

ARCHITECTURAL AND PLANNING PRINCIPLES FOR THE OPTIMIZATION OF OPEN SPACES IN RESIDENTIAL AND PUBLIC DEVELOPMENT

Durmanov V.

*Department of Architecture and Construction,
King Danylo University,
Ivano-Frankivsk, Ukraine
<https://orcid.org/0000-0002-2296-2310>
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Abstract

The article analyzes modern architectural and planning principles for optimizing open spaces in residential and public developments. Drawing on international experience from cities such as Copenhagen, London, and New York, it explores strategies for creating comfortable, inclusive, and sustainable urban environments. Particular attention is given to academic frameworks by Jan Gehl, Matthew Carmona, and the Project for Public Spaces (PPS), emphasizing human-centered design and social engagement. The quality of open spaces is shown to depend on accessibility, functionality, social interaction, and adaptability to change. The paper formulates a comprehensive set of principles ensuring a balanced and sustainable approach to urban open-space design.

Keywords: architectural planning, open spaces, public space, inclusivity, sustainable development, urban design, social interaction.

Problem Statement. Open spaces are an integral component of the urban environment, serving as the setting for a significant portion of public life within the city. Parks, squares, courtyards of residential complexes, and public gardens provide venues for recreation, walking, meetings, and social interaction, while also facilitating human contact with nature within the urban context. Properly designed open spaces generate multiple social, economic, and ecological benefits for communities [1]. Social benefits include improved public health and well-being, stronger social cohesion, and increased safety; economic benefits involve higher property values and enhanced attractiveness of areas for business and tourism; ecological benefits include urban climate mitigation, reduction of the heat island effect, and preservation of biodiversity [1]. However, many cities experience issues related to the quality and sufficiency of open spaces ranging from a shortage of usable areas and fragmentation of green zones to poor accessibility and misalignment with the needs of diverse social groups.

The challenge of increasing the efficiency of existing open spaces within dense residential and public developments is particularly relevant today. Urbanization and city densification result in high-rise residential buildings increasingly replacing traditional low-rise structures, thereby reducing available recreational areas for residents [4]. Studies show that the level of public space utilization in high-rise residential complexes is significantly lower than in medium- and low-rise neighborhoods [4]. The underlying causes include inadequate spatial configuration and zoning, the disconnection of open areas from residents' needs, and poor landscape and amenity quality in peripheral courtyards [4]. Often, such spaces remain "residual" – lacking clear function, poorly connected to their surroundings, and unattractive for everyday use. Furthermore, the absence of inclusive design approaches often excludes large segments of the population particularly people with disabilities, the elderly, and other mobility-limited

groups from fully using public open spaces [4]. Therefore, there arises the problem of developing effective architectural and planning principles aimed at optimizing both existing and newly created open spaces within residential and public development, to make them more functional, accessible, safe, and comfortable for all users

Task Definition. The aim of this study is to formulate architectural and planning principles for optimizing open spaces within residential and public developments, based on an analysis of international experience, contemporary scientific concepts, and current trends in urban design.

Analysis of Recent Studies. The methodological foundation of the research draws upon the works of M. Carmona, J. Gehl, Y. Han, J. Li, Q. Li, and D. Tang, whose studies explore the interaction between spatial configuration, social behavior, and environmental performance in urban public spaces.

Research Methods. The study employs a comprehensive methodological framework that reflects the interdisciplinary nature of the topic. The primary approach is the method of analysis and synthesis of scientific literature, applied to examine theoretical models and previous research findings in architecture and urban planning related to public open spaces. A review was conducted of English-language academic sources – including monographs, journal articles, and policy reports – as well as regulatory and methodological documents issued by leading international institutions (e.g., UN-Habitat, CABI), indexed in scientometric databases such as Scopus and Web of Science.

A comparative method was used to contrast international experiences of open-space design across cities and countries, identifying universal principles and context-specific features. The systemic approach enabled examination of open spaces as integral elements of the urban structure, interacting with other components such as the built environment, transportation systems, engineering infrastructure, and the social milieu. Additionally, a structural-typological analysis was employed to

classify different types of open spaces courtyards of residential blocks, public squares, parks, and adjacent areas and to identify distinctive planning features.

