Preservation of original appearance of Irkutsk

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Abstract. The article gives consideration to peculiarities and common factors of developing a three-dimensional structure of the city with due account for spatial development of the natural landscape and for historical heritage. The three-dimensional structure of the landscape presented through hierarchical relationships gives the opportunity to identify distinctive features that make the landscape different from the others. In addition, the three-dimensional structure allows specifying the least module of the landscape to preserve its visual characteristics. The generalized schematic diagram of the hierarchy of landscape spaces must be the tool to manage the development and preserve the original appearance of Irkutsk.

1. Introduction

The problem of preserving the original appearance of Irkutsk involves analysing and accommodating the aesthetic potential of unique patterns of the natural landscape with such big waterways as the Angara River and the Irkutsk River (Figure 1).

At the present day the natural landscape is the basis for the cultural landscape of the city that is arranged in layers of building structures of different time reference. Since the XVII century Irkutsk has gone through several periods of evolution. Each period is marked by specific combination of spatial planning and architectural-artistic systems in urban planning, which reflect the main development features of the basic principles of urban Siberian culture. Its spatial structure results from the evolutionary process of urban development when increasing built-up density of the historical part of the city under the conditions of naturally changing architectural styles, on the one hand, and under the influence of fluctuating construction volume, on the other hand. As a result, the urban development is characterized by its being inhomogeneous both in the context of spatial planning and architectural composition, as well as design elements. The historical buildings of Irkutsk are divided in two categories. The first category is comprised of typical buildings for housing and commercial purposes. They are a contrasting featureless background for the churches, monuments, large buildings intended for public and private use. The second category consists of some large buildings, churches, monuments and public use buildings. They are essential for structuring the city environment and have to be bigger and stand out from the buildings of the first category to make the city appearance impressive. Such a relationship between the buildings of different categories influenced their architectural-artistic grouping at the early stages of the city development. Mutual interaction of "monostructure", which included very tiny number of unique public use buildings, and spontaneous development of "polystructure" (residential buildings) provided architectural integrity of Irkutsk in the past. Religious architecture was popular "monostructure" in Irkutsk. Ecclesiastic buildings such as
churches, being large and picturesque, contrasted with single-storey buildings and created a magnificent panorama of the city. The terrain being hilly contributed to locating the most impressive buildings on the hilly sites. In this context they were felt as an architectural dominant. The analysis of locating high-rise buildings in the form of religious units in relation to the terrain and the river showed (Figure 2) that there are 3 groups of dominants in Irkutsk.

![Figure 1. Terrain situation in Irkutsk.](image)

![Figure 2. Spatial structure of the landscape and planning the historical part of Irkutsk (XIX century) with the system of high-rise dominants.](image)
1. The group of high-rise dominants of river orientation (built along the Angara River and Ushakovka River): Kharlampievsky Church, Roman Catholic Church, Church of the Saviour, Epiphany Cathedral, Znamenskii Convent, Kazansky Church, Church of the Transfiguration.

2. The group of high-rise dominants located on the terrace edge: Church of the Exaltation of the Holy Cross, Jerusalem Church.

3. The group of high-rise dominants located in the central part of the river terrace of the Angara River. Lost pieces of religious architecture (Kazan Cathedral, Tikhvin Church, Annunciation Church).

The history of international urban planning proves that a skyline is built with a view to contrast vertical constructions and terraced buildings. The historical parameters allow explaining the objective laws in the ratio of high-rise elements and the level of terraced buildings. At the end of XIX century the architect Mertens claimed that the emphasis of the skyline depends on the ratio of the vertical constructions and the average height of buildings. He made the conclusion taking into consideration the fact that the contrast can be created through building vertical constructions against clearly visible horizontal landscape. He identified the optimum relationship of such vertical constructions (churches) to the overall level of buildings as 1:2, 1:3, 1:4 (where one unit is the height of the buildings that are located near the vertical structure). In Irkutsk the proportion of the height of Kharlampievsky Church to the residential buildings was the following: \( h : h_1 = 5 \text{m} : 48,040 \text{m} = 1: 9,608. \)

This proportion between vertical dominants and residential buildings is closely related to the storey factor (the number of storeys in a building). A few cities in the world could preserve their original appearance due to having implemented regulations for controlling the number of storeys in buildings. St.Petersburg is referred to such cities where building high-rise constructions in the centre could be authorized only providing the regulatory requirement (1766) "The Committee on the Stone Construction of St. Petersburg" that says that buildings of 10 sazhens high (old Russian measure of distance equal to 2.13 m) is allowed on the embankment of the Neva River.

