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GLOBAL TRENDS IN LANDSCAPE ARCHITECTURE AND THEIR POTENTIAL IN SOLVING THE ENVIRONMENTAL PROBLEMS OF UZBEKISTAN'S CITIES

K. K. Tursunov
Senior Lecturer,
Department of Architecture and Computer Graphics,
e-mail: q.tursunov@ferpi.uz

N. A. Akhmedova,
Master's Student, Fergana State Technical University,
Uzbekistan, Fergana City
qobiljontursunovarchitek89@gmail.com

Abstract
Green spaces play a crucial role in the formation of sustainable cities of the 21st century — they regulate the microclimate, improve public health and increase the comfort of urban life. International experience shows that successful urban policy is based on the integration of natural components into the development of the urban environment. The article analyses contemporary trends in landscape architecture in different countries and assesses the possibilities for their adaptation in Uzbekistan. Particular attention is paid to the environmental challenges of small towns — the lack of green infrastructure, increasing climate risks and the lack of sustainable planning. Directions for the development of urban landscapes are proposed, based on nature-oriented solutions and sustainable design principles that can improve environmental sustainability and the quality of life of the population.

Keywords: Landscape architecture; green infrastructure; sustainable development; environmental problems; climate adaptation; international experience; urban ecosystems; nature-based solutions.

Introduction

Contemporary trends in urbanisation and climate change have placed landscape architecture at the centre of the global discussion on the future of cities. Whereas in the past, landscape was considered an aesthetic addition to architecture, today it is becoming a strategic tool for sustainable development and environmental stability [1].

The global community is increasingly aware that urban sustainability is impossible without integrating natural elements into the urban structure. Green spaces regulate the microclimate, reduce the heat island effect, increase biodiversity, and improve the psychophysiological state of the population [2]. Research in the fields of urban planning and ecology shows that access to green spaces is directly linked to levels of physical activity, reduced stress and increased social cohesion [3].

In the context of these global trends, the experience presented at the IFLA 2025 World Congress in Nantes (France) is indicative, where the key role of landscape architecture in solving the climatic and social problems of urbanised areas was demonstrated. It was also emphasised that the modern city should be perceived as a living organism in which green systems function alongside engineering and transport networks. Leading experts, including Katie Willis and Edward Wilson, note that human interaction with nature is not a luxury but a necessity — infrastructure for health, sustainability and quality of life [4].

Green areas are becoming an important element of urban infrastructure, capable of compensating for the effects of anthropogenic stress. The European Union's Mission – Soil programme and examples from architects such as Heide Hermari illustrate the transition from engineering design to nature-oriented solutions, where soil, vegetation and water are considered equal components of the urban environment [5].

Leading global examples include the BUGA project in Germany, the green corridors of Medellin (Colombia), the High Line park in New York (USA) and the "City in a Garden" strategy in Singapore — demonstrate how landscape architecture can transform the appearance of megacities and increase their resilience to environmental and social risks [6].

These cases confirm that the landscape approach is becoming a central element in the renewal of urban civilisation and a source of innovation in the planning of sustainable territories.

Thus, the relevance of the study is determined by the need to rethink the role of landscape architecture in shaping a sustainable urban environment in Uzbekistan, especially in small towns, where environmental problems, a lack of green spaces and climate challenges require comprehensive, systematic and scientifically sound solutions.

International experience in integrating green infrastructure

Contemporary international practice confirms that green infrastructure is a key tool for sustainable urban development. It is seen not as a decorative addition, but as a functional system that ensures ecological balance and adaptation to climate change [1].

Green corridors, rain gardens, vertical plantings and eco-parks create an interconnected network that regulates temperature, water balance and biodiversity. Leading global cities demonstrate successful examples of integrating nature into the urban fabric, where natural processes become part of the engineering logic of urbanism [2].