The integration of these methods resulted in the development of a generalized framework of architectural and planning principles for open-space optimization, applicable both to domestic design practice and in the broader international context.

Main Text. Global urban planning experience offers numerous examples of successful integration of high-quality open spaces into the structure of residential and public development. Many cities deliberately implement public space development strategies, considering them a key to the sustainability and comfort of the urban environment. UN-Habitat experts have developed global approaches to urban development, one of which is the concept of the “Five Principles of Sustainable Urban Neighborhood Planning.” This framework advocates for compact, mixed-use, and socially balanced neighborhoods with a well-organized network of streets and public spaces [3]. Within the UN-Habitat program “Global Public Space Toolkit” (2015), the universal value of public spaces is emphasized, accompanied by numerous best-practice examples from various countries [3]. The document underscores that free and equal access to high-quality open spaces is a shared principle among successful cities, and that the development of corresponding policies and regulatory frameworks is a joint responsibility of both local authorities and national governments [3].

A notable example of such success is Copenhagen (Denmark), where for several decades the city has consistently implemented the “City for People” policy under the guidance of urbanist Jan Gehl. Through the gradual expansion of pedestrian zones, redevelopment of squares and waterfronts, and the improvement of conditions for outdoor stay and movement, the city has witnessed a remarkable revitalization of urban life. As Gehl notes, each enhancement of urban public space quality directly leads to its greater use by residents – essentially, “improvements literally create space for a wider range of human activities” [2]. For example, the transformation of Copenhagen’s central streets into pedestrian areas during the 1960s–1980s was accompanied by a several-fold increase in pedestrian and cyclist activity, while city squares evolved into constant venues for gatherings and events. This experience demonstrated that creating attractive and comfortable conditions for pedestrians and outdoor activities can invigorate even a northern climate and encourage people to spend more time outdoors.

Another representative case is London (United Kingdom), where since the 1980s, public open spaces – from small pocket parks to large urban squares – have become an integral component of urban regeneration programs [1]. Throughout neighborhood redevelopment processes, significant efforts have been directed toward creating high-quality pedestrian areas, landscaped inter-building zones, accessible playgrounds, and social spaces designed for interaction among various demographic groups.

In the United States, urban design has traditionally emphasized large parks and residential courtyards;

however, in recent decades, cities such as New York, San Francisco, and Portland have actively adopted the principles of placemaking the creation of “places” with a unique character, community involvement in the design process, and an emphasis on multifunctional use of space. Between 2007 and 2010, New York City implemented the “World Class Streets” program in collaboration with Jan Gehl’s team, resulting in the creation of new pedestrian plazas (e.g., the transformation of Times Square into a pedestrian zone) and numerous small urban spaces (parklets, “pocket parks”) repurposed from former parking lanes. The outcomes included a notable increase in pedestrian activity, improved traffic safety, and the revitalization of local businesses in adjacent districts [2].

Such global cities demonstrate that open-space optimization can be achieved through both large-scale interventions (such as the development of new parks, waterfronts, and pedestrian streets) and incremental tactical approaches temporary public spaces, street furniture installations, and greening initiatives that gradually integrate into the permanent urban fabric. Despite contextual differences, successful cases share key features: open spaces are well-connected to their surroundings, possess clear functional purpose, diverse programming, and a human-centered orientation.

International standards recommend that parks and green squares be located within walking distance of residential areas, framed by active frontages building facades “facing” the public realm and integrated into pedestrian and cycling networks [5]. The experience of Western European countries confirms that every square meter of open space should be functionally justified and visually engaging; even small green areas or plazas must be purposefully designed and incorporated into the city’s spatial network [5]. Conversely, “accidental” green patches or paved courtyards disconnected from pedestrian flows tend to remain underused and impose maintenance burdens [5]. Therefore, global practice emphasizes the importance of strategic planning of open-space systems at both the citywide and neighborhood levels, alongside the detailed human-scaled design of each space according to community needs.

From an academic perspective, the foundational understanding of public spaces as social environments originates from classical studies by Jan Gehl, William Whyte, and Jane Jacobs, among others. In “Life Between Buildings” (1971), Gehl introduced the concept of necessary, optional, and social activities within open spaces (pps.org). He demonstrated that the quality of the physical environment most strongly influences optional (leisure-related) activities: “The better the space, the more optional activity takes place, and even necessary activities last longer” [2]. In other words, when a courtyard, street, or square is attractively designed with comfortable seating, a pleasant microclimate, and stimulating visual details people not only pass through it (necessary activity) but also choose to stay voluntarily (optional activity), which naturally fosters spontaneous social interaction.

