Architectural Studies
International Journal about Architecture

Volume 11, No. 4

UDC 711.432 + 712.25
DOI: 10.56318/as/4.2025.53

ISSN: 2411-801X
e-ISSN: 2786-7374

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Traditional and innovative approaches to landscaping and principles of their implementation in the context of urban space harmonisation

Abstract. Intensive urbanisation processes require solutions that combine the socio-psychological features of the development of urban fabric with modern technologies in order to preserve the connection of man with nature even in conditions of compacted development. The purpose of the study was to analyse traditional and innovative approaches to landscaping and determine the principles of their implementation to create a safe and comfortable space. A historical and comparative analysis was carried out, which showed the evolution of landscaping elements. It was revealed that before the growth of the role of cities, landscaping was an integral part of human life, a kind of intermediary between it and the environment. In addition, using the provisions of psychology and sociology, the study identified the main mechanisms of space perception, which helped to comprehensively assess the impact of nature on the quality of human life. Modern examples of integration of landscaping elements into dense development of cities in Europe (France, Denmark, Germany), Asia (China, Singapore), and the USA were analysed. Two groups of approaches to gardening were identified and summarised – traditional and innovative, each of which was represented by a 3D diagram of the main structural components. It was established that innovative technologies – green roofs, terraces and walls, vertical farms with hydroponic, aquaponics, and aeroponic systems, mobile landscaping – do not contradict historically established models, but transform and complement them in accordance with new spatial constraints and needs of cities. Based on this, three principles of urban landscaping were proposed: extensive – focused on the use of large areas with minimal resources; intensive – focused on less space, but more technological solutions and costs; combined – combined the advantages of both principles. For each of them, the characteristic forms of landscaping and their impact on different levels of human comfort were determined: physical, psychological, and social. It was noted that effective integration of landscaping into dense buildings was possible only if there was a balance between technological innovations and basic mechanisms of space perception. The results obtained can become the basis for developing strategies for sustainable development of Ukrainian cities aimed at harmonising urban space and increasing the sense of security of residents

Keywords: housing; building density; planning; landscape architecture; urban landscaping; urban agricultural production

INTRODUCTION

Intensive urbanisation has led to denser development and a reduction in green spaces, weakening people's connection with nature and negatively affecting their physical, psychological and social well-being. Advanced technologies for integrating natural elements into urban space often did not consider historically formed mechanisms of spatial perception, which is why there was a need for approaches that can combine traditional human behavioural models with the capabilities of the latest solutions. The ecological and architectural approach continued the

Suggested Citation:
Mudra, A. (2025). Traditional and innovative approaches to landscaping and principles of their implementation in the context of urban space harmonisation. *Architectural Studies*, 11(4), 53-63. doi: 10.56318/as/4.2025.53.

Journal homepage: https://arch-studies.com.ua/en
Architectural Studies, 11(4), 53-63
Received: 26.06.2025 Revised: 12.11.2025 Accepted: 19.12.2025 Published: 29.12.2025
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tradition of considering green spaces as part of architecture, which shaped not only the appearance, but also the quality of urban space. In 2020-2025, attention was focused on improving the ecological balance based on modern technologies – green roofs and facades, hydroponic, aquaponic, and aeroponic systems. F. Barriuso & B. Urbano (2021) analysed the extent to which green roofs and walls can mitigate climate change in cities by comparing their effectiveness in different continental conditions. The researchers determined that such systems reduce the impact of the urban heat island effect, reduce greenhouse gas emissions, improve storm drain management, reduce noise, and support urban biodiversity. This study organically complemented the paper by V. Marsaglia (2024), who detailed the differences between different types of innovative landscaping. The author proposed a broader typology of solutions – for example, living walls, roof gardening. O. Oleshko & Yu. Petrovska (2020) focused on the concept of phytodesign and its functional content, emphasising the role of plants in the development of both comfortable exteriors and interiors. Research by Å.O. Sang *et al.* (2022) focused on another aspect – the impact of green roofs and walls on human health. The researchers found that lowering the temperature using vegetation helped to reduce the risk of heart disease, while air purification improved the state of the respiratory system.

