ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-515-x, Impact Factor: 9.23

American Academic publishers, volume 6, issue 01,2026

Journal: https://www.academicpublishers.org/journals/index.php/ijai

UDK: 711.4:712.5

ISSUES OF LANDSCAPE DESIGN AND SELECTION OF GREEN ELEMENTS IN SUSTAINABLE URBAN PLANNING

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Abstract: This article examines the ecological, aesthetic, and functional principles of landscape design and green element selection in the context of sustainable urban development. The study is conducted with consideration of Uzbekistan's climatic conditions, limited water resources, and the use of locally adapted plant species. The results highlight the role of green infrastructure in improving urban microclimate, enhancing environmental balance, and increasing the overall quality of urban life. The findings provide practical insights for integrating sustainable landscape solutions into contemporary urban planning strategies.

Key words: Sustainable urban planning, landscape design, green elements, native flora, climate adaptation, open spaces, environmental sustainability, public parks, urban planning.

Introduction

Sustainable development of urban planning is a complex and multifaceted process based on the harmonious integration of closely related factors such as ensuring environmental sustainability, increasing economic efficiency, and meeting social needs. In the context of modern urbanization, rational use of natural resources in urban areas, maintaining ecological balance, and reducing anthropogenic pressure on the environment are emerging as important tasks.

In recent years, the issue of ecology and environmental protection has become one of the priority areas of state policy in Uzbekistan [1]. In particular, the growth of the population, increased transport load, and increased construction density have a negative impact on the ecological quality of the urban environment.

Against the background of these problems, improving the microclimate in urban areas, normalizing air temperature, reducing the amount of dust and harmful gases, and reducing noise levels are of urgent importance. The role of landscape design and green elements in effectively solving these tasks is invaluable. Trees, shrubs, flower beds, lawns, and other living components ensure the ecological sustainability of urban space, enrich its aesthetic appearance, and have a positive impact on the psychological state of the population.

At the same time, proper planning of green areas increases the functional efficiency of urban infrastructure, improves the quality of public spaces, and serves to create a comfortable and safe living environment for residents. Landscape design is considered not only as a decorative element in urban planning, but also as a strategic tool for solving environmental and social problems. In particular, the selection and placement of green elements in regions with harsh and arid climatic conditions requires a special scientific approach.

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This article analyzes the principles of selecting landscape solutions based on the economical use of water resources, suitable for the climatic conditions of Uzbekistan. It also highlights landscape approaches that use local flora, form green systems that ensure ecological stability, and serve the long-term development of the urban environment. The results of the study serve to develop scientific and practical recommendations on increasing the importance of landscape design in creating a sustainable urban environment and its effective implementation in urban planning practice.

Methods

In this study, the process of urban landscape design and the selection of green elements was studied in a comprehensive manner based on ecological, aesthetic and practical approaches. The research methodology was formed based on the analysis of theoretical views and practical experiences aimed at ensuring the sustainable development of the urban environment. The main attention was paid to assessing the impact of green elements on urban ecology, their functional efficiency and aesthetic value.

During the analysis, the main factors were taken into account: dry and sharply continental climatic conditions of Uzbekistan, seasonal temperature changes, low rainfall and limited water resources. At the same time, the criteria for selecting water-saving technologies, low-maintenance solutions and environmentally sustainable plant compositions in landscape design were studied. The adaptability, durability and long-term exploitation capabilities of local flora representatives were separately analyzed.

The research methods used were the analysis of scientific literature, observation, comparison and generalization of existing urban green areas. Also, advanced practical experiences, design solutions and recommendations given by experts on the formation of green infrastructure in urban spaces were systematically studied. This approach made it possible to identify the advantages and disadvantages of the methods used in urban landscape design. Based on the results obtained, methodological approaches were developed aimed at creating sustainable green infrastructure in urban areas, strengthening the ecological balance and ensuring a comfortable environment for the population. The research methodology serves to draw scientific and practical conclusions in the field of urban planning and landscape design and to formulate recommendations that can be used in the future.

Results

As a result of the analysis and generalizations, a number of important aspects of the process of urban landscape design and selection of green elements were identified. The results of the study identified the main directions that serve to ensure ecological sustainability, improve the quality of the urban environment, and enhance the functional efficiency of green infrastructure.

First, it was found that the selection of plant species suitable for climatic conditions is one of the most important factors in urban landscape design. In hot and dry climates, local trees and shrubs are characterized by high adaptability, low irrigation requirements, and long-term durability. These plants serve to reduce the costs of maintaining green spaces in urban areas, while strengthening ecological sustainability (Table 1).

Table 1. The importance of climate-adapted plant species in urban landscape design

Plant Group	Level of Adaptabilit	Water Requi-	Climate Tolerance	Main Functions in Urban

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	y	rement	Characteristics	Landscape
Native trees	High	Low-moderate	Resistant to heat and drought	Providing shade, improving urban microclimate
Native shrubs	High	Low	Adapted to dry air conditions	Dust and wind control, green buffering
Drought-tolerant plants	Very high	Very low	Suitable for water-scarce environments	Creating water - efficient landscapes
Native ornamental plants	Moderate–high	Moderate	Adapted to seasonal temperature variations	Enhancing aesthetic quality of urban spaces
Perennial plants	High	Low	Long-term durability	Reducing maintenance and management costs

Secondly, it has been found that the use of sustainable landscape solutions increases the ecological and aesthetic quality of urban spaces. Vertical landscape elements, open public spaces, avenues and parks allow to increase the share of green spaces in urban areas. Such solutions not only create an aesthetically attractive environment, but also increase the functional efficiency of urban infrastructure (Table 2).

