

Review

The Role of Allotments and Community Gardens and the Challenges Facing Their Development in Urban Environments—A Literature Review

Anita Kwartnik-Pruc ^{1,*}  and Gabriela Droj ² 

¹ Faculty of Geo-Data Science, Geodesy, and Environmental Engineering, AGH University of Science and Technology, 30-059 Cracow, Poland

² Faculty of Building Construction, Cadaster and Architecture, University of Oradea, 410087 Oradea, Romania

* Correspondence: anita.kwartnik@agh.edu.pl; Tel.: +48-12-617-35-20

Abstract: Current research largely focuses on the role of allotment gardens, the challenges facing them, and the direction of their future development in urban environments. The main idea behind the introduction of allotment gardens was to improve the living conditions and food supply of workers and the underprivileged. The impact of allotment gardening does not only concern the allotment gardeners but also the general public and the environment. It is important to emphasise that allotments have impacts not only on food production and outdoor physical activity, but also on the reuse of idle or neglected land, community development, therapeutic and nutritional benefits, and psychological benefits for allotment holders and residents. For this reason, this study captures six broad themes related to allotments: (1) community participation and cohesion, (2) health and well-being, (3) economic opportunities, (4) pollution, (5) urban planning and development, and (6) sustainable environment. The research is a systematic review in which steps were taken to minimise bias in the identification, selection, and summarisation of studies. The initial literature selection was based on a keyword search (title, abstract, and keywords) of the comprehensive literature databases Web of Science (all years) and Scopus (all years). The total scientific literature on which this review is based includes 162 research articles published between 1978 and July 2022. This work aims to fill these gaps and analyse existing knowledge by providing a detailed review of the academic literature, focusing not only on the benefits of community gardens and allotments in urban areas, but also on the existing problems related to allotments and urban gardening. Possible directions of development are also analysed based on the legal regulations in each country.

Keywords: allotment garden; community gardens; community participation



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1. Introduction

Over the past few decades, much of the world has experienced rapid and extensive urbanisation. This has confronted authorities with various problems, including the destruction of natural ecosystems and the deterioration of the environmental quality of towns and cities. All over the world, urban areas have increased. In underdeveloped countries, populations are migrating from rural areas to cities; in advanced industrialised countries, the reverse is happening, but the result is that rural areas adjacent to cities are becoming suburbs linked to the city itself. One of the effects of rapid urbanisation is the extensive use of all available land for profitable investment. This means that the creation of public green space is sometimes not a priority. A new urban paradox is that the increase in building developments has led to an increase in demand for urban green spaces, so one of the most important trends in urban planning has been to preserve green spaces and ensure their diversity and multifunctionality.

Urban green spaces include all forms of green spaces such as parks, cemeteries, roadsides, sports fields and playgrounds, vegetation around public buildings, nature

reserves, forests and woodlands, private gardens, urban agricultural land, green roofs and green walls, and other open spaces. Today's urban gardens are part of a new urban paradigm: environmental protection, the rediscovery of social interaction, and a return to nature. Inspired by economic crises, the temporary use of unused green spaces for a variety of urban activities has become popular in poor neighbourhoods. This includes urban gardens, which have emerged or "appeared" as part of civic initiatives or festival events. From a social identity perspective, parks can be associated with urban identity and urban gardens with rural or vernacular identity because of their agricultural dimension.

There are a variety of forms of urban gardens, including home gardens, allotments, and community gardens. Home gardens are located near the home and are cultivated by households. Community gardens are plots of land owned by different institutions and cultivated collectively by a group of individuals, with the main purpose being food production, but also education [1]. Community gardens also include school gardens, landscaped beaches, village common areas, institutional gardens, and rooftop gardens. Allotments and community gardens can be considered facilities that have three dimensions: environmental (green space, natural and organic food production), social (community development, increase in well-being), and urban (a combination of green thinking, sustainability, usability, and aesthetics). Therefore, allotments and community gardens are recognised in the literature as part of the urban green infrastructure that is important for providing urban ecosystem services. In some regions and countries, including North America and Romania, no distinction is made between allotments and community gardens [2]. This literature review focuses on allotments, but because of the coexistence of different forms of gardens, other types of gardens are also considered. They are often mentioned as an alternative solution when allotments do not have access to plots because of the shrinking availability of land.

