



Urban Domestic Gardens: Characteristics and Contributions to Urban Green Sustainability

Irina PANȚIRU¹, Erzsebet BUTA¹, Dănuț MĂNIUȚIU¹, Alexandru I. APAHIDEAN¹,
Nicușor SIMA², Alexandru DREGAN³, Rodica Maria SIMA^{1*}

¹ Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine, Mănăştur St., 3-5, Cluj-Napoca, 400372, Romania

² Faculty of Animal Science and Biotechnologies, University of Agricultural Sciences and Veterinary Medicine, Mănăştur St., 3-5, Cluj-Napoca, 400372, Romania

³ Institute of Psychiatry, Psychology and Neuroscience, King's College London, 16 De Crespigny Park, London, SE5 8AF UK

* Corresponding author: R. M. Sima e-mail: rodica.sima@usamvcluj.ro

REVIEW

Abstract

Domestic gardens (e.g., home, allotment) are important features of the urban green infrastructure (GI) and represent significant component of the urban landscape. The present work aimed to evaluate the overall role and benefits of urban allotments and home gardens for the urban GI in the Global North countries. A literature review was performed to identify published evidence from 2000 onwards on the impact of domestic gardens for GI sustainability within developed countries. A narrative synthesis was used to interpret available research pertaining to urban domestic gardens per se, to define their unique role in GI and to highlight areas in need of further research. The review suggested key differences in both nature and management of urban domestic gardens with major implications for their contribution to GI sustainability. We also acknowledged the heterogeneous social, cultural, ecological, and economic contexts underlying the impact of urban domestic gardens for GI. Further, urban domestic gardens also act as a source of food security and provide additional ecosystem services. The review concluded that home and allotment gardens are important contributors to urban GI sustainability and should be incorporated within the planning, design and management of urban infrastructures.

Keywords: allotment; domestic; gardens; infrastructure; sustainability; urban

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INTRODUCTION

Green infrastructure (GI) refers to a system of natural and artificial green spaces that provides ecological and social functions in urban areas (Pamukcu-Albers et al., 2021). Urban green spaces can contain high levels of biodiversity and provide a variety of ecosystem and cultural services that are important in enhancing urban resilience. Ensuring well-organized green spaces, from a functional perspective, is a key element in the development of the urban spatial structure (Poniży and Stachura, 2017). Several studies have highlighted the importance and significance of domestic gardens for expanding the GI of urban areas that provide habitat for new species and new ecosystems (Andrade et al., 2020; Teixeira and Fernandes, 2020), agricultural connectivity and food security (Yacamán Ochoa et al., 2020), reduce soil erosion, mitigates noise pollution, and landscape and improve the quality of human life (Wu, 2008). Domestic gardens are an important component of GI but their specific contribution has rarely been assessed and their role in urban space is difficult to quantify. The main objective of this study was to

evaluate the role and benefits of urban allotments and home gardens within the urban GI in the Global North countries.

MATERIALS AND METHODS

This review includes published research on the impact of domestic gardens for GI sustainability within the Global North countries from 2000 onwards. A narrative synthesis method was adopted to interpret available research pertaining to urban domestic gardens per se, to define their unique role in GI and to highlight areas in need of further research. Several websites were investigated for relevant articles (e.g., Pubmed), scientific articles (Scopus, Google scholar and others), and books from aboard, about the characteristics and contributions of allotment and home gardens to urban green sustainability.

Terminology definition, characteristics and comparison:

According to (Drescher et al. 2006), home gardens are a multi-species production system (edible and/or ornamental) around a dwelling to meet different physical, social and economic needs and functions, traditionally being an important way of using the land related to the individual household. Also, home gardens are located close to the housing and are usually maintained by individuals or households who have access to land (customary and legal). Allotment gardens represent concentration of several small plots of land (usually 500 m² or more) in one place separated from dwellings, allocated by authorities or gardening associations to people or households for own consumption and recreational use, excluding any commercial use (Bell et al., 2016).

The most important feature of allotment gardens is that they are administrated and organized institutionally and are used at the community level as a place of social interaction. In contrast to Germany, where each user of an allotment garden must be a member of the respective *Kleingartenverein* (Association of allotment gardens), in developing countries, gardeners are often not members of an organization/association but are part of a community. Allotment gardens are not necessarily located near the house, but rather are in areas with enough space available and where there are favorable soil and water conditions. Gardens can also be in areas unsuitable for buildings or buffer zones along railways and highways. In other cases, they may even be in protected areas necessary for balancing the urban microclimate, as in the case of some German cities (Drescher et al., 2006).

Urban home gardens are characterized by the following aspects: location is adjacent to housing, associated with common family activities, and display a large diversity of cultures to meet the needs of the family (Landon-Lane, 2004). Thus, home gardens focus more on the social and economic integration of the family involved, and the location of the land is closely linked to management decisions conditioned by ecological factors. An example of the geographical separation of home gardens and dwellings can be seen in the Montreal area, where Italians continue to garden away from home due to the scarcity of available land (Drescher et al., 2006).

