

2.3 Factors in the formation of landscaping elements in an urban multi-apartment residential environment

The living environment is the basic point of reference in the system of human relations with the surrounding world - the planet, place and other people. Despite competent planning decisions of apartments or good quality of construction, if the living environment is neglected or poorly organized, life in the city will not give a person the desired level of comfort.

In the conditions of rapid urbanization and depletion of resources, the main task of the architect is to find effective ways to use the limited amount of space and thus increase the effectiveness of construction. Despite the trend of increasing building density and population density, today there are already many examples in the world of how the demand for density can be harmoniously combined with care for people. One of the ways to improve the quality of the urban living environment is the introduction of landscaping elements. These elements include parks, farms, gardens and orchards, eco-corridors, landscaped courtyards, landscaped front gardens, and landscaped courtyards. They began to develop from the earliest times as a component of traditional city planning based on the principle of life – space – buildings. At different stages of the functioning of cities, some elements of landscaping declined, others developed, but landscaping always followed a person - his place of residence, work or recreation, forming a direct connection between the quality of the living environment and the comfort of life in the city.

The purpose of the publication is to determine the potential of landscaping elements in the system of influencing factors on the formation of the urban environment of multi-apartment residential buildings in the context of harmonizing human life.

As a result of the urbanization processes of the 20th century there is a chain reaction of problems that change the nature of human interaction with the living environment. The need for housing for a large number of new citizens has caused the densification of buildings, shifting the emphasis of architects from the design of a

complete urban environment to the construction of individual multi-story buildings, the space around which is often inert and does not carry a functional meaning. In turn, providing people with goods and services is related to the need for the economic growth of cities, which at the same time increases the pressure on the ecosystem, because it requires consumption and emissions of global resources. These physical changes in the environment prompt a person to have an intuitive internal reaction - the feeling of being trapped in the streets, which changes from anxiety to anger and transforms into the concept of sensory overload of the brain (Gehl J., 2010).

Considering this, it is possible to distinguish the following factors that influence the formation of the urban residential environment - urban planning, economic, ecological, socio-psychological.

Urban planning factors

1. Reducing the disadvantages of excessive building density. Taking into account the fact that no more land will appear in either new or existing buildings, an alternative way to improve the quality of the environment is the introduction of landscaping elements at all structural levels of human interaction with space (Fig.1, Fig.2).:

- a. at the «human-private apartment» level - balconies, loggias, winter gardens;
- b. at the «human-building» level - greening of transit and passage areas of horizontal communications, bridges-transitions between buildings, green roofs;
- c. at the «human-courtyard» level - terraces, patios, entrance groups;
- d. at the «human-street» level - front gardens, entrance groups from the street side, eco-corridors, vertical greening of blank wall planes;
- e. at the «human-district» level - city gardens and farms, green squares, parks, etc



Figure 1. A green roof of a community center in Singapore as a visual attractor for residents of neighboring buildings (González M.F., 2019)

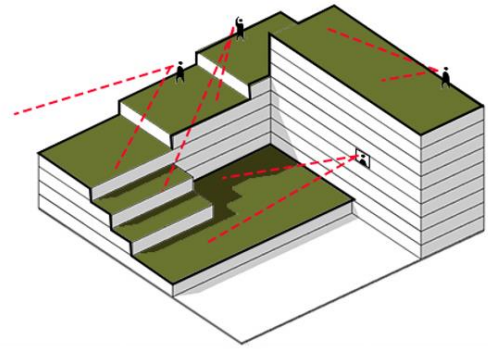


Figure 2. Use of the entire potential of the high-density building (the author's scheme)

2. Functional enrichment of the environment. The analysis of the existing level of improvement of the territory (determining the ratio between open and closed space, structuring the environment according to the level of interaction with people, identifying the functional content of the environment) forms the general concept of the urban farming in a certain part of the city. In accordance with this, it is possible to form three areas of design solutions for landscaping elements: 1. design of new landscaping; 2. revitalization of the existing neglected environment (Fig.3); 3. rethinking the underutilized environment - filling the existing landscaping with functions (Fig.4).