The concept of allotment gardens is widespread throughout the world, with the first allotment garden associations dating back to the 18th century in Denmark [3] and England [4]. In many European countries, allotments became very popular during and after the Second World War and were called "War Allotments" or "Victory Gardens" [4,5]. Interest in urban allotments (AGs) has increased in recent years. Nowadays, allotments and community gardens combine the concepts of green, ecological, and sustainable urban development with community urban development.

An allotment garden is basically an agricultural plot leased on the basis of a contract with a company, association, or institution that manages such a garden. They differ from community gardens in that an individual or a family can use a plot within a larger garden for their own use, freely deciding what plants to grow and where and when and how to cultivate that area. However, there are common areas, such as main paths, parking lots, and picnic areas, that must be maintained by all members and this fosters a sense of community. Allotment gardens offer numerous advantages, especially for the gardener but also for the community, so the increasing popularity of allotments is obvious. These benefits include fresh food, physical activity in nature, the reuse of fallow or neglected land, community development, therapeutic and nutritional benefits, and psychological benefits for gardeners and residents.

In recent decades, numerous research papers have been published regarding the role and impact of allotment gardens. In analysing the literature on this topic, it is impossible not to mention a book of great value that is a comprehensive transdisciplinary publication on urban agriculture in Europe [6] and a book [7] that provides a scientific overview of various features, benefits and advantages of urban allotments in Europe. However, this literature review is limited to academic articles. The main theme is the benefits of urban gardening for people's health [8–14] and well-being [12,14–17]. Another popular topic within the field of allotment research is the recreation and leisure dimension [3,10,18]. Many researchers analyse the economic aspect of the fresh vegetables and fruits produced in the allotments or even by moving permanently to live on allotments [19–21]. The potential urban pollution transferred to urban-grown vegetables has also been extensively studied [22,23]. Various

studies have shown that, in addition to legal regulations, the ethnic, social, and cultural background of the inhabitants also has an influence on the use of urban green spaces and, in particular, allotment gardens, which is why this topic has been studied worldwide.

Guitart, Pickering, and Byrne [1] focused on community gardens by analysing the methods used to carry out the research, the geographic location of the gardens, their characteristics, gardeners, and landowners. They also explored the motivations, benefits, and limitations of community gardening. Other researchers have published literature reviews on allotments to summarise what is known about this topic. Many studies have conducted a systematic review of the health benefits of urban community gardens, such as Tharrey and Darmon [24] or the effects of allotments on the well-being of gardeners [25], such as Ilieva et al. [26], whilst authors such as Orsini [21] have conducted extensive research on the social benefits of urban agriculture, including allotments. Many of the literature reviews to date have generally focused on the health and well-being benefits of allotments or their contribution to urban agriculture, and only occasionally on their impact on development in urban areas. Although there is much research addressing various difficulties and problems of these allotments, only the benefits and not the challenges have been addressed in previous literature reviews. This paper aims to fill these gaps and to analyse existing knowledge by providing an in-depth review of the academic literature, focusing not only on the benefits of community gardens and allotments in urban areas, but also on the existing problems related to allotments and urban gardening. The research objective of this paper is to answer the following questions:

- (1) Which issues related to allotments are the main focus of research depending on their location in the world?
- (2) Does the interest in the research carried out depend on the country of the allotments?
- (3) What are the reasons for choosing different subjects of study related to urban gardening depending on the country of origin?
- (4) What challenges are allotment gardens facing?
- (5) What directions can the development of allotment gardens take based on the legal regulations of each country?