The socio-psychological approach to gardening was based on the ideas of the influence of nature on humans, considering it as an important element of everyday comfort. In the contemporary interpretation, this approach has acquired innovative content due to concepts that combined architecture and psychology. Nature was considered as a basic need of an urban resident – one that helps to reduce stress levels and maintain social connections. The study by A. Shwartz *et al.* (2023) emphasised that the impact of landscaping on the psychological state is not unified: much depends on individual perception, the level of environmental awareness, and other factors. Scientists emphasised that there was no universal formula like "the more plant species, the better for everyone". S. Šćepanović *et al.* (2025) proposed a new classification of green spaces, highlighting "on-road" – green elements that people see every day, when moving around the city, and "off-road" – places that required special visits. Their research showed that it was "on-road" landscaping that had a more pronounced impact on human health, which emphasised the importance of green areas integrated into hiking routes as a factor of socio-psychological comfort. G.N. Bratman *et al.* (2021) specified the mechanisms, by which people perceive space, and analysed how landscaping can work in two key areas: reduce the impact of harmful factors and simultaneously promote well-being. F. Beute *et al.* (2023) compared different types of green spaces in terms of mental health benefits and emphasised the need for an interdisciplinary approach – a combination of natural, social, and medical sciences together with specialists in spatial design. C. Wan *et al.* (2021) proposed a model for conceptualising the relationship between landscape elements and community cohesion. In the Ukrainian scientific discourse, this area was developed by O. Kosyk & K. Letik (2021), who identified key aspects of the organisation of urban space by means of landscaping that were primarily focused on human comfort. Thus, the contemporary paradigm of urban landscaping relied on the continuity of ideas and also updated them in accordance with new challenges. Tradition here does not limit development, but becomes the basis for an innovative understanding of the natural element in architecture.

The purpose of the study was to investigate traditional and innovative approaches to urban landscaping and formulate the principles of their practical application in the context of improving the quality of urban space and the comfort of life of residents. To achieve this goal, a comprehensive approach to the development of scientific literature and sources was applied. Using the historical and comparative method, the evolution of landscaping in urban space was traced. Due to the variety of aspects of the topic, the research was expanded with an interdisciplinary approach involving the provisions of psychology and sociology. This helped to comprehensively assess the role of landscaping in the development of a safe and comfortable space. At the next stage of the study, architectural objects with integrated elements of landscaping were analysed – multi-apartment residential buildings in Bordeaux (France) and Copenhagen (Denmark), a community centre in Singapore, an administrative building in Oberhausen (Germany), a park in Taichung (China), and the Glasir landscaping system in New York (USA). Graphic materials for the study were obtained from specialised electronic resources ArchDaily (n.d.), Dezeen (n.d.), and Landezine (n.d.). Methods of comparative analysis and generalisation helped to form a sample of various buildings and urban spaces that differed in geographical location, place in the urban structure, functions and methods of applying landscaping. Based on this sample, two main approaches to the organisation of landscaping were identified. To organise materials, the authors applied the formalisation method using ArchiCAD and Adobe Photoshop programmes. Each of the approaches was presented as 3D diagrams in a unified format, which helped to demonstrate differences in the use of green elements. At the last stage of the study, three principles of implementing urban landscaping were proposed, and their main features were formulated – recommended forms of landscaping and the impact on human comfort.

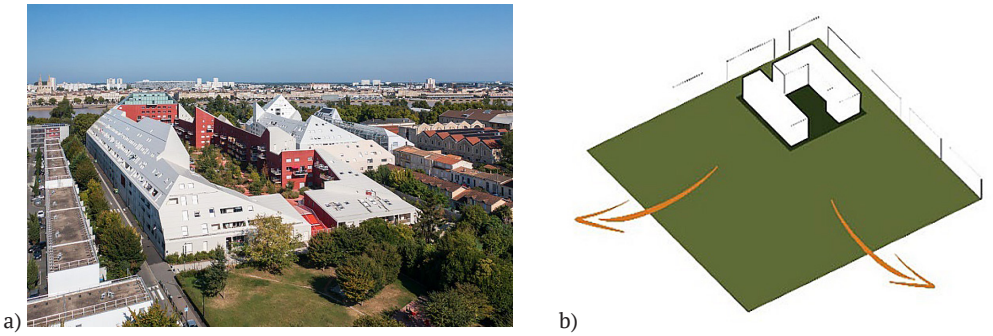
Historical prerequisites for the development of urban landscaping and its extensive principle of implementation

The planning of the first settlements depended on natural conditions – climate, topography, water, and the need for protection. These factors determined the first spatial decisions, in which nature was not just a background, but an active element of space formation. Where there was a lot of land, people used extensibility: they developed large areas for arable land and expanded settlements

without restrictions. In the Mayan civilisation, this strategy led to resource depletion and an environmental crisis, which forced a switch to more efficient land use methods – reducing crops, introducing new technologies, and creating house plots. In mountainous areas, such as the Andes, on the contrary, rational solutions were applied from the very beginning – terracing, irrigation, economical use of each plot (Lentz *et al.*, 2014). Thus, the prerequisites for intensive farming models were born. As the complexity of socio-economic structures increased, urban planning also changed. The gradual increasing dominance of the city over the countryside did not correspond to the usual picture of the world. For example, to preserve a connection with nature, suburban villas combining elements of decorative parks and kitchen gardens – the prototypes of modern summer cottages – appeared around Rome (Jashemski *et al.*, 2017). The Middle Ages were a period of return to the utilitarian logic of urban planning. The establishment of cities took place against the background of famine and wars, so people looked for safe places near castles and abbeys, adapting the surrounding space to life. This was how settlements with spontaneous terrain-dependent development emerged, where most of the territories were allocated for gardening (Leslie, 2016).