In summary, significant differences between the two types of gardens (e.g. allotment, home) occur at the administrative, social, and ecological levels depending on the management practices addressed.

Functions of domestic gardens within the urban GI:

Gardens traditionally used to grow fruit and vegetables are an important element of urban landscape or GI. In terms of allotment gardens, they represent multifunctional urban green spaces, and over time their functions have changed under the influence of socio-economic factors. The study of the inventory of allotment gardens, conducted by (Dymek et al., 2021), shows that in Poland 50% of allotment gardens are mainly used for recreational purposes. At the same time, allotment gardens used for both recreation and cultivation account for 27% of all inventoried gardens, and the share of gardens used only for cultivation is 1.5%. These two functions of recreation and cultivation are also common in allotment gardens in other countries, such as Germany (Teuber et al., 2019), France, Canada (Poulias et al., 2016), and Portugal (Silva et al., 2016).

The role of allotment gardens is often wrongly identified only with the interests of a small group of direct users, and their attribution to urban green sustainability is underestimated (Kronenberg et al., 2013). However, both the users of the allotment gardens and the other inhabitants of the city benefit from a wide range of basic services such as active recreation, contact with nature and quality food supply (Sowińska-Świerkosz et al., 2021; Kronenberg et al., 2013; Barthel et al., 2010; Bell et al., 2016; Cabral et al., 2017; Langemeyer et al., 2018). The study developed by (Barthel et al., 2010) showed that in urban Stockholm, allotment gardens are compared to dynamic libraries of socio-ecological interactions that provide fertile soil, flowers and vegetables, pollination and pest regulation. The most important functions of allotment gardens are the provision of products and cultural services (Kronenberg et al., 2013, Silva et al., 2016; Edmondson et al., 2020; Young et al., 2020). In Portugal, the most mentioned motivations to apply for a Municipal Network of Urban Allotment Gardens (MNUAG) were to supplement the family budget, occupation of leisure times and access to organic farming, followed by environmental concerns, the physical activity, and education (Silva et al., 2016). This type of garden also contributes to increasing social resilience (Barthel et al., 2010; van der Jagt et al., 2017; Lee and Matarrita-Cascante, 2019) and have an extremely important role in the

spatial planning of cities, providing functional and structural connectivity to green spaces (Bell et al., 2016). A great example of increasing social resilience can be the garden “Stopping Place”, from Szeged, Hungary, known to play an important role in reducing alienation and improving accessibility of green spaces for health benefits (van der Jagt et al., 2017). Moreover, these continuous networks of open production spaces can connect the city to the countryside (Viljoen and Wiskerke, 2012) and complement green leisure spaces.

On the other hand, home gardens feature a variety of physical, social and economic functions, which include physical areas for living, storage and waste disposal, social meeting areas, children’s playgrounds and areas with economic potential for the cultivation of food, medicinal plants and fruit trees. Overall, a home garden is a place to live, but also a place to produce a variety of food and household products that can generate income (Landon-Lane, 2004).

Ecosystem services provided by urban domestic gardens:

Urban green spaces provide several ecosystem services for city dwellers, such as cultural services through which people could experience nature in urban space (Buchel et al., 2015). These green spaces are also areas of increased social importance for leisure and recreation (Jim and Chen, 2006; Trembecka and Kwartnik-Pruc, 2018; Biglin, 2020). Also included in the category of ecosystem services provided by urban green spaces are the reduction of air pollution and the improvement of local climate, respectively the quality of the natural environment in cities (Gill et al., 2007; Tratalos et al., 2007; Malinowska and Szumacher, 2008), provision of habitats for various organism, thereby contributing to the maintenance of biodiversity (Müller et al., 2010; Hostetler et al., 2011; Frey and Moretti, 2019). Furthermore, urban green systems provide supply services through allotments garden, home gardens, and other examples of urban agriculture which ensure food supply (Szulczewska et al., 2013; Spilková and Vágner, 2016; Sowińska-Świerkosz et al., 2021). For example, “Igelbäcken” allotment garden from Stockholm, Sweden provides a place to grow food and to support health and well-being (van der Jagt et al., 2017). Previous studies (Lewińska, 2000; Pawlikowska-Piechotka, 2010; Kronenberg et al., 2013) have emphasized the significance of allotment gardens for the natural environment of cities, specifically, because they are considered wildlife corridors that link urban green spaces, whose continuity and internal diversity determine their ability to provide ecosystem services. The scientific literature related associated with home gardens with plant biodiversity and ecological processes present limited information on the subject in the Global North. Previous research has focused more on lawn-dominated landscapes and the negative impact of lawn fertilization in suburban areas on air quality and rainwater (Cook et al., 2010). A study (Dewaelheyns et al., 2013) regarding suburban Flemish gardens, which included ornamental lawns and vegetable gardens, found that home gardens can harm the environment through the excessive use of fertilizers and compost in vegetable gardens. On the contrary, research from the Global South on rural gardens has reported home gardens as increased plant biodiversity ecosystems. In addition, plant diversity in domestic urban gardens is ensured through the acquisition of plant species by gardeners and their management practices (Loram et al., 2008). Overall, domestic gardens comprise a substantial proportion of the green space of cities, and regardless of their structure, they are important elements in maintaining and improving the plant biodiversity of urban areas (Taylor and Sarah Taylor Lovell, 2013).

