

The principles of the coastal areas in the context of large cities

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Summary. The coastal territory is the most valuable for using for urban purposes. The city and its water area has a strong influence on each other, their intersection is the coastal zone, the border between the built environment and the part of the nature.

Relevance of the study of coastal areas in big cities is being connected to their high "demand" in different historical stages. Particular planning structure of big cities is largely determined by the nature of coastal areas and natural affinity and economic conditions. Overview of urban development of coastal areas shows growing interest to them everywhere in the world. These areas are seen as the contact zone of the natural and urban landscape.

The present article considers how much the relationship between man and water area of the city was changed over the time, and what issues exist in the shaping of the coastal areas of cities nowadays.

The article provides a classification of areas of city embankments upon configuration and interaction with area waters.

The author identifies the basic principles of the coastal areas of cities, uses the integrated approach to the study of coastal areas, where they are considered as an integral part of urban space.

Key words: coastal spaces, waterfront area, coastal landscape, water front of the city.

INTRODUCTION

The history of the development of most cities is inextricably linked to water spaces within their structure, rivers, lakes or seas. Therefore, an integral part of the city with access to water areas is coastal areas. Wide expanses of water (big rivers, lakes, seas) have the greatest impact on the image of the city.

The city and its water area are in parallel artificial and natural environment, but they have a clear border crossing. Various components of the origin of the border produce specific issues which need to be addressed today's society.

The attitude to the city water area was changed very dramatically in recent years. Initially, water was considered as an obstacle to the development of the city and its connections. But with the development of science and technology people began to use the city water area and coastal areas for their own purposes.

The coastal area is valuable for using them for urban purposes.

When planning city decisions, located on the shores of large bodies of water, people tend to bring them to the downtown and residential development, create embankments

which serve the city decoration, place water near large planted area. Beaches, recreation and sports water facilities are located on the banks of ponds [6].

In the current situation the deindustrialization of cities and perception of nature as an integral part of the human condition, the question the role of water space in the structure of the city, related to the importance of cross-border regions between "natural" and "artificial" is an important aspect of urban planning.

PURPOSE OF WORK

The purpose of this paper is to define the basic principles of coastal areas of big cities and show that for the time being there is need to move from individual development of coastal areas and landscapes (parks, embankments, harbors, etc.) to programming and complex concepts that take into account the basic issues of coastal areas of big cities.

MATERIALS AND METHODS

Research of coastal areas of big cities and their development should be done through a comprehensive use of the historical, cartographic, statistical and comparative analysis, allowing identifying patterns of development.

RESULTS AND DISCUSSION

The role of the embankments in the city is complex and versatile, so comprehensive solution to all issues related to its establishment and operation, is particularly important [4].

Embankments are space-planning complexes near water bodies that occupy large urban areas. They are directly connected with urban development, and water area. Embankment complex includes community facilities, natural or artificial coastal landscape, as well as underground and above-ground engineering, communications and equipment [4].

Recently, the widely used term "coastal zone" or "coastal area". They are not strict uniform concept. For the boundaries of coastal areas on the coast and the sea in different countries and in different disciplines used different principles. For example, the width of the coastal zone in different countries varies from tens of meters to hundreds of miles and difficult to detect that definition, which is most common. Also important to highlight an optimal allocation principle of the coastal territory.

According to the main trends of the coastal areas of the city we can talk about them as about areas with specific economic, social and environmental resources in the urban structure. Question of worsening of the ecological situation in the cities that deviate from the standard indicators, requires a solution. The level of air pollution, lack of green areas needs to revise the approaches to coastal areas creation, which first of all, must comply with the requirements of people.

Objective factor in building urban landscape is the size and configuration of the area.

Use sculpturesque properties of natural factors areas, conservation of landscape areas, additional planting green space can create a coherent system of green spaces and water that contributes to the formation of integrated architectural expressional urban ensembles.

In today's urban planning major role is dedicated to ensemble, not a separate building. Therefore, designing new embankments or their parts, must take into account the overall architectural and spatial ensemble of the whole embankment.

It's advisable to create accents for circuit prospects of embankments on their ends that give the completeness and architectural expression to the embankment.

It's important to take into account panoramic perception of the city extended through the water surface both the opposite bank and the water. On the banks of narrow rivers spatial development should be used for creating green margins, gaps, organizing various

transversal perspectives, enriching the architectural composition of embankments.