The Renaissance was a new stage in the development of urban landscaping: nature was perceived as a universal source of beauty and harmony. Courtyards and inter-house spaces were combined into green cells for communication and plant care. It was then that landscape art – a combination of architecture, landscape, and humans – was actively developing (Mosser & Teyssot, 1991). The Industrial Age brought drastic changes. Industrial urbanisation reduced agricultural land, so cities began to allocate land plots to workers for their own farms. During the world wars, "victory gardens" were actively created – in all possible places – vacant lots, school yards, stadiums – to provide people with food (Gowdy-Wygant, 2013). After the war, with the growth of prosperity, the need for urban gardening decreased. Its function was partially adopted by suburban settlements, which preserved a deep connection between humans and nature. Thus, the historical development of spatial organisation has demonstrated a natural evolution of human interaction with landscaping. When there was enough space, simple, low-cost models of green spaces prevailed – extensive ones. With the growing density of buildings, there was a need for careful planning, technologisation, and intensive use of each site. And where the conditions were intermediate – with moderate restrictions, but without a critical shortage of territories – transitional, combined options were formed. These three ideas – extensive, intensive, and combined – can be distinguished as the main principles of implementing urban landscaping.

The extensive principle was developed at a time, when cities still had enough space, but resources for care remained limited. It was based on the use of the existing natural potential of the territories – favourable climate and terrain conditions, soil fertility, access to water. After the expansion of multi-storey residential areas and the destruction of a significant part of the estate development in the 1960s and 1970s, traditional forms were preserved in the form of significant green areas – urban forests, parks, as well as garden and country plots and adjacent parts of the countryside (fields, meadows), which were within the city in the process of its expansion. An example of the modern recreation of this logic was Ilot Queyries, a multi-apartment residential building in the city of Bordeaux in France, designed by the architectural firm MVRDV. A distinctive feature of the project was the shared courtyard, which, due to its area of 5,200 m^2, not only physically complements the neighbouring park, but also served as its visual extension in the eyes of the public. Thus, a characteristic feature of the traditional approach shown in the 3D diagram was the maximisation of the vegetation area in the horizontal dimension (Fig. 1).



a) b)

Figure 1. Traditional approach to urban landscaping in the context of an extensive principle of its implementation
Note: a – courtyard as part of a park area in Bordeaux, France; b – 3D diagram of the main structural elements of extensive traditional landscaping
Source: based on H. Abdel (2021)

At the basic level of urban comfort, i.e., physical safety, such spaces played the role of a natural barrier between humans and adverse environmental factors. Large green areas mitigated the effects of urbanisation – it purified the

air, reduced noise levels, and reduced overheating of the city. M. Žuvela-Aloise *et al.* (2016) and R. Staniszewski *et al.* (2025) determined that increasing the area of green spaces by 10-20% can reduce the average air temperature in the city by 0.45-2.0°C, and the noise load level – by 2-10 dB. The value of extensive gardening was not limited only to physical comfort; it had a significant psychological dimension that affected both the emotional state and cognitive processes of a person (Kellert, 2018). Even the papers by scholars of the 19th and 20th centuries, C. Sitte (1922), E. Howard & F.J. Osborn (1965) and I.L. McHarg (1969), traced the idea of a harmonious combination of nature and urban space – it became the basis for further research on the role of natural elements in the structure of the city. One of the key steps in this area was taken by R.S. Ulrich (1984), proving that people, who contemplate natural landscapes recover faster – both physically and psychologically. Based on his findings, a theory of attention recovery emerged (Kaplan & Kaplan, 1989), which emphasised that excessive visual overload of urban space drains cognitive resources, while nature, on the contrary, activates involuntary attention and gives the brain the opportunity to rest. Large green areas are perceived without tension-the gaze moves easily, and the feeling of space becomes softer and calmer. This is the main advantage of extensive gardening: it returns a person to the natural rhythm of life, reduces stress levels, and increases psychological stability.