This concept underpins the paradigm of human-centered design, according to which architects and urban planners must design environments based on the

behavioral scenarios of people, rather than merely on abstract spatial dimensions or circulation patterns.

Contemporary academic research further develops and specifies the principles of open-space design. For example, Matthew Carmona (University College London) in his 2019 article proposed a normative framework of ten principles for the design and management of public spaces [1]. He divides these into three strategic (planning) principles and seven design principles that define spatial quality in detail.

The strategic principles include: (1) Evolutionary character of public space – embedding spatial development within the broader urban context and ensuring adaptability to change; (2) Diversity – rejection of standardized approaches and recognition of local specificity and the needs of different groups (the principle of a “city for all,” derived from Henri Lefebvre’s concept of the right to the city) [1]; (3) Publicness and freedom of access – guaranteeing genuine openness and preventing hidden privatization or social segregation of spaces, in other words, maintaining “truly public space” free from discrimination or barriers [1].

These three foundational principles form the framework conditions for spatial policy: at the city scale, there should be a coherent strategy for the network of open spaces, including their financing, maintenance, and development, to avoid fragmentation and “ownerless” areas with no clear responsibility.

The architectural and planning (design) principles, according to Carmona, are expressed through seven quality criteria for specific spaces [1]. In summary: first, clear identity and boundaries the design should emphasize that a space is public and distinct from private zones (“clearly defined public space”), preventing the creation of “no man’s lands” with ambiguous status [1]. Second, active surroundings and engaging functions the area should be bordered by active ground floors, entrances, commercial or cultural “activity magnets” to ensure vibrancy and continuous use (“active/engaging space”) [1]. Third, meaningful content and amenities inclusion of features that make the place both distinctive and comfortable, such as public art, interesting landscaping, play areas, and water elements [1].

A crucial additional principle is facilitation of social interaction. Spatial planning should encourage various forms of social activity from large public gatherings to spontaneous encounters. This requires “social magnets”: sufficient and diverse seating options (benches, curbs, steps since “the quantity and variety of seating are often underestimated” [6]), a pleasant atmosphere (e.g., greenery and water), and opportunities for people-watching (such as outdoor cafés). William Whyte (1980), in his observations of New York City plazas, noted that the presence of convenient seating and food options significantly increases occupancy rates people enjoy sitting and watching others, which promotes longer stays and greater social engagement [6]. Thus, comfort and sociability are inherently inter-related.

Another key aspect is the balance between pedestrian and vehicular movement, especially for open spaces adjacent to streets [4]. Car dominance high

speeds, extensive parking undermines the social attractiveness of spaces. Therefore, design must ensure pedestrian safety and minimize traffic disruption. A successful example is the concept of “shared streets” in European cities, where curbs are removed, pedestrians have priority, and vehicle movement is intentionally slowed. This approach, implemented in residential neighborhoods across the Netherlands and Germany, has proven effective in enhancing both livability and community interaction.

The final two principles concern comfort and resilience. The comfort principle includes both physical and psychological aspects: protection from crime through natural surveillance, and comfort from climatic conditions shade, wind protection, and adequate lighting [4]. A good public space is one in which people feel relaxed, unthreatened, and at ease. Recent literature also stresses the need for inclusive design, taking into account gender, age, and physical ability safe spaces are those where women, children, and the elderly feel equally comfortable and visible [6].

Finally, the resilience principle refers to the adaptability and longevity of design [4]. A successful open space is one that can perform multiple functions over time without losing its appeal. This is achieved through the use of flexible elements (modular furniture, convertible platforms), durable materials, and well-considered landscaping that enhances environmental quality as it matures.

In addition to the aforementioned theoretical principles, professional literature provides numerous practical recommendations and design standards. For example, the Essex Design Guide (2019) in the United Kingdom highlights several key principles for open spaces: ensuring natural surveillance (parks should face building frontages rather than being hidden behind structures), which enhances the sense of safety; locating smaller public spaces along main pedestrian and cycling routes to ensure accessibility and logical integration into the neighborhood structure; and equipping resting areas with supportive infrastructure benches, shaded areas (trees or canopies), trash bins, lighting, and restrooms considering the needs of the elderly and people with limited mobility [5].

