South Indian hut.

The most ancient stage of the process can be considered as the spontaneous use of constructive and functional-spatial means of wildlife and the results of the "construction" activity of animals, birds and insects. [3, 3 Sychev, A.V. Landscape Architecture: Textbook. A Handbook for universities / A. V. Sycheva. - 2nd ed., Corr. - Moscow: Publishing House ONIKS 21 Vek, LLC, 2004. - 87 p.] (Figure 1) Natural forms in the organization of the architectural space at this stage were primarily functional.

The second stage - from the beginning of architecture development as art and to about the middle of nineteenth century. For this stage of the architecture development the principle of nature imitation characterized the usage of the nature forms with decorative purposes and copying its external shapes. [2, 3] (Figure 2)

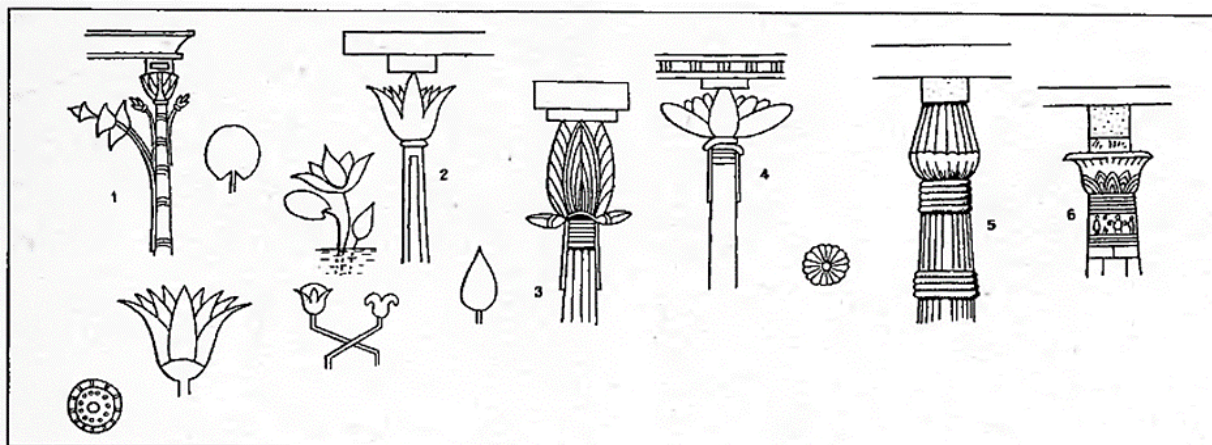


Figure 2. Making column capitals of ancient Egypt temples by analogy with the shapes of lotus and papyrus flowers.

To achieve the symbiosis of natural and inhabited space can not only through the creation of new architectural shapes and buildings, but also by maintaining the landscape in the current buildings.

The most efficient use of the natural landscape can achieve geoplasic- plastic processing relief, through which it acquires not only a decorative shape but more often a shape corresponding to a particular function. Each function meets the specific details of the relief - stairs, ramps, retaining walls, etc. [3, 3 Sychev, AV Landscape Architecture: A Handbook... A manual for students / A. V. Sycheva. - 2nd ed., Corr. - M.: LLC "Onyx Publishing house" 21st Century", 2004. - 87 p.] The modern technologies allow to enormously transform the existing relief or create it anew, creating artificial hills, terraces, slopes. Geoplasic combines the possibilities of enhancing the aesthetic expressiveness of the urban environment with the economy in use of the soil left after construction.

The most characteristic and picturesque elements of the natural landscape can be emphasized and create entirely new shapes with geoplasic.

The decorative and spatial possibilities of the relief plastic are very great. The artificial hills can isolate different zones in residential development or parks, create small enclosed spaces. They also act as a screen, protecting places of recreation and games or buildings from noise and wind. The terraced slopes can be turned into small amphitheatres. [3,3] The Garden of Cosmic Speculation, Dumfriesshire, Scotland. is an example of geoplasic use. It was created by landscape architect and theorist Charles Jencks and his wife_Margaret (Maggie) Keswick Jencks, Scottish writer, artist and garden designer. (Figure 3).The main philosophical idea of the garden is a reflection on the creation of the universe, its laws, the meaning of life and global interdependence. The total area of the **Garden of Cosmic Speculation** is 16.2 hectares. The garden is divided into five parts, and each part has a different shaped ponds, hills, sculptures - each with their own scientific and philosophical value. Here there are fractal landscape and pools with black holes, the mathematical symmetry and logarithmic curves. All this is harmoniously combined with the landscape and the surrounding greenery. [4 The **Garden of Cosmic Speculation** is a mysterious place in Scotland [Electronic resource]. - Access mode: <https://dizaynland.ru/sady-mira/sad-kosmicheskikh-razmyshlenij> (access date: 01/18/19).].

The techniques discussed in the article can be applied in Komsomolsk-on-Amur. For example, the public space is being solved in the project for the improvement of the "Enthusiasts" public garden in the "New Lenin" housing block. The system of footpaths and grounds on the plan forms a composition of smooth natural forms. (Figure 4).

The configuration allows the pedestrian paths to "revive" the monotony of typical building of the neighborhood and makes staying in the park more interesting and comfortable for humans.

Also, the geoplasic techniques are used in the project: the descent to the lower platform of the public garden, located in its central part and it forms an amphitheater with visual spaces, and the soil

residue are used to create the bulk hill in the walking and playing zone (Figure 5). The recreation areas with awnings are raised to small height.



Figure 3. The Garden of Cosmic Speculation, Dumfriesshire, Scotland.