This tradition has been transformed, adapting to modern conditions: if once extensive gardening was associated mainly with horizontal spaces, now it was actively mastering the vertical. Green roofs, terraces, and facades (Manso & Castro-Gomes, 2015; Giacomello, 2021) not only increased the area of human contact with nature, but also returned to dense buildings the feeling of free, dispersed view that previously gave extensive urban green areas. An example of this was the three-dimensional solution of the Oasis Terraces community centre, located in Singapore. In order to offset the disadvantages of dense development, the London bureau used such a technique as terracing – this helped to lighten the mass of the building and its perception from street level and apartments of neighbouring residential complexes. The green roof was designed as a place for joint urban gardening, which was intended to strengthen ties in the community. Using a 3D diagram, the main difference between the innovative approach was shown – the shift from the horizontal of urban space to the building vertical (Fig. 2).

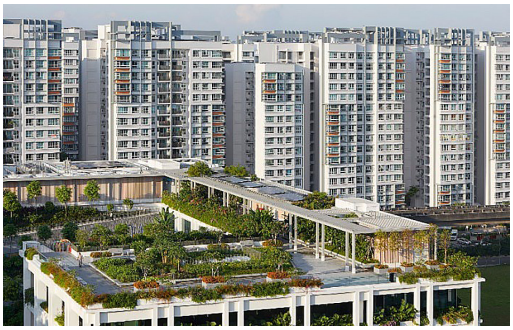
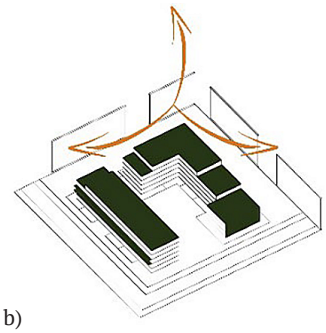
a)  b) 

Figure 2. Innovative approach to urban landscaping in the context of an extensive principle of its implementation
Note: a – green roofs and terraces in Singapore, Asia; b – 3D diagram of the main structural elements of extensive innovative landscaping
Source: based on A. Griffiths (2019)

Equally important was the social dimension of this tradition. As noted by E. Fromm (1973), excessive population density in cities activates defensive responses – from alienation and loneliness to manifestations of aggression. A person was evolutionarily adapted to life in small communities – families and neighbouring communities, where emotional connection and mutual support were maintained. It was this need that has long been met by garden and suburban cooperatives – spaces that combined caring for nature with informal communication and a sense of belonging. In the modern city, their role was gradually being taken over by new "green nodes" – galleries, corridors, bridges-transitions between buildings, which became places of spontaneous meetings and short social contacts. Table 1 summarised the main approaches to the extensive principle of implementing landscaping in the city.

Table 1. Extensive principle of urban landscaping implementation

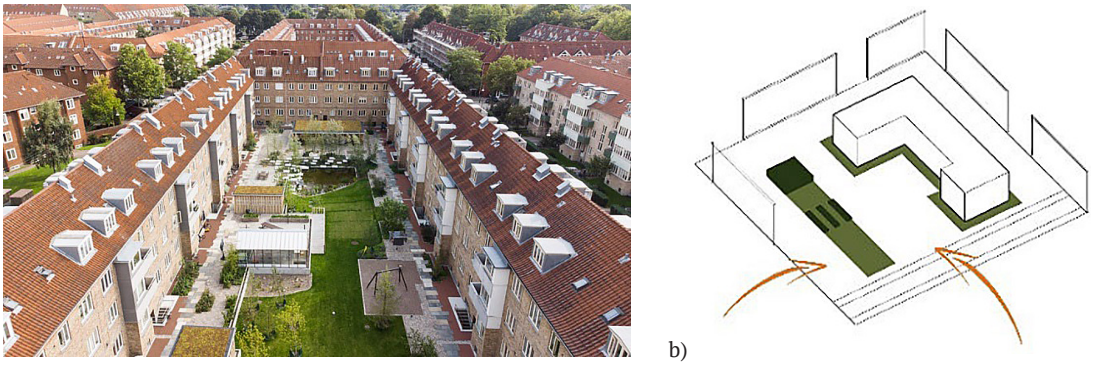
	Traditional approach	Innovative approach
Forms of landscaping	Green parks and urban forests. Territories of garden and suburban cooperatives and parts of rural areas (fields, meadows) within the city limits	Large layers of landscaping in the structure of the building – roofs, terraces, walls. Green transit spaces in the building structure
Impact on human comfort	Psychological safety (distribution of attention), social safety (informal communication), physical safety (reducing temperature, noise, pollution, ensuring air circulation)	

Source: developed by the author

The integration of extensive landscaping into the building structure changes the perception of multi-storey buildings, giving them a density of human scale. In this context, the transition from tradition to innovation appears as an opportunity to make the space work more efficiently, while maintaining concern for human needs.