Depending on the size of water space and its shape, location, length of embankment and its functional content itself coastal area may look like boulevard with landscape gardening or type a regular grand esplanade.

If embankments are converted into transport arteries, they must have a protective dense greenery of the residential area. These conditions should take all possible measures to ensure that this forced decision has a minimal effect on the coastal landscape, and eventually use mainly embankments for leisure of urban residents.

Improvement of embankments involves creating pedestrian alleys of areas for recreation, playgrounds, squares, parks and boulevards and improvement of road transport, landscaping and lighting, laying of underground utilities, installation of protective drainage etc.

The main role in the design of embankments is given to green spaces. Planting of greenery in embankments is performed with the maintenance of existing mature trees and shrubs in rows, individual trees or groups of free shapes so that trees do not interfere with panorama of the water reservoir, but rather emphasize the openness of perspective on the water surface.

The conditions for a short rest and walks in the green near the water have to be created, where you can enjoy the most expressive picturesque panorama of the urban landscape. While selecting green plants the height of trees and shrubs, their shape, the color of leaves and change its color at the time of flowering should be taken into consideration. The range of trees, shrubs, flowers and their composition in combination with lawns, small architectural forms can be most diverse. Lawns and flower gardens are widely used in the design of oblique embankments, creating a thick green carpet of bright spots flowers.

When planting the greenery on embankments the orientation must be taken into consideration. On the embankments, which are facing south, it is necessary to create shaded

areas. In walking alleys, the greenery is usually placed on the inside of the mall.

Berths, stairs to the water, parapets, fences, rotunda and benches, decorative vases which are harmoniously inserted and artistically executed are to replenish the architecture of embankments, giving them picturesque identity. Stairs with sightseeing platforms not only connect the walking mall, laid at different levels of the slope or combine embankments with water, but are by nature of embellishment of embankments.

The picturesque embankments have a major impact in creating a unique identity of coastal cities. They are paid special attention also because they are favorite walking place for citizens and in resort cities - tourists, becoming essentially a well-ordered city recreation park.

Please note that in forming marine city's skyline the length of the coast, its outlines contribute greatly on its perception from the sea.

Concave configuration of the terrain allows perceiving dominants in expanded form with both water and land, convex - right opposite - reduces visibility. The steep hilly coast makes panorama of the city diverse and naturally divided into spatial components. Mainlines, approaching embankments, organize access to water of residential areas and architectural planning connection with residential development.

Boundary space is an integral part of the creation of waterfront zones of cities. "Boundary spaces" is a natural dominant (river, bay and sea), industrial area, office and residential buildings, transport infrastructure in all parts of the embankments [9].

"Water front" is also very important concept for coastal zones of cities. This part of city faces or borders by water: river, lake or sea. Urban areas along the banks of large bodies of water can be divided into the following functional areas:

- 1) on the embankments used as recreation, parks, gardens, sports facilities are created – to support favorable ecological conditions in the urban environment. Green plants are placed on the embankments considering

the overall architectural and planning decisions for territory, which depends on the functionality of the embankment, its shape and size, construction of coastal slopes and retaining walls. They are placed symmetrically on the sides of the roadway, or asymmetrically usually dominated landings, completion boulevards directly from the side of the water;

2) traffic use of the embankments is necessary to ensure access to social and functional business or industrial zones, located in the coastline;

3) residential embankments are designed to ensure communication with the waters of residential development, which favorably affects the psychological and physical health of people;

4) public embankments, which include the structure of public buildings of different destination: administrative, sports or any other buildings and structures;

5) industrial embankments which are located in large industrial areas and include in its structure factories, manufactures warehouses and other areas [14].

Classifications of embankments are also defined by their configuration and interaction with water area:

1) compact organization of embankment space is determined by the effect on water reservoir area, which surface exceeds considerably the length of the coastline and specifies a functional orientation for coastal area;

2) the linear configuration of the embankment is more common for linear cities and has a small difference of its length with an area of territory that affects its space. The coast line type has a focus and often performs a certain function;

3) batch water development is focused on cooperation of individual sections of coastline, due to territorial or functional zoning.