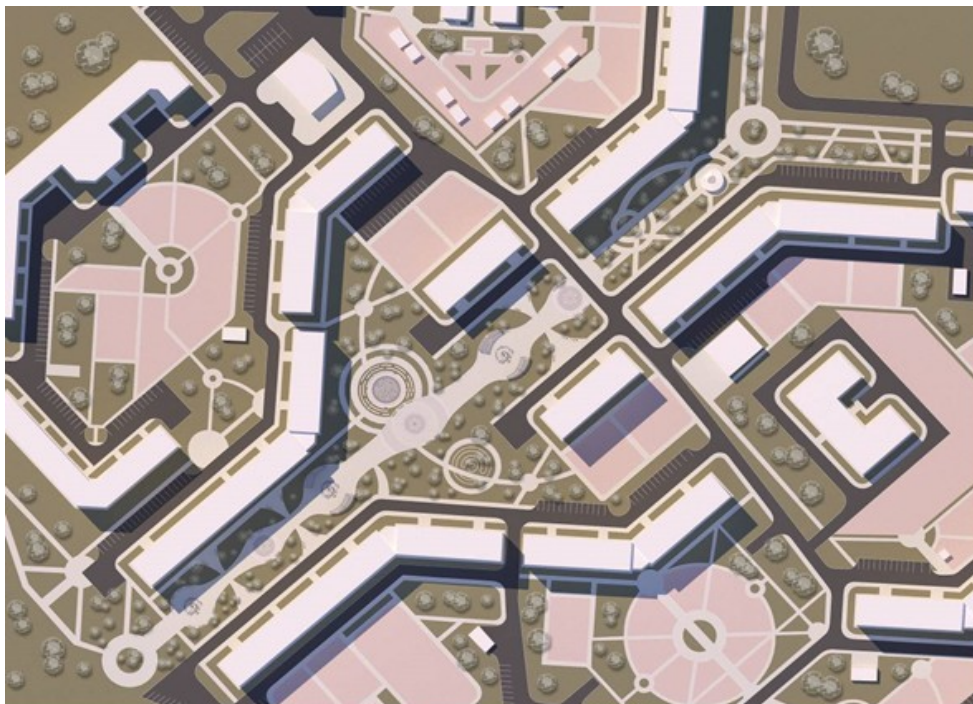


Figure 4. The pedestrian area improvement of the “Enthusiasts” public garden in the “New Lenin” housing block, Komsomolsk-on-Amur. General construction plan



Figure 5. The improvement project of the pedestrian area of the “Enthusiasts” public garden in the “New Lenin” housing block, Komsomolsk-on-Amur.. Geoplastics techniques.

The natural motifs are also used to develop the laying pattern: the central square of the public garden for entertainment facilities. It resembles an airy dandelion on a bright summer day (Figure 6), and the paving of recreation areas with awnings remind a spiral seaweed covered with dew.

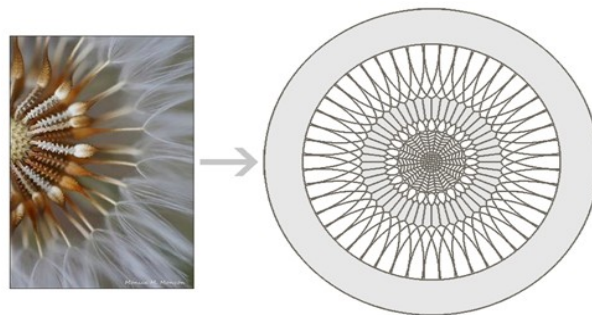


Figure 6. The laying pattern.

Flat, street lights built in the laying pattern imitate dew drops, and the spatial light source is forged multilevel lights, resemble the outline the dried poppy heads (Figure 7).

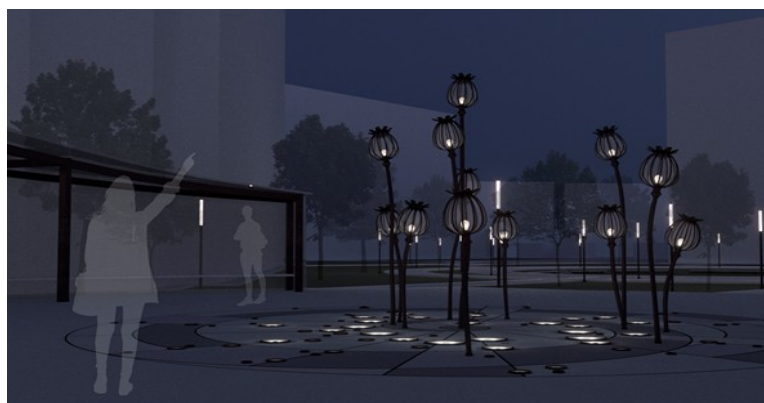


Figure 7. The light composition in a recreation area with awnings.

Curved fore-roofs and flower stalls repeat the shape of flower petals (Figure 8). The same motif is repeated the back benches located throughout the park.



Figure 8. The floral stall.

4. Conclusion

Thus, at this stage of the landscape architecture, there are many techniques that allow to bind architecture and nature. The architectural bionics allows us to organize the human environment more harmonious, natural and vibrant. Flowing silhouettes borrowed from natural objects used in landscape design, allow you to change rigid, geometric structure of typical building, consisting of prefabricated houses, make it more flexible and comfortable. The harmony between man and nature, architecture and landscape is always achieved if the architect does not formally, but creatively come in his search of the landscape situation, identifying and highlighting its best qualities.

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