Intensive principle of urban landscaping implementation

Intensive farming had traditionally been established based on the idea of maximum efficiency in the use of space. It occurred, where the territory was limited, but the need for yield remained high. That was why people invested more resources – time, labour, and finances – to achieve results, compensating for the lack of space by increasing productivity. For this purpose, fertilisers, chemicals, irrigation systems, and special equipment were used, which allowed using every square metre of land efficiently. An important element was greenhouses, which provided the possibility of growing plants throughout the year, regardless of climatic conditions. This can be seen in the example of the inner courtyard in Copenhagen, Denmark, created in collaboration with residents, designers, and the municipality to solve the problem of flooding. Rainwater from the roofs did not go into the sewers, but collected in the lake and streams, unloading the city system and simultaneously forming a space for recreation and children's games. In the centre was a greenhouse, the glass facades of which accumulated heat and extended the season of stay in the yard for almost a third of the year. The 3D diagram reproduces the typical placement of intensive traditional landscaping in the structure of urban fabric – in city gardens and vegetable gardens, and on adjacent territories (Fig. 3).



a) b)

Figure 3. Traditional approach to urban landscaping in the context of an intensive principle of its implementation
Note: a – beds and greenhouses in the courtyard in Copenhagen, Denmark; b – 3D diagram of the main structural elements of intensive traditional landscaping
Source: Landezine International Landscape Award (n.d.)

Gradually, intensive farming began to play not only an economic role: its presence in urban space created a sense of predictability and control. One of the aspects of psychological security was the recognition of space: in monotonous buildings, unusual objects – greenhouses, glass pavilions, open vegetable gardens – became landmarks. The brain remembered them as "anchors" that helped to create mental maps of the area. This reduced stress levels, as people felt confident knowing, where they were and how to return to familiar places. The tradition of intensive farming has not disappeared, but has been transformed into new technological models. The main principle remained rational use of space, which since the beginning of the 2000s, when sustainable development was established as a systematic approach in urban planning, was gradually supplemented by the desire to preserve natural resources – water, soil, and energy. Thus, vertical trusses appeared, which, combined with glazed facades and open structural elements, turned not only into production sites, but also into architectural dominants that enriched the urban landscape and simultaneously enhanced the sense of order.

The most common methods of modern intensive gardening were hydroponics, aquaponics, and aeroponics. Hydroponics involved growing plants without soil, when the roots were submerged in nutrient-rich water. Instead of soil, substrates were used – both natural (expanded clay, crushed stone, sand) and artificial (mineral wool). Aquaponics combined the cultivation of plants and fish in one system, where fish produced waste that served as fertiliser for plants, and plants purified water for fish, creating an environmentally friendly and interdependent ecosystem. Aeroponics was a system, in which plant roots were suspended in the air and periodically sprayed with a nutrient solution that provided them with the necessary elements for growth (Harwood & Martin, 2014). One of the most significant cases of using innovative landscaping was the project of an administrative building in Oberhausen, Germany. The main component was a vertical truss that ran through all the floors and led to a greenhouse on the roof, where hydroponic systems were located. Part of this landscaping was used as a research area for the Fraunhofer Institute for Environmental, Safety and Energy Technology. The 3D diagram illustrated the possibilities of this innovative approach: the focus of the design solution shifted to compactness in terms of building volume (Fig. 4).

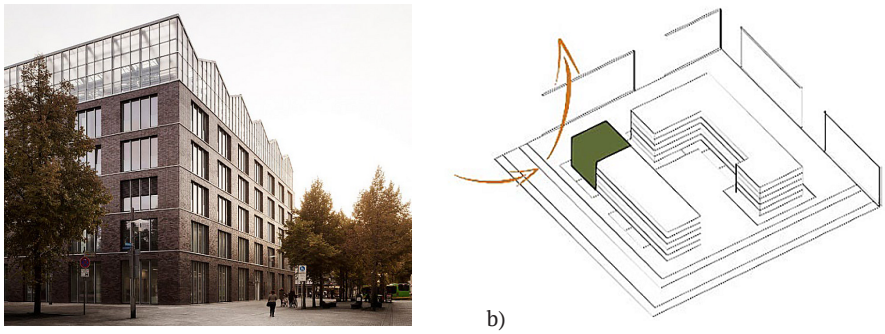


Figure 4. Innovative approach to urban landscaping in the context of an intensive principle of its implementation
Note: a – vertical roof truss in Oberhausen, Germany; b – 3D diagram of the main structural elements of intensive innovative landscaping
Source: based on J. Astbury (2019)

