

# Landscape and Architecture: Interacion for Sustainability

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**Abstract.** The article is focused on the problems of relations between landscape and architecture for the aim to discover additional resources, existed in the architectural objects spatial interpretation with additional ecological sense. Heuristic method, supported by systematical analysis of international experience, is used for some proposals on the ways of landscape and architecture integration offering. Main conclusions are devoted to the means of architectural objects ecological transformation.

**Key words:** integration, green architecture, components of nature.

Looking for the way of sustainable development providing, especially in the new constructed areas, not always and not all the specialists, operating with the landscape, are involved in the analytical thinking about equal role of open green spaces and architecture in this important direction of creative activities. Innovative way of thinking on this direction might be more integrated, putting more requirements to the qualities of architectural objects and making more ecology supporting efforts in the new buildings interpretation.

The question of sustainability for the future environment providing might closely unite landscape architects and architects in the mutual oncoming movement to use additional resources, that belong to the field of researches just between these two spheres of activities, changing their imagination about united possibilities.

In the process of present necessity comprehension of sustainable development concept realization in Russian cities the activity of practical and theoretical specialists in the field of architecture and landscape architecture, as well as everyone, who is connected with qualitatively new objects of construction formation, is plunged to serious revision from the position to choose the most modern and effective decisions corresponding to new requirements. Search of such decisions is impossible without existing problems analysis in the field of interaction of architectural objects with landscape, as the former approach to architectural spaces organization in the majority of domestic cities had not been always focused on the nature inclusion as a component of new constructions and realization of resources saving concept.

## The reason for the problems research

Objective definition of the existing problems allows to formulate a basis for the new approaches offering, answering to the purposes of projected structures transformation in a harmonious part of environment, and possessing instead of while dominating vector of nature components reduction

to introduce the vector of its close integration. Present situation is in certain sense revealing, showing not only the problem of architectural projects making, but opening the question about the role and the place of landscape architects in the process of space creation, giving them not only the chance to decorate it after finished by architects buildings erection but to construct it on united logic together.

In the most general view the main problems in the field of the buildings and surrounding landscape interaction in a domestic practice could be expressed in following positions.

- 1) Rejection of natural environment by erected structures.
- 2) Absence of ecologically positive resource in the surface of buildings.
- 3) Refuse of nature components using as structural elements of architectural spaces.
- 4) Absence of experimental development on the nature fragments inclusion as part of building volume.
- 5) Separated consideration of the building and its nearest landscape in the resources saving aspect.

The radical prevalence of such materials as stone, concrete, metal, glass and minimal using of living nature components becomes the most typical from upper named problems among many constructed monumental buildings mainly public, but as well residential.

## How the situation might be changed

It is a question not only on the means of the buildings "passive" transformation into certain "green" structures, covered by plants (although it remains as well actual), or nature forms copying in the process of projecting in the plan and the building silhouette interpretation (bionical forms following), but about revision of the construction concept for the architectural space turning towards united natural-architectural space.

Restructuring of the buildings plan (open and flexible design) and using of mixed with nature the building section solution, construction with vertical

and horizontal alternation of traditional, “lifeless” and natural, “living” components becomes an additional resource for the qualities of new structures changing.

Uniting thinking about the ways of sustainable development concept realization and the possibilities of “green” architecture using, Arthur Spektor marks: “Sustainability in architecture is no longer an option, or even an ethical consideration – it is the most crucial issue of our time if we are to leave the planet in a habitable state for future generations. The question is whether we can get it all done before the condition becomes irreversible” [1].

Among the purposes of architectural objects interpretation changing in the interaction with the landscape it is possible to allocate following:

- 1) formation of structurally and functionally integrated space uniting the architecture and the nature.
- 2) creation in the building surfaces fragments with the natural resources, providing positive influence on the ecological qualities of environment.
- 3) transformation of natural-architectural space into united space with the coordinated logic of nature resources using.

Speaking about *hypothesis* of the further development of architecture under the alternative version, it is possible to suggest consider a degree of nature components inclusiveness in the structure of architectural spaces in qualitative criterion for opportunities valuation of their integration with surrounding landscape and positive influence on environment ecological qualities.

#### *Components of landscape and architectural object*

Alternativeness of architecture means the new approach introduction to architectural objects projecting and their arrangement in the allocated territory on the basis of certain eco-system designing, based on the account of already existing real opportunities of the concrete site nature characteristics, adding new components of the nature as parts of the spatial system “building-landscape”.

Starting development of territory, choosing the form and structure of the building, and as a result realizing strategy of “bio-integration” as Arthur Spektor marks, “... We need first to ascertain an eco-system's structure and energy flow, its species diversity and other ecological properties and processes. Then we must identify which parts of the site (if any) can have different types of structures and activities, and which parts are particularly sensitive...” [1].

Among the components of natural landscape, interaction with which will be reflected for new eco-system certain stability, it is possible to mark such, as a surface of the ground, forms of relief,

vegetation forms and water components of environment. As potential spaces for spatial eco-system components distribution in structure of new architectural objects it is possible to allocate the following: vertical surfaces of external walls, roof coverings of the building, horizontal surfaces of terraces, niches and ledges on the facade, internal opened and closed (atriums) court yards, spaces between external “layers” of architectural object, inclined surfaces in the external contour of structure.

The project of Cartier Foundation for Contemporary Art in Paris, realized by architect Jean Nouvel, had served some kind of the manifest, a professional appeal to other architects to reconsider as future attitude to components of the nature inclusion in the architectural space. A number of means for such natural-architectural space construction, including “dematerialization” and “superposition des plans” [2], have formed in the further the basis for the imaginations about contemporary architecture development correction.