Ecological functions and strategic importance

The integration of natural components into the urban structure contributes to:

- reducing air and water pollution;

- mitigating the effects of flooding and overheating in urbanised areas;
- increasing biodiversity and ecosystem sustainability;
- the creation of comfortable public spaces and social integration [3].

Contemporary urban planners view green infrastructure as the living framework of a city, connecting parks, streets, courtyards and embankments into a single ecosystem.

Examples from Nantes (France), Copenhagen (Denmark), Singapore, and New York (USA) clearly demonstrate how landscaping solutions can transform industrial, climatically challenging, or socially overloaded areas into sustainable and healthy urban environments [4], [5].

International experience in integrating green infrastructure

Table 1

City / Country	Main strategy	Key elements of green infrastructure	Effect/Result	Adaptability in Uzbekistan
Nantes (France)	"Garden city" along the Loire River	Linear parks, bio-plateau, phytoremediation	Improvement of water and air quality	Yes — along the Fergana and Syr Darya rivers
Copenhagen (Denmark)	Climate-resilient streets	Rain gardens, permeable pavements	Reduction of flooding and overheating	Yes — applicable in arid areas
Singapore	"City in a Garden"	Vertical gardens, green bridges	Lower temperatures, increased biodiversity	Partially — in densely built-up areas
New York (USA)	High Line Park	Revitalisation of industrial areas	New public space, cultural effect	Yes — for former industrial areas

Table 1. "International experience in integrating green infrastructure"

Analysis and adaptation opportunities for Uzbekistan

The experience of Nantes deserves special attention, as it shows how water can become a structuring element of the urban ecosystem. The use of phytoremediation and bioplatforms for natural wastewater filtration not only increases environmental sustainability, but also creates new public areas. A similar approach is appropriate for Uzbekistan, where many cities are located along rivers — Fergana, Syr Darya, Zarafshan — and can use water corridors as a basis for ecological restoration [6].

Copenhagen demonstrates an example of integrating engineering and natural solutions through the creation of "climate-resilient streets". A system of rain gardens and permeable pavements reduces the risk of flooding and promotes the efficient use of rainwater. In the arid climate of Uzbekistan, this approach is particularly relevant as it provides a closed water cycle in the urban environment.

Singapore is a benchmark for vertical and intensive greening. Here, green infrastructure is included in every new project, from residential buildings to transport hubs. For the dense urban development of Uzbekistan, this experience can serve as a guideline for the reconstruction of central areas, where the lack of space can be compensated for by vertical greening of facades and roofs [7].

The High Line project in New York demonstrates how rethinking industrial heritage through landscape can shape new social values. For small and medium-sized cities in Uzbekistan,

this model is suitable for the revitalisation of former industrial areas, transforming them into cultural and recreational spaces.

Key conclusions for this section

International experience shows that the successful integration of green infrastructure requires a comprehensive approach, including:

1. strategic planning and regulatory control;
2. the use of nature-based technologies (rainwater harvesting, phytoremediation, vertical greening);
3. involvement of local communities in the design of public spaces;
4. adaptation to climatic conditions and cultural specifics of the territory.

These principles can form the basis of a national strategy for greening small towns in Uzbekistan, aimed at improving environmental sustainability, quality of life and the development of a green economy.

Problems in the development of landscape architecture in small towns in Uzbekistan

Despite their rich cultural heritage and favourable climatic potential, small towns in Uzbekistan face a number of environmental, urban planning and socio-economic challenges that hinder the formation of a sustainable urban environment. Unlike megacities, where comprehensive greening and improvement programmes are implemented, green infrastructure in small towns is often fragmented and decorative in nature, failing to provide the necessary environmental functions [1].

Key problems

Among the most pressing problems are:

- a shortage of green areas in residential and public areas;
- low quality of existing green areas;
- inconsistency of urban planning decisions with natural conditions;
- a shortage of qualified specialists in the field of landscape architecture;
- the absence of national standards and a regulatory framework for the development of green infrastructure [2].