The social aspect of intensive farming also had significant potential. Traditional urban gardens and vegetable gardens had always served several functions simultaneously: it was places for work, recreation and communication, helping to avoid the appearance of dangerous, monofunctional areas. As noted by J. Jacobs (1961), the security of space was ensured not only by the presence of the police, but also by its active use. If the place was filled with people, who work, relax, or study, it automatically became safer due to "eyes on the street". A modern modification of this idea was urban agricultural production, integrated into buildings that combined social, commercial, and educational functions. Table 2 summarised the main approaches to the intensive principle of implementing landscaping in the city.

Table 2. Intensive principle of urban landscaping implementation

	Traditional approach	Innovative approach
Forms of landscaping	City gardens/vegetable gardens and adjacent territories with greenhouses	Vertical trusses with elements of hydroponics, aquaponics, aeroponics
Impact on human comfort	Psychological security (orientation in space), social security (multifunctionality of space), physical security (independence from weather conditions)	

Source: developed by the author

Saving space in this case allowed several functions to co-exist side by side, enriching the density of buildings with a variety of uses. In turn, the development of different types of activities determined the visual variability of compositional solutions, which created more interesting sensory impressions for a person.

Combined principle of urban landscaping implementation

Combined farming had traditionally emerged, where resources were limited and the need for landscaping was constant. In such circumstances, people were looking for ways to combine utilitarianism and harmony, creating small green cells in the city structure. So, there were linear and dotted street plantings – green corridors, front gardens, apartment courtyards, which formed natural "inclusions" among dense buildings. This was also evident in the planning of the linear park in Taichung, China. The architects reinterpreted the abandoned railway track as the green frame of the city, which not only physically connected individual public spaces, but also maintained the ecological balance of flora and fauna under the pressure of urbanisation. The 3D diagram showed the main compositional axes created by combined traditional landscaping, and its main difference was the location along pedestrian paths (Fig. 5). In the psychological dimension, this organisation of space had a deep evolutionary basis. J. Appleton (1975) explained a person's choice of a place to stay because of the instinct to "see, but not be noticed": a person naturally tended to the perimeter of space, where the ability to see and the ability to hide were combined. This mechanism created a basic sense of security, which was preserved on a subconscious level. Its development was the "savanna" theory (Herwagen, 1993), according to which since primitive times people preferred not open spaces, but small groups of green spaces – groves as shelters that allowed them to observe the environment, while remaining protected. In an urban context, it was small-scale landscaping that reproduced this logic – it structured shapeless areas, created visual landmarks, and formed a sense of protection and control over the space. Since 2010, with the development of the ideas of tactical urbanism, the traditional model of combined economy had evolved, acquiring new forms that meet the challenges of the modern city. Mobile landscaping was an example: unlike stationary green areas, mobile structures can be installed, moved, or completely removed, making them a flexible tool in dense urban areas. Thus, the space acquired dynamics, easily adapted to changes and better met the daily needs of residents. The project of the Glasir urban

landscaping system in New York was indicative. Glasir was a modular construction structure with aeroponic elements that can provide the city and surrounding area with local products throughout the year. The unified block solution allowed creating many configurations from 2x2 modules. The primary factor in choosing a specific shape and location in the city was the three-dimensional vision of the created space, that was, what kind of visual effect should be obtained from the interaction of the structure with the person and buildings. Therefore, the characteristic features reproduced on the 3D diagram were the variability and variability of space (Fig. 6).

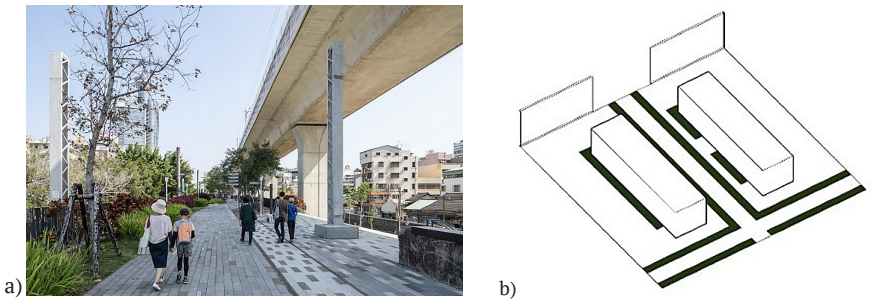


Figure 5. Traditional approach to urban landscaping in the context of the combined principle of its implementation
Note: a – green corridor in Taichung, China; b – 3D diagram of the main structural elements of combined traditional landscaping
Source: based on P. Pintos (2020)