The authors hope that the research presented here can be the basis for conducting further studies related to allotments and community gardens to improve the legal and cadastral regulations that are currently inadequate and are leading to the decline of allotments. In addition, spatial analysis based on GIS technology could be used more widely in the assessment and planning of new allotments by both researchers and local authorities.

2. Materials and Methods

In this study, we conducted a systematic literature review to understand the complexities of urban gardening in general and community gardens and allotments in particular, considering not only their benefits but also their problems and challenges.

The analysis captured empirical research in six broad themes extracted from all the topics covered in published research on community gardens: (1) community participation and cohesion, (2) health and well-being, (3) economic opportunity, (4) pollution, (5) urban planning and development, and (6) a sustainable environment.

2.1. Data Collection

In conducting the proposed study, we followed widely used protocols for conducting a systematic review and took steps to minimise bias in the identification, selection, and summarisation of studies. The initial literature selection was based on a keyword search: allotment gardens (title, abstract, and keywords) of the comprehensive literature databases Web of Science (all years) and Scopus (all years). The first search was performed in August 2022 and retrieved 865 articles, including 426 results from Web of Science and 439 from Scopus. Of these, we found 291 duplicates, articles that were indexed in both catalogues. After this first phase of screening, we obtained a list of 574 entries. In the second phase of screening, the list was narrowed down based on the topic; the abstracts of the scientific papers

were analysed in detail to determine whether the paper actually addressed the topic of urban agriculture or allotments and to decide whether the article should be included in the final list. In this second step, 427 other papers were rejected, 298 were not relevant to the present study and analysis, 17 were not journal articles, 37 did not cover the topic of agriculture in urban environments, 46 were not accessible to the public, 7 were not in English, and 7 were reviews. At the end of the second sorting stage, 162 academic articles or book chapters remained. The following Figure 1 shows the diagram flow of the review methodology.

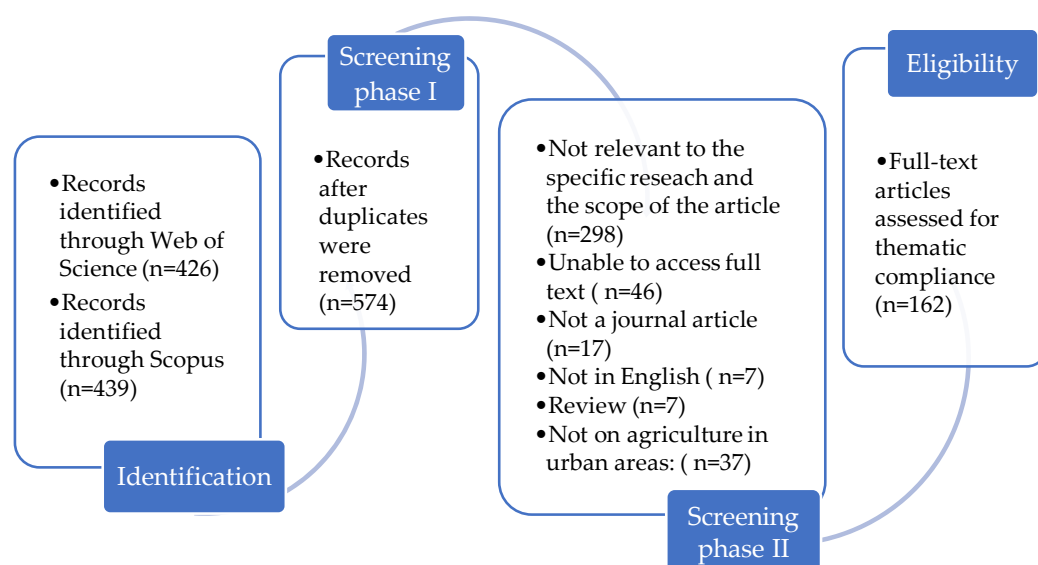


Figure 1. Diagram flow of the review methodology.