Figure 3. Modular urban farms on the streets of Brooklyn, USA as a new feature to existing landscaping (Harrouk C., 2020)

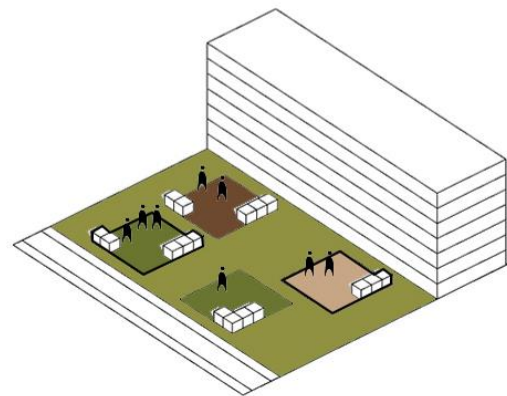


Figure 4. Activation of inert areas (the author's scheme)

In conditions of dense construction, the layering of functions within one building is extremely important. The active functional filling of the first and last floors gives the part of the housing the characteristics inherent in individual building (Sim D, 2019). For example, at the street level near food establishments or shops, the landscaping element uses the urban environment as an additional commercial space and provides fresh food directly to the table, near public services - it softens the connection with the street and allows institutions to be located closer to their users, near the exhibition halls - activates the street facade at eye level, which encourages passers-by to linger longer (Fig.5, Fig.6). In turn, the green roofs with a view of the surroundings integrate the tall building into the lower environment - they form common spaces with a lawn, summer terraces, places for barbecues, etc.



Figure 5. A farm-to-table restaurant in Paris, France (Harrap C., 2019)

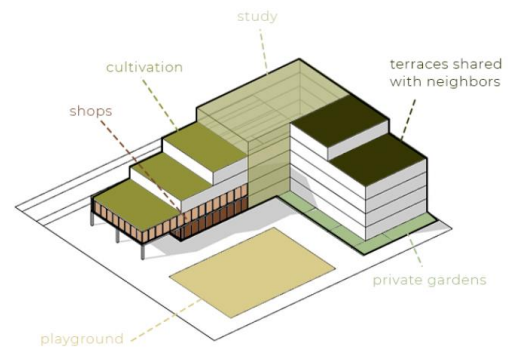


Figure 6. Mixed-use greenery (the author's scheme)

Economic factors

1. Small business support. Landscaping elements provide an opportunity to engage residents in farming activities, which provides the potential to create a co-housing unit or commercial component within a home, complex or residential group. The components of such landscaping elements are premises for cooking, packaging and storage of grown products, as well as places of sale - for example, catering establishments, shops, fairs, etc. This entails the creation of additional jobs - from gardeners to drivers, salesmen, managers, etc., and also it provides young people with business and retail skills (Sim D, 2019).

2. Expansion of the range of market offers. The introduction of landscaping elements correlates with the increase in housing value by providing various needs of daily life and creating more spaces for different types of activities:

a. Housing with a commercial agrarian element. The first option is to designate all housing in the building for employees, on the 1st floor - commerce, where the grown is sold. The second option is the cohabitation method: employees come to work in a residential complex with an agrarian element, but do not live here, that is, residents and employees are in the same volume of the building, but their paths do not cross (Fig.7, Fig.8).



Figure 7. A commercial landscaping element as part of a residential complex in Toronto, Canada (Toneguzzi M., 2017)

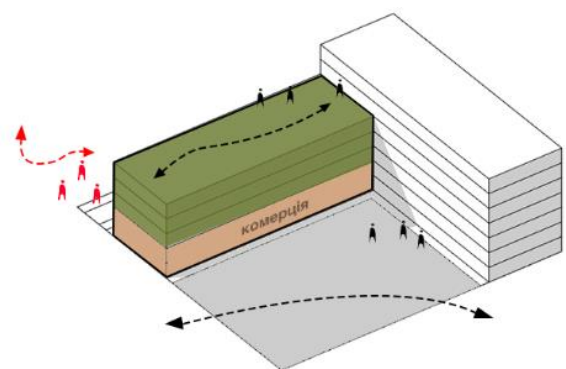


Figure 8. Separation of flows of residents of the building and workers (the author's scheme)

Under such conditions, the following recommended economic models of housing with autonomous urban farms can be identified: 1) the initiator-community, which, through special intermediary organizations, submits a request to the city to lease the territory and is looking for an investor. 2) an investor-agricultural organization that leases territory from cities and uses it independently. 3) an investor-interested organization from adjacent areas (market, supermarket, etc.), which provides part of its territory for production and uses the received resources for further trade. 4) an investor-city that creates municipal programs to support the city economy, for example, a tax reduction for developers if they have a green roof (and in some cities, buildings of a certain area receive the right to build only if they have a green roof), grant programs for environmental solutions etc. The most often used economic model is the city-intermediary-producer cooperation system. The intermediary determines suitable

areas for farming (mostly on roofs), rents them, then transfers them to private owners, the practice of holding competitions for the best project is also common, and later supports them at the stage of implementation.