Domestic gardens can play an important role in improving the environmental impact of the domestic curtilage by isolating homes against extreme temperatures and reducing energy consumption. Moreover, the gardens help to improve the air quality, alleviate flooding and provide a refuge for wildlife (Cameron et al., 2012). However, inappropriate management practices can lead to negative environmental impacts such as increased greenhouse gas emissions, improper use of water, pesticides, fertilizers, and the introduction of invasive species with serious consequences for native biodiversity and the economy associated with eradication measures (Cameron et al., 2012). Although domestic gardens are important elements in urban GI, their distinctive contribution is rarely evaluated and their value, in the context of urban green space, is difficult to quantify.

Planning urban domestic gardens:

The importance of domestic gardens in the spatial structure of cities depends on development trends and policies adopted by the authorities. The existence and development of domestic gardens are threatened by continuous and rapid urban expansion. The study by (Dymek et al., 2021) indicated that in Poland, in the next few years or several decades, allotment gardens will disappear or be moved to the peripheral areas of cities. Urban residents will spend more time and money traveling to these areas. Therefore, allotment gardens will lose their traditional nature and, given that the cultivation of fruits and vegetables requires frequent and regular visits, the gardens will turn into suburban leisure places.

Allotment gardens are usually located in areas attractive for investment, so these areas are vulnerable to functional transformation. Hence, it is necessary to identify gardens that are of high value in urban GI and which are omitted from the functional transformations. An important role in the evaluation of these gardens is played by scientists, officials, and urban planners. There are also proven and effective methods that can be applied in the

assessment of allotment gardens, but they present a high degree of difficulty, requiring statistics and significant interpreting skills (Anderson et al., 2019).

Development projects tend to overregulate the maintenance and management of allotment gardens. As a general rule, the selection and supply of seeds and fertilizers are carried out by the authorities, which leads to the minimization of traditional vegetable cultivation and the mitigation of gardeners' ability to experiment and be innovative. Moreover, the attitudes of the authorities demonstrate that the role of fruit trees in cities is underestimated, including in food security (Drescher et al., 2006).

Access to a home garden and involvement in gardening depends on factors such as the existence of a favorable general environment, soil and water resources, and the availability of specific inputs (seeds, knowledge, work and time, budget). Therefore, these factors determine the vulnerability of individual households to engage in subsistence activities and market-oriented food production.

Allotment gardens, institutionalized and properly integrated into urban planning have a considerable impact on the level of the (non-) supporting structures and can greater regulate the entitlement and access to resources. Besides, allotment gardens are more visible through associations, while home gardens are isolated examples. Since home gardening is considered a private activity, there is little public support for the development of these gardens. Home gardening occurs only when certain circumstances permit, the availability of space being a major determinant in this case. Public support is more likely to be given to allotment gardens due to their greater visibility (Drescher et al., 2006). In terms of the environmental impact and results of both activities, differences arise depending on the management strategies used. For both home gardens and allotment gardens, space is restricted, but allotment gardens allow for gardening for those who do not have access to a private garden near their houses. Therefore, the ability to grow food is an important dimension of this relevant access for both types of gardens. However, community empowerment, relevant to the allotment gardens, can be seen as a process of political support and negotiation between municipal authorities, locals, and various interest groups.

RESULTS AND DISCUSSIONS

The review suggested key differences in both nature and management of urban domestic gardens which substantially affect their implications for GI sustainability. Domestic gardens help improve the air quality and thermal comfort to their residents, reduce domestic energy consumption, minimize surface run-off and provide habitat for wildlife within the urban environment. Further, urban domestic gardens also act as a source of food security, by lowering personal food budget and providing an additional source of income through the sale of garden products, while offering additional ecosystem services. Yet, inappropriate management practices can lead to negative environmental effects, such as increased greenhouse gas emissions and not their diminution, unsuitable use of water, pesticides, fertilizers, and introduction of invasive species with huge consequences for native biodiversity and economics associated with eradication measures. We also acknowledged the heterogeneous social, cultural, ecological, and economic contexts underlying the impact of urban domestic gardens for GI.

CONCLUSIONS

Home gardens and allotment gardens are important contributors to urban sustainability and should therefore be incorporated within the planning, design, and management of urban infrastructures. This is particularly relevant to the current and future global climate warming context.

This review highlights several areas in need of further research. These studies need to consider the fact that domestic gardens, such as wider green space, are variable, and the influences of contrasting garden styles must be included in any methodology.

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Conflicts of Interest

The authors declare that they do not have any conflict of interest.

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