Depending on the horizon and boundary waters and high altitude embankments are:

1) the single-stage - these embankments are arranged at the height of the wall 5 – 5,5 m. Higher walls are inappropriate for building from architectural point of view [1];

2) two-stage and multistage embankments are build, based on engineering and economic reasons. Embankments should be provided tiered shape with vertical walls or a combination of the bevel and the wall that fortified or landscaped with stone having a slope of 1:1 – 1:1,5 [6].

A broader intermediate level offers spaces for lingering be the waterside and temporary uses such as summer cafes. This element, frequently used over longer sections of a river, is conceivable when space is limited. The divisive character of a vertical riverbank is ameliorated and the flood area is improved by broadening the cross-section [13].

A staged transition to the water over several broad terraces usually permits several users to coexist. The design emphasizes the twofold function of this area, on one hand access to the river and on the other an interesting recreational area beside the river. To develop its effect fully, this approach is suitable for longer stretches of a river. A gradual transition to the adjacent urban space can be created, without a perceptibly hard borderline. Broad riverbank steps create public space beside the water, offering direct contact with the river at various water levels. By opening new sightless they can achieve striking connections between the urban surroundings and the river. Diverse structuring of the steps enhances their various functions as movement spaces and pleasant places to linger, similar to the tiers of a sport stadium [13].

The combination of upper and lower embankments creates a wonderful game of contrasts of environments if they are allotted different functions.

However, when constructing territories, the question of economic feasibility is a key one [3].

When designing or remodeling coastal areas certain principles of zone creating, are used, helping to make architectural environment more comfortable for human beings in it.

Among the main principles of coastal zones are:

- 1) the principle of humanization of the space environment;
- 2) the principle of parity of artificial and natural components;
- 3) the principle bio positive spaces [15];
- 4) the principle of creation a single water-green frame (ecological frame of the city);
- 5) the principle of architectural and planning solution "approach of the city to the water" [9];
- 6) the principle of aesthetic harmonization;
- 7) the principle of the city environmental sustainability;
- 8) the principle of investment attractiveness [3];
- 9) creation of innovative urban-art image (innovative ultramodern city image) [5].

The principle of humanization of the space environment (Fig. 1) means the implementation of the principle of philosophy, which is based on respect for people, caring for them and their belief in the great potential for improvement. In general terms, it is about humanizing when the focus of all activities is given to the person and its needs [2]. During the process of humanization of the space environment, so it is meant to achieve improvement of physical, psychological and spiritual comfort for human in both artificial and natural environments [11].

The transformation of social and economic conditions leads to changes of the role and place of human in the modern world. The variety and rapid change of the needs of different social groups in organizing of their material and spatial environment are the main reasons for creating modern city-build objects for civil purpose [7]. All this determines the need to review the existing approaches of architectural and landscape creation of coastal areas of city.



Fig. 1. The principle of humanization of the space environment. Cheonggyecheon river linear park, Seoul, South Korea

Creation of equipped places for people staying at the coastal strip (pad recreation, seasonal service centers and children's play spaces) could help reactivate the embankments landscape, implementing their unique natural resource.

The most powerful way to create a comfortable environment is a landscape improvement. Cultural development of effective landscaping of coastal areas is extremely important for big cities.

The forms of vegetation used to solve such issues: linear structure of coastal systems, creation of separate visual barriers, emphasis of ceremonial areas, scaling of environment depending on the nature of space. The transition to a consistent replacement of old with new plantings of vegetation is one of the options for coastal areas restructuring, focused on building of effective natural frame. It is appropriate to create multilevel frame with green plants (trees, shrubs, bushes) in coastal and adjacent areas.

For the perception of architectural environment as an extension of the natural using of natural materials such as natural stone and wood are needed.

This applies primarily to embankments bevels and berms surface treatment, shore strengthening constructions that are in close visual and tactile contact with people. Especially wood has great humanized possibilities [11].

Demonstrative practice of coastal areas creation in all major cities of modern world shows that natural materials are used widely everywhere.

Humanization of coastal spaces is also associated with "the concept of sustainable development» (sustainable development) [8] of cities which is actually becoming popular due to signs of crisis which can be observed in relations between human and environment. While the elements of nature are inserted in the urban landscape and when the visual and functional transformation is dedicated to increase the level of comfort this should not be limited by external order and decoration only [11].