Today, when large-scale housing construction is increasing and the centre of the city is being reconstructed, the problem of regulating the number of storeys is increasingly relevant. Especially within the process of revitalization of the city landscape, it is necessary to restore the area without damaging its original appearance. It is highly recommended that monuments of architecture contributing to Irkutsk image should be preserved. Building new high-rise constructions has to meet the need for combining with the historical architectural ensembles and monuments. The only way to preserve and develop the multifaceted image of the capital of Eastern Siberia is to consider its historical architectural composition. There is a trend in Irkutsk to develop mid-rise buildings. But it changes the panorama of the city. According to Evreinova Y.N. the panorama of the city can be impressive under the condition of its balancing with the natural environment since buildings have to be integral to the landscape and adapt to it. City space should improve the landscape when making it dynamic and expressive, or making it calm in terms of the urban planning situations. [1] A. G. Bolshakov believes that in order to achieve a balance of interests in developing the city centre, the new urban policy should be based on the natural relationship of values and morphotypes. The author analyses the restoration of the centre of Irkutsk emphasizing the high quality of organizing the space. He suggests that the balance of values and their proper distribution on the territory of the historical centre of the city should be based on the urban planning rules and regulations [2]. N. N. Baranov considers that configuration of the terrain and water surfaces – seas, lakes, rivers, channels and reservoirs as natural factors – has a certain influence on the skyline of the city. The terrain being hilly contributed to locating the biggest and the most impressive buildings on the hilly sites (castles, cathedrals, palaces or monuments). In this context they are felt as architectural dominant ensembles and it is the terrain that contributes to it [3].