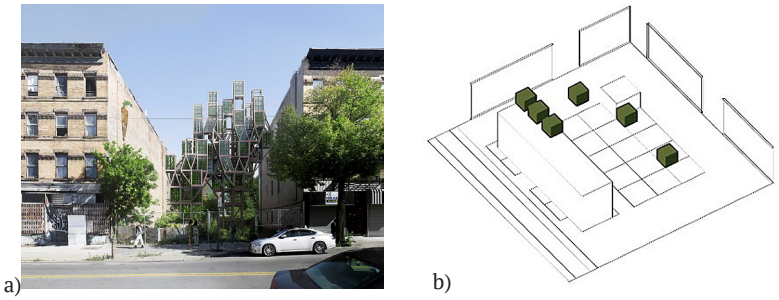


Figure 6. Innovative approach to urban landscaping in the context of the combined principle of its implementation
Note: a – modular landscaping in New York, USA; b – 3D diagram of the main structural elements of combined innovative landscaping
Source: based on C. Harrouk (2020)

The social dimension of the combined principle was to form a culture of belonging to a place. Small green areas in apartment courtyards or front gardens create "transitional" spaces between private and public, where informal contacts arose and a sense of belonging was formed. Mobile landscaping in such areas makes them even more open to communication: passers-by were more likely to stop, when they see some activities (Gehl, 2010). This was how the natural interaction between people and space was gradually formed, which strengthened the sense of community and trust in the city. The educational aspect remained equally important. Traditionally, children learned how to care for plants from their elders – this experience formed ecological thinking and respect for nature. Mobile gardening can replicate this function in urban spaces: it was increasingly being placed near schools, kindergartens, or other educational spaces. Such constructions became an interactive learning tool that helped to learn about nature in a dynamic, playful way. In the physical dimension, greening lines along roads became barriers between cars and pedestrians, creating protection both on a psychological level (a sense of isolation) and on a practical level (elements of greening restrain transport in the event of a collision). Thus, the space was organised in such a way that a person gains control over the situation, and the flows of transport and pedestrians were separated (Table 3).

Table 3. Combined principle of urban landscaping implementation

	Traditional approach	Innovative approach
Forms of landscaping	Green corridors along the streets, front gardens, apartment courtyards	Mobile landscaping
Impact on human comfort	Psychological security (sense of protection and control), social security (belonging to a place-community; elements of learning-games), physical security (development of a protective barrier)	

Source: developed by the author

Given the interdisciplinary nature of the scientific discourse on the introduction of landscaping in urban space, the number of studies in this area was constantly growing. Within the framework of the extensive principle, J. Kingsley *et al.* (2020) analysed the social potential of urban gardens and vegetable gardens based on a sociological study in Melbourne (Australia). The researchers found that urban gardening was perceived as a space for interaction, support, and mutual benefit, which created a sense of community. In turn, P.-Y. Nguyen *et al.* (2021) focused on the impact of the quality of urban landscaping on the physical and psychological state of a person. The researchers identified a number of criteria – comfort, safety, calmness – and determined that high-quality landscaping was associated with a reduction in psychological distress, depressive and anxiety states, and antisocial behaviour. In the context of the intensive principle, R. Gunapala *et al.* (2025) reviewed the social aspect of vertical gardening, emphasising that it can create additional opportunities – from spending time together to education and professional development. M. Artmann *et al.* (2021) investigated the psychological factors of urban agricultural production. Based on the example of gardening in German cities, the authors proposed a model that emphasised the importance of combining physical experience and mental connection with nature for the development of proecological behaviour. The combined principle was represented by Q. Ren *et al.* (2025), who turned to an evolutionary approach to explain psychological comfort. The researchers emphasised the importance of the prospect-refuge parameter as one of the key parameters in the design of green spaces. F. Rosso *et al.* (2024) developed this topic as part of a study of tactical urbanism, analysing the impact of pocket parks on subjective feelings of comfort and on objective microclimatic indicators. S. Rajendran *et al.* (2024) compared hydroponics with traditional soil gardening, emphasising its potential in urban density settings. J. Garzón *et al.* (2023) outlined the key opportunities and challenges of aeroponics, while S.L. Lama *et al*. (2025) analysed aquaponics, especially in terms of its cost-effectiveness. Within the Ukrainian context, researchers' attention also increased. O. Klymchyk (2021) considered the prospects for the use of vertical gardening in the cities of Ukraine, and I. Patseva *et al.* (2022) developed practical recommendations for the implementation of green roof projects, in particular on the example of Zhytomyr. Overall, the scientific discourse remains heterogeneous: most studies have focused on individual aspects – environmental, social or psychological – avoiding a comprehensive interdisciplinary analysis of the effective use of greening opportunities. Simultaneously, this approach has become necessary to achieve the strategic goals of urban development and increase human comfort. This required a broader dialogue between researchers, practitioners from different fields, investors, local authorities, and the public – an exchange of ideas that will help to ensure the sustainability of urban development.