#### **Means of buildings and landscape interaction**

For the ecological qualities of new natural-architectural spaces changing the main resource in future development belongs not only to providing advanced researches with such subjects as what kind of plants and by what technologies they might be included into architectural spaces. No less important becomes the question and adequate researches making, how the architecture itself has to be structurally transformed in order to become able for the natural components integration, providing real improvement of ecological situations.

From the point of view of the chosen means influence for architectural objects volume-spatial interpretation in the interaction with natural components of landscape such means as the building interaction with ground surface and with the forms of vegetation are representing the greatest interest because might have real influence to the effectiveness of integration, including aspects of energy- and resources saving.

##### *1. Interaction of architectural object with the ground surface*

Among the most widespread means, reflecting possibilities of the building and the ground surface interaction, it is possible to note “overhanging” and “compensation”. On an example of Quai Branly Museum (arch. Jean Nouvel, completed in 2006 year) in Paris the mean “overhanging” might be presented mostly evidently when under the basic volume of the Museum the transit pedestrian ways between planted shrubs and grasses had been organized (Fig. 1).



Fig. 1. Example of the mean “overhanging” using. Quai Branly Museum in Paris, France [Source: photo by the author]



Fig. 4. Interaction of the building with vegetation following the mean “application”. Trade centre “Sihlcity”, Zurich [Source: photo by the author]



Fig. 2. Demonstration of the mean “compensation” possibilities. Park La Vache Noire on the roof of Commercial Centre, Paris, France [Source: photo by the author]



Fig. 5. Possibilities to introduce the containers with the plants in the structure of building facade. Walter Nernst-Haus, Institute of Chemistry, Humboldt University, Adlershof, Berlin, Germany [Source: photo by the author]



Fig. 3. Example of the mean “compensation” using on the roof of trade center. “Sihlcity”, Zurich, Switzerland [Source: photo by the author]



Fig. 6. Example of the mean “introduction” using in the public building architecture interpretation with green gardens between three higher blocks. Trias Towers, Berlin, Germany [Source: photo by the author]

Vegetation accommodation on the roofs surfaces, correlating to the square of building stain, compiles the essence of “compensation” mean and allows to keep relative ecological balance around the building and to promote heat loosing reduction through the contour of building's roofs. As the modern international practice shows, this mean had already effectively used as the “green” surfaces on roofs of

big shopping centers, and even had been interpreted as the “green” park of new generation on the roof of Commercial Centre “La Vache Noire” in Paris (Fig. 2). In the new shopping center “Sihlcity” in Zurich the square of covered with grass roof surfaces composes 5 of 10 hectares of all roofs covering square that confirms possibility to transform at least 50 % of building roof square into the green space (Fig. 3).

## 2. Interaction of architectural object with forms of vegetation

Among the most potential means of the buildings interaction with the vegetation forms, it is necessary to mark the means “application” and “introduction”. Relating to the essence of such interaction, we have to realize the resources of the nature, contained in the spontaneous vegetation, but creating the chance for technologically supported vegetation, making adequately equipped shell. The mean “application” realization might be carried out in a wide range of modern “green” technologies. For example, experience of modern big structures erection has confirmed an opportunity of the plants growing along the external bearing shell done of metal cables (Fig. 4) and accommodation of vegetation in containers on the different levels over the building facade (Fig. 5). The difference is that in the first case the plants like high tree-lianas are planted in the massive soil along the bottom of the building, having less risk of frozen, but in the second case the plants in the containers have bigger risk for the frozen, if the volume of soil is not big enough of if it is not supported by natural heating from massive construction.

On such examples as Trias Towers in Berlin, it is possible to notice, that spatial interpretation of architectural object's volume, forming it from several blocks putted on united low storey basis, possesses the evident opportunity to use the surface of lower part roof as the basis for the garden accommodation on the roof between higher blocks, realizing the mean “introduction” (Fig. 6).

## References

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## Conclusions

For the sustainable development concept realization the questions of landscape and architecture interaction move from the field mostly problematic to the field of new resources analyzing and realizing. The approach to create continued by the architecture qualitative transformation additional eco-system “building-environment” might give important vector for joint investigations over new architectural space interpretation.

Using the effect of existing additional heating processes on the external surfaces of the building in the cold time of the year the green technologies might be one of the ways towards the energy consumption reduction, giving this small portion of not lost energy for the mass of soil with the roots of plants. No less importance the creation of water effective landscapes has, where the buildings and surrounding environment might “work” together.

For the qualitatively new ideology of architecture introduction it is necessary in the countries already involved in the sustainable development concept realization to accelerate distribution of the adapted international ecological standards, such as LEED, BREEAM or DGNB, which could promote appearance of new approaches to the components of nature integration in architectural space structure. But one of important position is that in this process the landscape architects with better knowledge of vegetation peculiarities and green technologies have to be ready for the new solutions offering, based on scientific researches.

**Kopsavilkums.** Zinātniskajā rakstā ir apskatītas ainavas un arhitektūras mijiedarbības problēmas ar mērķi aptvert esošās papildus arhitektūras objekta telpiskās interpretācijas iespējas ar ekoloģisku nozīmi. Daži ainavas un arhitektūras integrēšanas priekšlikumi ir balstīti uz pētījumu, izmantojot heuristisko metodi, kuras pamatā ir starptautiska mēroga pieredzes sistēmātiska analīze. Galvenie secinājumi ir attiecināmi uz arhitektūras objekta ekoloģiskās transformācijas veidiem.