When planning residential complexes, it is recommended to aggregate open areas combining several small parcels into a larger park that is easier to maintain and offers a wider range of uses [5]. At the same time, small local spaces (such as playgrounds or green courtyards) remain important for environmental diversity, but they must be designed with the same attention to quality and multifunctionality as larger parks [5]. These guidelines align closely with academic principles, enriching them with practical and technical detail.

Equally significant is the model developed by Project for Public Spaces (PPS) an organization that has studied thousands of public spaces worldwide. According to PPS, a successful place is characterized by four core components: accessibility, activities, comfort (and image), and sociability [6]. These dimensions encompass most of the principles discussed above. Accessibility refers to both physical and visual openness, seamless connectivity to surrounding pedestrian routes, and

the absence of barriers for different social groups [6]. Activities denote the variety of available uses and scenarios that give people reasons to come and stay [6]. Comfort includes both subjective feelings of safety and pleasantness, and tangible features cleanliness, order, sufficient seating, and options for sun or shade. Sociability reflects whether people come in groups, interact with one another, and invite others a sign that the space has become a true “third place” for social connection [6].

This PPS model has become a widely used evaluation tool, placing the human experience of space at the center of urban design practice. It bridges research and application by emphasizing that successful public spaces are not just physical voids between buildings but living environments shaped by comfort, inclusivity, and everyday use.

Conclusions. Thus, academic analysis allows for the formulation of a comprehensive set of principles for optimizing open spaces: strategic and contextual integration (embedding within the urban system and responding to local conditions); diversity and inclusivity (designing for multiple user groups and scenarios, avoiding monofunctionality); publicness and accessibility (ensuring openness to all and strong connectivity within the urban network); activity and richness (providing functions and stimuli that attract and retain people); comfort and safety (offering both physical and psychological well-being); social integration (fostering interaction, events, and community building); balance with transport (prioritizing pedestrians and minimizing negative vehicular impacts); and flexibility and resilience (adaptability to change, material durability, and ecological sustainability).

These principles are embedded in many contemporary urban design frameworks and guidelines, forming the conceptual and methodological foundation for the creation of high-quality, human-centered, and sustainable open spaces in residential and public developments.

References:

1. Carmona M. Principles for public space design, planning to do better. *URBAN DESIGN International*. 2019. Volume 24. P. 47–59. URL: <https://link.springer.com/article/10.1057/s41289-018-0070-3#:~:text=and%20used%20,CABE%202004a>.
2. Gehl J. Life between buildings Using Public Space. Washington-Covelo-London. 2011. 211 h. URL: https://cus.ubt-uni.net/wp-content/uploads/2024/11/Jan-Gehl-Life-Between-Buildings_-_Using-Public-Space-2011-Island-Press.pdf#:~:text=Each%20quality%20improvement%20in%20the,%E2%80%93%20given%20room%20to%20a.
3. Global Public Space Toolkit From Global Principles to Local Policies and Practice. URL: https://cus.ubt-uni.net/wp-content/uploads/2024/11/Jan-Gehl-Life-Between-Buildings_-_Using-Public-Space-2011-Island-Press.pdf.
4. Li J., Han Y., Li Q., Tang D. Optimizing public space in high-rise residences: A whole life cycle perspective with Kruskal algorithm – A case study of a Shanghai high-rise residential project. *Buildings*. 2024. Vol. 14. No. 6. Article 1769. URL: <https://www.mdpi.com/2075-5309/14/6/1769#:~:text=1> DOI: <https://doi.org/10.3390/buildings14061769>.
5. The Key Principles of Public Open Space. URL: <https://www.essexdesignguide.co.uk/design-details/landscape-and-greenspaces/the-key-principles-of-public-open-space/#:~:text=It%20is%20preferable%20for%20parks,from%20a%20foot-way%20or%20cycleway>.
6. What Makes a Successful Place? URL: <https://www.pps.org/article/grplacefeat#:~:text=,there%20many%20photo%20opportunities%20available>.