Table 2. Sustainable Landscape Solutions and Their Impact on Urban Spaces

Landscape Solution	Key Features	Ecological Benefits	Aesthetic/Functional Benefits
Vertical landscaping	Green walls, rooftop gardens	Increases green area in dense urban zones, improves air quality	Enhances visual appeal, provides insulation, reduces urban heat island effect
Open public spaces	Plazas, squares, pedestrian zones	Supports urban biodiversity, improves microclimate	Creates social gathering areas, aesthetic enhancement
Parks and gardens	Urban parks, botanical gardens	Provides habitat for flora and fauna, improves air and soil quality	Recreational and visual appeal, encourages outdoor activities
Linear green corridors	Tree-lined streets, green alleys	Connects fragmented green spaces, reduces pollution	Improves urban connectivity, visually organizes cityscape

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Community green projects	Neighborhood gardens, pocket parks	Encourages local engagement, supports small-scale biodiversity	Enhances neighborhood aesthetics and social cohesion

Third, the positive impact of green areas on the urban microclimate has been clearly demonstrated. Trees and shrubs reduce direct sunlight, moderate air temperature, trap dust and harmful gases, and improve air quality. As a result, the urban heat island effect is reduced and a favorable microclimate is formed for the population (Table 3).

Table 3. Impact of Green Areas on Urban Microclimate

Green Element	**Mechanism of Action**	**Microclimatic Effect**	**Additional Benefits**
Trees	Provide shade, reduce direct sunlight	Lowers ambient temperature, mitigates urban heat islands	Reduces energy demand for cooling, improves thermal comfort
Shrubs and bushes	Act as wind and dust barriers	Reduces wind speed, traps dust and pollutants	Enhances air quality, decreases airborne particulates
Green spaces (parks, lawns)	Increase evapotranspiration and soil moisture	Cools surrounding areas, stabilizes local humidity	Supports biodiversity, encourages outdoor recreation
Vertical greenery	Green walls, rooftop gardens	Reduces surface temperatures, buffers solar radiation	Improves building insulation, enhances aesthetic appeal
Combined vegetation (trees + shrubs)	Multi-layered canopy	Maximizes cooling effect and air purification	Creates comfortable and healthy urban environment

Fourth, the preservation and development of biodiversity was considered one of the important outcomes of landscape design. Green areas, combined with local flora and fauna, enhance the stability of the urban ecological system, support natural balance, and serve to preserve biological resources in the conditions of urbanization. This is an important factor in ensuring the long-term ecological sustainability of the urban environment (Table 4).

Table 4. Role of Biodiversity in Urban Landscape Design

Aspect	**Key Features**	**Ecological Benefits**	**Urban Planning/Functional Benefits**
Native flora	Trees, shrubs, perennial plants	Supports local ecosystems, maintains soil fertility	Reduces maintenance costs, enhances resilience to pests and

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			diseases
Local fauna	Birds, pollinators, small mammals	Promotes ecological balance, aids in pollination	Improves recreational and educational value of green spaces
Green corridors	Connected parks, street trees, riparian zones	Facilitates species movement, prevents habitat fragmentation	Enhances urban connectivity, aesthetic cohesion
Multi-layered vegetation	Combination of trees, shrubs, groundcover	Maximizes habitat diversity, stabilizes microclimate	Strengthens ecological services, improves urban quality of life
Sustainable landscape management	Low-intervention, resource-efficient practices	Maintains long-term biodiversity, reduces anthropogenic stress	Ensures ecological and social sustainability in urban planning

Discussion

The role of trees and shrubs in creating the architectural, artistic and aesthetic aspects of sustainable urban development through landscape design, as well as in preserving the ecology of the environment, is invaluable [2]. Research results show that the proper planning of green infrastructure has a direct impact on maintaining the ecological balance in the urban environment, reducing anthropogenic load and improving the quality of life of the population. Therefore, landscape design should be considered not as a secondary element, but as a component of strategic importance in the urban planning process.

The limited water resources and high temperature conditions in the climatic conditions of Uzbekistan require a special approach to choosing landscape solutions. As the study revealed, the use of water-saving technologies, the use of local flora that is less demanding on irrigation, and the introduction of green elements that are easy to maintain are among the important conditions for sustainable urban planning (Figure 1).

This approach not only ensures environmental sustainability, but also reduces the economic costs associated with the maintenance and operation of green areas.

Also, the use of innovative solutions such as vertical landscape elements, green walls and roof gardens allows you to increase the share of green spaces in densely built-up urban areas. These bioelements expand the functional capabilities of urban spaces, enrich their aesthetic appearance and serve to create an environmentally friendly environment. Vertical landscapes are especially important in areas where there is a shortage of space (Figure 2).

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Figure 1. Sustainable landscape design in the climate of Uzbekistan





Figure 2. Green spaces in urban areas

The results show that integrating ecological, aesthetic, and social factors in landscape design and the selection of green elements is essential for ensuring the long-term sustainability of urban environments. This approach will improve the physical and mental well-being of urban residents, increase the efficiency of public space use, and contribute to the modern and sustainable development of cities.

Conclusion

Landscape design and the selection of green elements are a strategic tool for sustainable urban development, serving the ecological, aesthetic and social development of the urban environment in the climatic conditions of Uzbekistan. The selection of local plant species and the use of sustainable landscape solutions allow the formulation of practical recommendations in the field of urban planning and urbanism.

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