CONCLUSIONS

As a result of the study, it was found that urbanisation processes change the structure of cities, compacting buildings and reducing the possibilities of human interaction with nature inherent in it throughout human development. In addition, the study revealed that the combination of the latest technologies with the specifics of human perception allowed creating adaptive models of urban space, where nature returns a sense of security – control, belonging to a place, information exchange. Traditional groups of approaches to landscaping, formed in different historical epochs, remained relevant, because it laid the foundations for safety and comfort, while innovative ones developed them in accordance with new spatial and technological challenges. In the context of certain approaches, three principles of urban landscaping implementation were proposed – extensive, intensive, and combined. The extensive principle tends to maximise the possible use of space with minimal labour, time, and finances. Its meaning was to create a favourable microclimate, disperse human attention, and maintain informal social ties. The landscape here works as a spatial background – through green roofs, terraces, walls, and transit spaces. The intensive principle was based on the limited area and provided for its efficient use due to significant investment of resources; its goal was to achieve high food productivity, form a recognisable image of the space, and ensure its versatility. Landscaping in this case acquired a high-tech character and was implemented through vertical farms using hydroponic, aquaponic, and aeroponic systems. The combined principle takes an intermediate position, combining minimal use of space with moderate resource consumption. Its task was to create buffer zones, form a sense of control over space, and strengthen a person's emotional attachment to a place. For this purpose, mobile landscaping elements were used, which easily adapted to different use cases and allowed flexible changes in the spatial organisation without significant interference. For each principle, the recommended forms of landscaping and their impact on physical, psychological, and social security were defined. Further research should focus on combining certain principles into a single multi-level system, while maintaining the idea that the new organically continues the old, which will ensure harmony between man, nature, and urban space.

ACKNOWLEDGEMENTS

None.

FUNDING

None.

CONFLICT OF INTEREST

None.

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Традиційні та інноваційні підходи до озеленення та принципи їх впровадження в контексті гармонізації міського простору

Анотація. Інтенсивні урбанізаційні процеси потребують рішень, які поєднують соціально-психологічні особливості формування міської тканини з сучасними технологіями, щоб зберегти зв'язок людини з природою навіть в умовах ущільненої забудови. Метою статті став аналіз традиційних та інноваційних підходів до озеленення й визначення принципів їхнього впровадження для створення безпечного та комфортного простору. Проведено історико-порівняльний аналіз, який показав еволюцію елементів озеленення. Виявлено, що до зростання ролі міст озеленення було невід'ємною частиною життя людини, своєрідним посередником між нею та навколишнім середовищем. Також, за допомогою положень психології та соціології у дослідженні було визначено основні механізми сприйняття простору, що дозволило комплексно оцінити вплив природи на якість життя людини. Проаналізовано сучасні приклади інтеграції елементів озеленення у щільну забудову міст країн Європи (Франція, Данія, Німеччина), Азії (КНР, Сінгапур) та США. Виокремлено та узагальнено дві групи підходів до озеленення – традиційний та інноваційний, кожен з яких представлено 3D-схемою основних структурних складових. Встановлено, що інноваційні технології – зелені покрівлі, тераси та стіни, вертикальні ферми з гідропонними, аквапонними та аеропонними системами, мобільне озеленення – не суперечать історично сформованим моделям, а трансформують і доповнюють їх відповідно до нових просторових обмежень і потреб міст. На основі цього було запропоновано три принципи впровадження міського озеленення: екстенсивний – орієнтований на використання великих площ із мінімальними ресурсами; інтенсивний – орієнтований на використання менше простору, але більше технологічних рішень і витрат; комбінований – поєднує переваги обох принципів. Для кожного з них визначено характерні форми озеленення та їхній вплив на різні рівні комфорту людини: фізичний, психологічний та соціальний. Наголошено, що ефективна інтеграція озеленення в щільну забудову можлива лише за умови балансу між технологічними інноваціями та базовими механізмами сприйняття простору. Отримані результати можуть стати основою для розроблення стратегій сталого розвитку українських міст, спрямованих на гармонізацію міського простору та підвищення відчуття безпеки мешканців

Ключові слова: житло; щільність забудови; планування; ландшафтна архітектура; міське озеленення; міське агровиробництво