Description of the visual characteristics of the landscape engaged A. Vergunov[4], L. Zalesskaya, E. Mikulina[5], J. Simonds[6]; methodology of architectural and landscape analysis A. p. Vergunov[4], A. V. Sychev[7], M. Purvinas[8]; study of various aspects of linking the city planning with the landscape A. G. Bolshakov[9], A. p. Vergunov[4], V. R. KRO-gius[10], E. M. Mikulin[5],
Yu. B. Khromov[11], etc.; harmonious inclusion of architectural forms in the landscape of Yu. 12];
identification of volume-spatial structure of the landscape by V. K. Shcherban[13]; manifestation of
the city appearance through the panorama of V. K. Mo-or[14], E. A. Erysheva[15]
In order to preserve the original image of Irkutsk and achieve well-balanced compositional
relationships between the buildings and the landscape it is necessary to find and employ an appropriate
approach to interpret the landscape as a spatial system that is structurally varied. There are some issues
to analyse here:
1. To identify the criteria for the three-dimensional structure to be well-balanced.
2. To point out the properties that allow describing the territory as a three-dimensional
structure.
3. To work out the typology of relationships between the elements of spatial structures of the
city and the landscape.
4. To identify the criteria of the maximum permissible level of the relationships between the
buildings and landscape.
5. To develop the generalized schematic diagram of the hierarchy of landscape spaces as a
tool to manage the development and preserve the original appearance of the city.
The issue of identifying and preserving the original architectural appearance of the city is related to
evaluating its aesthetic qualities. So, there appears a question about the criteria for their evaluation. M.
E. Weitens points out that under northern conditions there are two factors that make the original
appearance of cities expressive and unique: nature and urbanization. There is one feature that is
common for such cities as Murmansk, Kirovsk and Apatity. What unites them is the visual
relationships between the city environment and the natural environment. In those cities where the
relationships are provided by the urban planning pattern, which highlights the most picturesque spaces
of natural surroundings, the urbanscape is notable for being the most expressive and original.
Monchegorsk and northern part of Murmansk are referred to such cities. The architectural precedent of
Murmansk proves that one of the possible directions to develop a distinctive appearance of a northern
city is contrasting residential buildings (where wind-protective designing methods are employed) with
the natural landscape. Clear functional zoning to locate the industrial port area and residential area in
different levels had a positive impact on developing the urban environment of Murmansk. Its terraced
spatial type allowed the observer to see the terraces from top clearly. Research of Leningrad Scientific
Research Institute proved that there can be different modes of communication with the natural
environment depending on the severity of climate. There are three types of the modes: closed,
nominally open and open regimes [16]. Bolshakov A. G. points out the sustainable development of the
landscape as a criterion of harmony for the architectural environment, as when it is disturbed, it cannot
be aesthetically appealing [17].
Since the city and natural spaces interact on a regular basis, they have to be considered and
evaluated through one and the same criterion. Spatial structures of the landscape and the city can be
taken as a criterion for such an evaluation. Y. Raninsky touches upon the consistency in developing
the historical city and speaks for a special "ensemble of spaces". First and foremost, the city image
depends on the type of relationships these spaces have. It can be spacious or cramped, open to light
and air and, conversely, gloomy and closed. Its being picturesque and regular is primarily reflected in
its spaces. People do not see the plan of the city. Spatial relationships are the first thing the observer
perceives in the process of understanding and building a city image [18]. To find these relationships, it
is necessary to generalize natural forms in their hierarchical structure. It will make it possible to
understand the geometric patterns of constructing the spatial structure of the landscape, to show the
structural diversity and unity of the natural environment and to quantify information about the physical
parameters of the space. Furthermore, it will contribute to obtaining an objective basis for architectural
and spatial composition. It provides the opportunity to use common graphic symbols to denote the
forms of urban and natural spaces. Z. N. Yargina claims that the spatial structure of the landscape is
always a certain sign of originality. Its allocation allows for a long-term potential assessment of the
development of the urban fabric, while maintaining uniqueness in the appearance of the city [19]. This
is due to the fact that the urban fabric is developed to meet social requirements (sanitary and hygienic, socio-psychological, socio-demographic, socio-economic, socio-cultural). Constructive and technological needs evolve within the economic and social progress of society and are not so stable. The architectural planning stereotype of urban spaces and typical means of building make both different areas and even cities similar. The structural diversity of landscape spaces being unique due to their aesthetic characteristics creates a stable system of spatial orientation in time and can play an important role in the development of individual features in the architectural and artistic appearance of cities.

"When remembering the history of urban planning and the history of urban development, we should not forget that in many cases they were located on those lands that are now classified as being inconvenient". In order to be protected against enemies' attacks steep slopes and hills of the landscape were used. Settlements in the bends of the rivers were founded to make it easy to move. Various natural anomalies of certain areas contribute to developing specific individual architectural appearance of urban environment. Natural factors, both favourable and unfavourable ones, affect the original character of the planning structure and architectural solutions of building issues significantly[20].

2. Conclusion

When looking for the elements of original architectural appearance of cities, it is important to start with the identification of the three-dimensional structure of the natural landscape. Selecting and building the hierarchy of the three-dimensional structure of the landscape gives the opportunity to identify distinctive features that make the landscape unique. The main feature is a hierarchical mosaic structure of spaces that certain landforms have. The generalized schematic diagram of the hierarchy of spaces contributes to identifying the smallest module of the landscape, which visual properties should be preserved. It can show the location and direction of developing these three-dimensional cells. The schematic diagram should become a tool in planning the development of the city (Figure 3). The balanced interaction of the landscape and the city can be provided only if the type of space that is formed by building constructions coincides with the natural space. Thus, within the process of maintaining the unique appearance of Irkutsk, the main objective of the engineer qualified in structural design is identifying and preserving the combination of landscape spaces, while emphasizing the image through building methods and taking into account the remained historical high-rise dominants.

Figure 3. Three-dimensional structure of the landscape.
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