Due to the fact that Ukraine is only at the first stage of the development of modern horticulture, the agreed financing system is still in question, the legislation defines only that landscaping in cities should be covered by the local budget. In foreign practice, initiatives from the community (membership contributions, crowdfunding), investments by private entrepreneurs, charity (both from specific individuals and schools, churches, public organizations, etc.) and city funds are used.

b. Housing with a partially commercial agrarian element. A common worldwide practice is the system of shared use - this is a program regulated by the city government, with the help of which a landowner can rent out his private yard. The landowner and the interested gardener can agree informally, for example, the gardener pays rent, gives part of the grown products or part of the proceeds after the sale, and specially created organizations can be responsible for regulating their relationship.

c. Formation of a sustainable food system in the city. If we consider urban greening as a part of the city's economic system, the creation of programs that would give cities an impetus to self-sufficiency - for example, a network of individual producers, united official organizations, sales markets (trade and catering establishments) and the city government itself, is of particular interest. Thanks to this, the city becomes less vulnerable to global economic problems, achieves a certain autonomy within the country, and the load on its central infrastructure decreases.

Ecological factors

1. Balancing climate change. Global climate change has caused the city to heat up. This is enhanced by the features of the city itself and its favorite materials - asphalt, concrete, metal - which during the day under the influence of solar radiation not only heat up, but also absorb so much heat that they release it even after sunset. Urban greening reduces the impact of dense construction on natural processes, providing better control and stability of the environment. Green plateaus – courtyards, green roofs, green corridors – create a microclimate different from the microclimate of the

surrounding streets: the resulting temperature difference stimulates natural ventilation and mitigates the heat island effect (Speck J., 2018).

2. Physical and psychological rehabilitation. Regulating the microclimate is a key factor that encourages residents to spend more time in the fresh air - walking in the yard or tending to their own patio. The creation of green barriers protects against noise from the streets and harmful emissions, forming a number of advantages for daily human comfort - from the ability to sleep with an open window and hanging laundry in the yard (Fig.9).

3. Recycling of waste, water and energy. The strategy of sustainable development assumes that each generation must leave the world to posterity in the same state as it was received - or in a better state. The modern global practice of introducing innovative technologies into the system of urban landscaping (hydroponics, aquaponics, aeroponics) makes it possible to save and reuse resources by creating a closed production cycle. On a large scale, several urban gardens or organizations exchange waste for their reuse, on the basis of which they form "agricultural parks" - a united ecological urban network (Fig.10) (Speck J., 2018).



Figure 9. The residential complex for the elderly in Singapore with innovative technologies for growing plants (Rosenfield K., 2014)

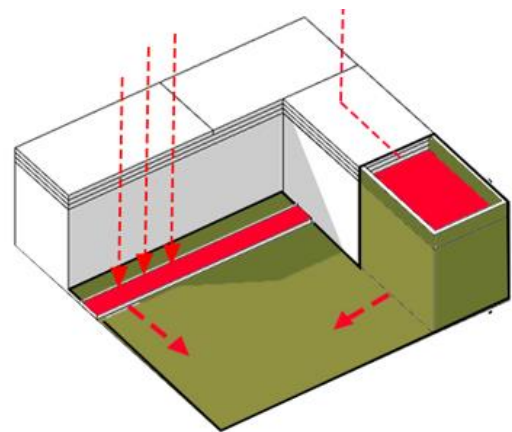


Figure 10. Reuse of resources and a closed cycle of production (the author's scheme)

It is recommended to adopt the permaculture approach as a basic approach to urban management. It is formed by a set of used methods of urban management. The system of conducting urban agricultural production can be called permaculture -

permanent (sustainable) farming. The basis of permaculture is the concept of sustainability - ecological (self-regulation and self-reproduction, staying in balance, etc.), economic (bringing predictable profit and resistance to external economic troubles) and social (creating a community).

Socio-psychological factors

1. Modeling the flow of people. People "intuitively" know how to move, but arbitrary buildings can destroy these habits. Such a strategy only works when the environment is a safe, easy and intuitive place where people know how to behave, what to expect and how to navigate. In order to reduce the number of "strangers" in the courtyard, landscaping elements should be designed so that, without psychological pressure, people are forced to move only in certain areas of the territory. Outsiders can see these zones, but their organization makes it clear where private territory is and where it is shared (Newman O., 1972).

Completely enclosed gardens, terraces and balconies help to isolate the residents of the 1st floor from the active life in the yard and street traffic. Landscaping creates additional controlled open spaces that provide privacy and security. At the same time, the selection of a "buffer" zone between the pedestrian paths and the windows of the first floor can protect from prying eyes and make it difficult for outsiders to approach the windows and other elements of the building. These spaces prevent noise, odors and clutter, saving neighbors from potential sources of annoyance.

Modeling the flow of people leads to the concept of structural stratification of space – a defined hierarchy of territory with areas of shared access in larger areas outside the blocks, where people from all over the city gather, and smaller, more private areas, inside – for local residents. Each of the types of use of space encourages different types of activity and behavior.