In most small towns, greening has developed spontaneously, without taking into account climatic, hydrological and soil conditions. As a result, urban streets are overheating, air quality is deteriorating, soil is becoming polluted and there is a shortage of recreational spaces, especially in historic centres.

The lack of a systematic approach means that green areas remain fragmented and do not function as a single ecosystem [3]. The social functions of the landscape are also underestimated: parks and squares are designed without the active participation of local residents, which reduces their demand and viability.

Key problems of small towns in Uzbekistan and ways to solve them

Table 2

Problem	**Cause**	**Possible solution**	**International equivalent**
Lack of green spaces	Lack of comprehensive planning	Creation of linear parks and green corridors	Nantes (France) — "Garden City"
Overheating and air pollution	Lack of greenery and shaded areas	Vertical gardens, urban forests, green roofs	Singapore — "City in a Garden"
Lack of water for irrigation	Arid climate and irrigation losses	Rainwater harvesting, permeable pavements	Copenhagen – 'Climate-resilient streets'
Lack of personnel	Lack of specialised educational programmes	Training of specialists in landscape design	Europe, USA — professional certification systems
Weak regulatory framework	Lack of uniform standards	Development of national standards for landscape design	United Kingdom, Germany — BREEAM, DGNB

Table 2. Key problems of small towns in Uzbekistan and ways to solve them

Situation analysis

The key barrier to the development of landscape architecture in small towns is insufficient institutional support. Most initiatives are implemented in a fragmented manner and are not supported by regulatory and legal mechanisms [4]. At the same time, funding for green projects is often limited, making it impossible to implement innovative nature-based solutions.

The climatic characteristics of Uzbekistan — high summer temperatures, moisture deficiency and soil salinity — require the use of adapted technologies:

- the use of xerophytic (drought-resistant) plants,
- introduction of drip irrigation and closed water circulation systems,
- creation of green screens and shade galleries to protect streets from overheating [5].

Particular attention should be paid to involving local communities in the design and operation of green areas. International experience shows that community gardens, "green courtyards" and "third places" strengthen social cohesion, foster a sense of belonging and encourage responsible attitudes towards the urban environment [6].

Development opportunities

Despite the existing difficulties, the potential for the development of landscape architecture in small towns in Uzbekistan is quite high.

With a comprehensive approach that includes:

- the development of a national green infrastructure strategy,
- the integration of environmental standards into urban planning,
- the development of professional education and training,
- partnerships between the state, the private sector and local communities,

landscape architecture could become a key area of sustainable urban development in the country [7].

In the long term, small towns could become pilot sites for the implementation of climate-adapted solutions: green corridors, riverside parks, vertical gardens and water-saving technologies.

Figure 1. Conceptual diagram — "Model for integrating green infrastructure into small towns"

Thus, the integration of natural components into the planning and development of small towns is not only a necessity but also a strategic priority that can ensure a sustainable future for the country's urbanised areas.

The study confirms that landscape architecture in small towns in Uzbekistan is an integral element of sustainable urban development and has high potential for solving environmental, social and climate problems. International experience — from the "City in a Garden" strategy in Singapore to the High Line project in New York and the "green streets" in Copenhagen — shows that integrating natural systems into the urban environment leads to lower temperatures, improved air and water quality, increased biodiversity and the creation of comfortable public spaces [1], [2].

For Uzbekistan, the key areas are the development of a national green infrastructure strategy, the implementation of nature-based solutions, the creation of a system for training landscape architecture specialists, and the adaptation of international standards to local climatic and cultural conditions [3]. The implementation of these measures will help to create an environmentally sustainable, socially inclusive and economically efficient urban environment in small towns.

Thus, landscape architecture should be viewed not as a decorative component of urban improvement, but as the infrastructure of a sustainable future, ensuring harmony between nature and humans, and serving as a strategic resource for the modernisation of Uzbekistan's cities in the 21st century.

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