The principle of parity of artificial and natural components (Fig. 2) consists in equal use of natural and artificial elements in the design, reconstruction and regeneration of coastal areas of big cities. Using both synthetic and natural ingredients provides the most harmonious habitat for humans.



Fig. 2. The principle of parity of artificial and natural components. Jack Evans boat harbor, Coolangatta, Brisbane, Australia

Application of means of architecture integration and landscape art (in the structure of the coastal space) is based on environmental and semiotic approach.

The principle of parity of artificial and natural components destined to ensure environmentally sustainable and identically visual field with an optimal ratio between the architectural and natural components.

The principle of bio positive space (Fig. 3) provides maximum inclusion of natural ingredients in the framework of reconstruction and new spaces designed by coastal spaces and respect for the existing natural resources. Bio positive spaces principle is the foundation and basis for enhancing the role of natural frame in refilling of coastal spaces and is the preferred choice for the natural components for the purposes of ecological renovation and new urban embankments [17].

A significant role is also given to the regeneration and renovation of postindustrial coastal areas.



Fig. 3. The principle of bio positive space. 723 E Ashby Pl, San Antonio, Texas, USA

The principle of bio positive space implies for architecture the need to improve energy efficiency of buildings and structures within the coastline and the use of alternative energy systems, economic lighting (increase of natural light due to light scattered by the internal surfaces of the building).

It is essential introduction to architectural concepts theory of "green buildings plastics» (green architecture) [12] and ecological construction.

Aesthetic harmonization principle (Fig. 4) is oriented to improve perceptions of visual quality of the coastal environment in order to achieve unity of composition of buildings, green space systems, means of visual orientation, small forms, etc.

The using of this principle allows ensuring of historic preservation and conservation of

the "spirit of place" in large cities all over the world.



Fig. 4. Aesthetic harmonization principle. Ipswich River Heart City Parklands, Ipswich, Brisbane, Australia

Creation a single water-green frame (ecological frame of the city) (Fig. 5) is an integrated approach to the design of the coastal area of cities and shows that these areas are tied very closely economically and socially with the city itself.



Fig. 5. Creation a single water-green frame (ecological frame of the city). Madrid Rio Landscape, Arganzuela, Madrid, Spain

The principle of environmental sustainability (Fig. 6) is dedicated for creation of "conditions for sustainable city development, feasibility for high environmental quality of coastal areas, renovation (restoration) of wa-

ter front of the city and maintaining ecological balance" [19].

Reducing of the number of potential sources of environmental stress (industry and transport) in the structure of the waterfront area is a priority direction of urban development. Reducing the anthropogenic impact on nature and human beings is directly related to the improvement of environmental coastlines quality. The modern city can't be considered humane environment in case if it doesn't use all measures to reduce the negative impact on the biosphere.



Fig. 6. The principle of environmental sustainability. Saint Martin channel, Paris, France

City planning coastal development is an integral part of environmental safety of the city [18].

Functional organization quality of the coastal areas of big cities do not fully meet the basic requirements of a modern, ecological safety, comfort space, aesthetic appeal in terms of contact of urbanized environment with the natural landscape. Due to the growth of cities – especially big ones, special attention should be given to natural complexes of coastal zones, as their reducing under the pressure of urbanization leads to the need to create methods and guidelines for the maintenance of the environment at the city planning level [10]. The creation of a single water-green city frame as a basic planning mean to ensure ecological balance of the urban environment foresees maintenance and creation of significant natural areas in the structure

coastlines performing recreational, environmental and health related functions.

Architecture and planning solution of "approach of the city to the water" (Fig. 7) is an important principle of planning coastal areas of big cities. It is primarily based on transport and economic aspect of the city.



Fig. 7. Architecture and planning solution of "approach of the city to the water". East River Park, New York, USA

The principle of investment attractiveness (Fig. 8) consists in the most efficient and sustainable using of coastal resources, assuming encouragement of investments to in order to change the properties of adjacent areas to the level which will ensure their profitability. Clarification of legal aspects that make the basis for encouraging of investments at various levels can ensure the appearance of additional resources for focused and economically justified development of urban coastlines [16].