2. Creation of a holistic environment. In the perception of space for the human psyche, it is important to choose the simplest way and combine everything that falls into the field of view into a single picture. Thus, the introduction of landscaping elements requires the search for the integrity of mood, purpose, form and materials. For this, composition techniques are used - rhythm or meter, statics or dynamics,

symmetry, asymmetry or randomness and their possible combinations. For example, an agrarian element on children's playgrounds can complement the dynamics and be an element of play, while the elements of landscaping in the dining area of the courtyard tend to be static. At the same time, the concept of depth appears in the space, and with it, perspective, angle of view, openness or closedness, compactness or distraction. A green terrace on the 3rd floor will not have the same visual effect for its owner, for a passerby who sees it from street level, for a resident of a neighboring house who sees it from a window (Fig.11, Fig.12).



Figure 11. Achieving architectural expressiveness by landscaping terraces in a residential complex in Vienna, Austria
(Hidden architecture)

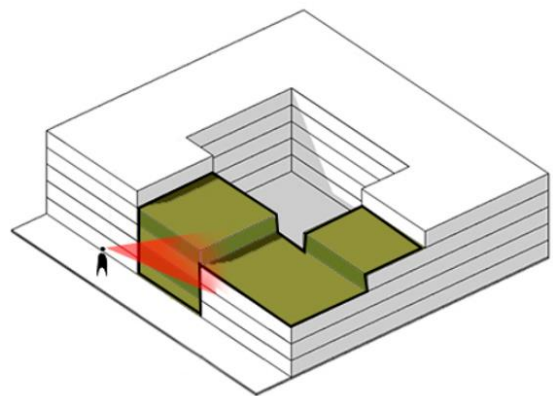


Figure 12. Creation of the green accents (the author's scheme)

An agrarian element can be an accent or reference point, a spatial border, a space separator or a background. A strong dominant can be an axis, for example, an eco-corridor, as well as points of intersection of axes and their completion. Transitional spaces are also important: for example, when a building is formed near an existing forest, the layout of the block closer to nature will become less regulated. It is the same situation when the urban environment determines how we organize landscaping: for example, creating an urban garden next to a square will mean that as you approach the edge of the square, the natural character of the garden will become urbanized (Fig.13, Fig.14).



Figure 13. Adding green facade to the existing landscaping of the office building in Ho Chi Minh City, Vietnam (Abdel H., 2023)

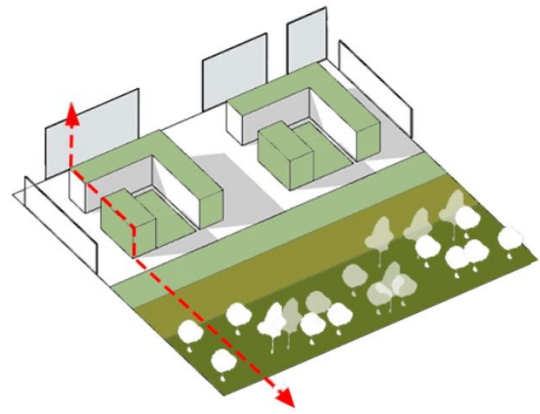


Figure 14. Creation of the transitional spaces (the author's scheme)

3. Communication and cooperation. The structuring of the inter-house space due to various elements of landscaping contributes to the creation of an ecological community as a vector of communication between residents who will take care of their area next to neighbors, children, parents, etc. In turn, this gives children the opportunity to get a safe place to play and study (Jacobs J., 1961).

4. Feeling of safety and security. The agrarian element creates a space that ensures the psychological safety of a person and protects his consciousness based on the preservation of the connections between the living environment and the person formed in the course of human development, social security, which directly means a feeling of protection from crime, violence and chaos, as well as a sense of a person, that it is part of society and has the opportunity to exchange information and energy (Newman O., 1972). Green cells form residents' sense of belonging to a given place, and thus simulate a collective security system.

As a summary, it is determined that today urbanization is not an obstacle, but a new opportunity for architects to make cities work more efficiently. How many people will be comfortable living together depends on a combination of factors that influence the formation of the residential environment - urban planning, economic, ecological and socio-psychological. Based on the principles of sustainable development, the main vector of architects' response to these factors is the consideration of human needs in

building plans, and one of the practical mechanisms is the introduction of landscaping elements into the system of the residential environment.

The result is the emergence of new principles of urban space use: the combination of building density with the density of human scale, ecological sustainability with a variety of functions, clear structuring with flexibility and adaptability of the environment. This approach to designing the environment changes the perception of space and leads to a general revitalization of life in cities. Having more meaning to spend time outdoors, people not only use the environment more actively, but also gain a sense of ownership and control over what surrounds them. At the same time, the probability of meeting other people increases, which contributes to the social and economic diversity of the neighborhoods, and thus to the cohesion of the community.