

SUSTAINABLE DESIGN PRINCIPLES IN MODERN LANDSCAPE ARCHITECTURE

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Abstract: This article highlights the role of modern landscape architecture in sustainable development. It discusses the importance of landscape design in maintaining ecological balance, the rational use of natural resources, and improving the quality of urban living environments. The article also explores aspects such as achieving aesthetic satisfaction through landscape architecture, enhancing the quality of public spaces, and restoring ecological systems in urban areas. It analyzes contemporary approaches, challenges, and future directions in both the practice and theory of landscape architecture.

Аннотация: В данной статье освещается роль современной ландшафтной архитектуры в устойчивом развитии. Рассматривается важность ландшафтного дизайна в поддержании экологического баланса, рациональном использовании природных ресурсов и улучшении качества городской среды. Также в статье рассматриваются такие аспекты, как достижение эстетического удовлетворения с помощью ландшафтной архитектуры, повышение качества общественных пространств и восстановление экологических систем в городских условиях. Анализируются современные подходы, проблемы и перспективные направления как в теории, так и в практике ландшафтной архитектуры.

Keywords: Landscape system, landscape architecture, aesthetic and ecological, relief, horticulture, ecology, nature.

Ключевые слова: Ландшафтная система, ландшафтная архитектура, эстетическая и экологическая, рельеф, садоводство, экология, природа.

Introduction. It is well known that architects are not only involved in the construction of buildings and cities but also play a vital role in the organization and design of open spaces. These include streets, squares, flowerbeds, boulevards, beaches, neighborhood parks, playgrounds, private gardens, parks, national parks, historic landscapes, and more. The primary goal of urban landscape and landscape architecture is to shape the artistic, architectural, planning, and landscape environment in open spaces through the combination of natural and artificial elements, small architectural forms, landscaping components, and information systems. Architecture, urban planning, and landscape architecture are closely interconnected, differing in the materials and tools used to shape the environment. These three fields have historically served common goals throughout the development of human society. [1] The concept of sustainable development has become one of the central directions in architecture, urban planning, and especially in landscape architecture. The increasing population, urbanization, environmental issues, and limited natural resources make it necessary to implement sustainability principles in landscape design. Key Principles of Sustainable Design. Maintaining Ecological Balance. Sustainable landscape design aims to support natural ecosystems without causing harm. Projects strive to preserve natural relief, vegetation cover, and water resources as much as possible.

1. Rational Use of Natural Resources. Sustainable design involves conserving natural resources. For example, systems for collecting and reusing rainwater, energy-efficient lighting, and selecting plants adapted to the local climate are applied.

2. Harmony with Local Ecosystems. Designs should be adapted to local flora and fauna. The selected plants must serve not only decorative purposes but also functions such as dust absorption, air quality improvement, and providing habitat for wildlife.

3. Social Inclusivity. Sustainability is not only ecological but also social. Parks, promenades, and recreational areas must be accessible and suitable for all social groups: people with disabilities, children, the elderly, and others.

4. Adaptability to Climate Change. New landscape solutions must be resilient to climate change. This includes creating shaded areas in hot climates, applying water-saving technologies, and building drainage systems capable of withstanding heavy rainfall. Green Roofs: Used in urban areas to reduce heat islands, retain rainwater, and create additional green spaces. Modern landscape architecture serves not only aesthetic purposes but also plays a crucial role in shaping a sustainable lifestyle. Its main goal is to create an ecological, economic, and socially comfortable environment that ensures harmony between humans and nature. Therefore, integrating sustainable design principles into landscape architecture practice is a pressing task today.

Materials and Methods. In Uzbekistan, landscape planning is part of the district planning scheme. However, the increasing ecological challenges necessitate the protection and preservation of natural and land resources. Furthermore, it is becoming necessary to identify landscape restoration and the study of environmentally impacted areas as independent professional fields aimed at improving environmental sustainability. In landscape planning, it is crucial to enhance social, economic, ecological, and aesthetic comfort. The future of parks and squares cannot be evaluated outside the broader urban system. First and foremost, it is important to note the increasing complexity of the vertical structure of green areas. This is related to the emergence of new elements in the territorial development of cities and agglomerations. The development of green systems varies across cities. Urban greening efforts are influenced by factors such as the size and specialization of the city, its significance, the presence of historical buildings and structures, and natural conditions (climate, soil, existing vegetation, topography, and water bodies). The size of the city directly affects the composition, dimensions, and functional organization of green spaces. Based on their location within residential areas, green spaces are categorized into five types:

- Green areas for nature conservation: reserves, natural monuments, sanitary protection zones around water sources.

- Cultural heritage parks: historic gardens, dendrological, botanical, and zoological gardens and parks.

- Public use parks: city and district parks, squares, boulevards, pedestrian streets, riverfront zones, and suburban recreation areas.

- Restricted-use green areas: neighborhood and block parks, specialized parks, gardens near kindergartens, schools, administrative buildings, higher education institutions, and sports complexes.

- Green spaces for special purposes: roadside vegetation, industrial zones and their sanitary areas, nurseries, greenhouses, roads, and railways. [1]

The formation of park and garden architectural objects in urban green areas has followed different paths in different cities. The principles of traditional irrigation systems in Central Asia can be observed in the historical cities of Uzbekistan such as Samarkand, Bukhara, and Khiva, where flatland water supply systems (canals and reservoirs) were established. Currently, the historical principles of planning green spaces have largely disappeared. The necessity of creating a continuous and integrated green system in urban environments has already been acknowledged.

Research in the fields of landscape architecture and urban landscape planning shows that landscape solutions that preserve natural topography can support the implementation of urban planning principles.

Despite constant changes in external environmental factors, urban planners must develop and test models that ensure the growth of cities and their surroundings while strengthening, not weakening, the connection with nature. In practice, first-level residential complexes in large cities consist of islands encompassing various functional zones. These include central, peripheral, industrial, recreational, and external transport zones, among others. This spatial and functional organization of urban landscapes is defined not only by specific functions but also by natural, socio-economic, ecological, sanitary-hygienic, urban planning, and spatial factors. Two main groups of factors influence this process: landscape (natural) and urban planning (functional planning) factors.

To further improve the greening system of settlements in Uzbekistan, there is a need for an architectural framework that considers the quantitative ratio of green system elements in both urban and rural areas. Based on research conducted by the Tashkent Scientific Research Institute (ToshZNIIEP), recommendations for the regulation of green spaces in Uzbekistan have been developed and can be applied in practical design and urban planning. [4]

In parks and forest-parks, we observe a crucial link between humans and nature. The city of the future – the one being laid down today – must not be placed in opposition to the natural environment but should be harmoniously integrated with it. Urban boundaries are becoming less defined, and the interconnection between buildings and open green areas is becoming one of the key principles in the development of urban and settlement systems. [5]

Conclusion. In large cities, there are vast forests, large water reservoirs, and hundreds of hectares of parks. These areas must preserve and, if necessary, restore the wealth of the natural landscape. It is essential to provide opportunities for recreation in nature close to places of residence, work, or study, without the need to leave the city. However, the conditions for urban development, the landscape characteristics of cities, and the recreational needs and preferences of different populations are highly diverse. These needs vary across residential systems located in different natural and climatic conditions. The main objective of landscape design is to create a comfortable spatial environment with all necessary functional, aesthetic, and ecological characteristics for human life. This goal is based on the intentional transformation of specific natural landscapes. Therefore, the identification, classification, and study of their structure are of great importance not only for theory but also for practical architecture.

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