Coastal zones are the ones the most exploited and attractive investment areas due to its rich historical resources. Domestic and foreign experience of cities "near the water" can distinguish two types of coastal space: first - an industrial or commercial zone, berth for water transport; second – beach and walking park, full of comfortable seating and is a picturesque street, which hosts various cultural events. As a rule, the cities with "water front" combine both functional loading of the coastal zone, distinguishing them geographically.

With the development of coastal areas, it is important to understand that their functional saturation must meet the needs of citizens, justify costs of investors and not to destroy the environment.



Fig. 8. The principle of investment attractiveness. Nyhavn, Copenhagen, Denmark

The principle of creation of innovative urban-art image (innovative ultramodern city image) (Fig. 9) consists in creation of a water front and embankments prospective and coastal areas.

A new urban sprawl is normally developed, spatially following in a linear direction from the coast. This phenomenon is a direct effect of the improvement of transport systems, the increase of living standards and the importance of tourist activities and has led to negative effects on coastal biodiversity, a steady increase on demands for water resources and an increase of waste production and pollution.

By including coastal zone issues in the city's development plans, an integrated approach could be generated taking into account all the essential matters for the achievement of effective policies for both coastal/marine and urban activities.



Fig. 9. The principle of creation of innovative urban-art image (innovative ultramodern city image). Crimean embankment, Moscow, Russia

Analysis of the cities that have their waters –rivers, lakes coast, bays, sea allows segregating of two main issues of urban landscape and coastal areas creation:

1. Functional development of embankments. Contradictions in appropriate functional applicability of coastal territory – on the one hand industrial and commercial area of the city - a place for freight and passenger water transport; at the same time the embankment is a walking zone.

There is a task to create for pedestrians' chamber and cozy environment of coastal areas: pedestrian zone, running zone, cultural zone.

Two versions of the approach and solution coastal cities can be defined – first: respect for the historical heritage of the city – the inclusion to the area of the old piers, ports and harbors, and second: it is important to use modern architectural and engineering methods of development of coastal areas, which create "collage" nature area [20].

Thus a clear segregation of promenade and industrial zones in the city should be done, besides deliberate separation of industrial flows and flows of people.

2. Integration of modern embankments in a dense urban environment. Creation of a "planning system interaction" of urban and coastal areas: architectural and spatial formation oriented to waterfront city center; including terraces and natural coast in the

planning; disclosure of modern luxury development to the river or artificially created harbor, etc.

CONCLUSIONS

The coastal area of the city is one of the most attractive areas for humans; they need a complex approach in order to solve specific issues and problems that have been formed over a long period of time.

Urban areas along the coast can perform different functions - an embankment function, used for urban parks and recreational areas; waterfront function that is only used for commercial or transport purposes. The issue of zoning of coastal territories is very important according to these types of embankments for the correct and harmonious functioning of each of them.

The issue of spatial and functional correction of the urban environment is an important issue to create the coastal areas of big cities as well as environmental rehabilitation of coastal zones in big cities and ergonomic and aesthetic harmonization of architectural and landscape environment of coastal areas of big cities.

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ПРИНЦИПЫ ФОРМИРОВАНИЯ ПРИБРЕЖНЫХ ТЕРРИТОРИЙ В КОНТЕКСТЕ БОЛЬШИХ ГОРОДОВ

Аннотация. Наиболее ценными для использования в градостроительных целях являются прибрежные территории. Город и его водное пространство имеет сильное влияние друг на друга, их пересечение и является прибрежной зоной, границей между искусственной средой и частью природы.

Актуальность исследования прибрежных территорий крупных городов связана с их высокой востребованностью на разных исторических этапах. Обзор состояния градостроительного развития прибрежных территорий показывает растущий интерес к ним во всем мире. Эти зоны рассматриваются как контактные зоны природного и урбанистического ландшафта.

В статье рассматривается, как с течением времени менялось отношение человека к водному пространству города и какие проблемы существуют в формировании прибрежных территорий городов.

В статье приводится классификация набережных зон города по конфигурации и площади взаимодействия с акваторией.

Автор выделяет основные принципы формирования прибрежных территорий городов, использует метод комплексного подхода к изучению прибрежных территорий, в котором они рассматриваются как неотъемлемая часть городского пространства.

Ключевые слова: береговые пространства, набережная зона, прибрежный ландшафт, водный фасад города.