2.2. Synthesis

The total scientific literature on which this review is based includes 162 research articles published between 1978 and July 2022. The following Figure 2 shows the distribution of the reviewed literature over time. As can be seen in this graph, interest in urban gardens increased significantly after the 2008 financial crisis, with most academic articles published after 2015.

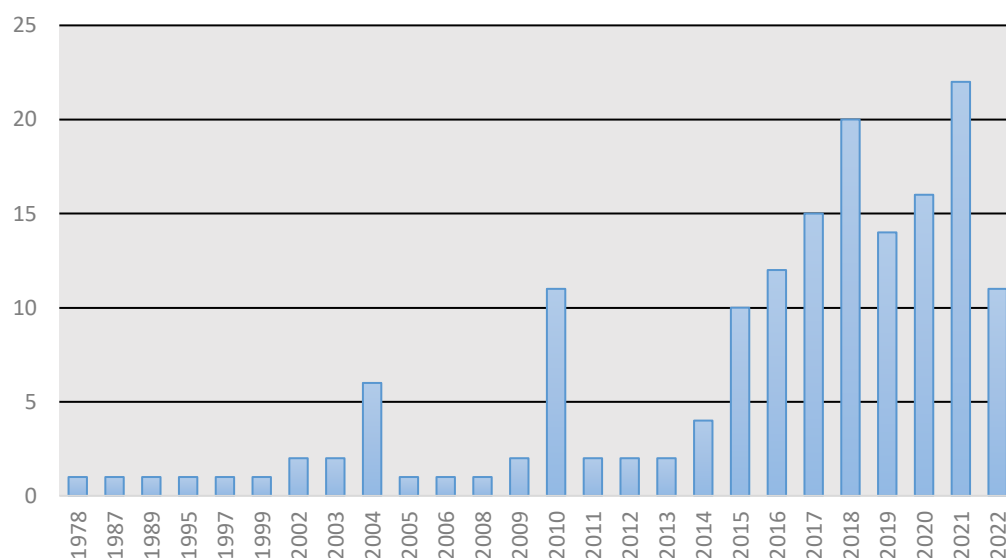


Figure 2. The temporal distribution of the literature review.

Some of the articles selected for review analysed the situation of allotment gardens and/or community gardens in general and others focused on the legal framework or

development in a specific area or country. The following Figure 3 shows the geographic distribution of countries where the benefits and challenges of allotments and community gardens were studied.



Figure 3. Number of papers according to the location of the allotments/community gardens (made by Arcgis online authors).

The global distribution of the literature shows that Europe has the largest proportion of studies dealing with both the benefits and problems of allotments.

3. Results

The main idea behind the establishment of allotment gardens was to improve the living conditions and food supply of workers and the underprivileged. The impact of allotment gardening does not only concern the allotment gardeners, but also the general public and the environment. It is important to emphasise that allotments have impacts not only on food production or outdoor physical activity, but also on the reuse of idle or neglected land, community development, therapeutic and nutritional benefits, and psychological benefits for allotment holders and residents. For this reason, this study captured six broad themes related to allotments: (1) community participation and cohesion, (2) health and well-being, (3) economic opportunities, (4) pollution, (5) urban planning and development, and (6) a sustainable environment. Most of the studies included in this literature review addressed only one of the above topics, but there are also some articles that analyse multiple aspects of urban gardening (for example, three articles analyse community participation and health issues, one article analyses health and urban planning, two articles analyse urban planning and sustainable environment, one article analyses pollution and urban planning, one article analyses economic opportunities and urban planning, and one article combines economic opportunities with sustainable environment). The following diagram shows the distribution of these topics in the literature review (Figure 4).

3.1. Community Participation and Cohesion

Allotments provide community agriculture for urban residents. Developed primarily for local food production, they also contribute to urban resilience and provide many additional benefits, including community participation and cohesion. This type of community building is one of the most popular research topics related to allotments (Figure 5).

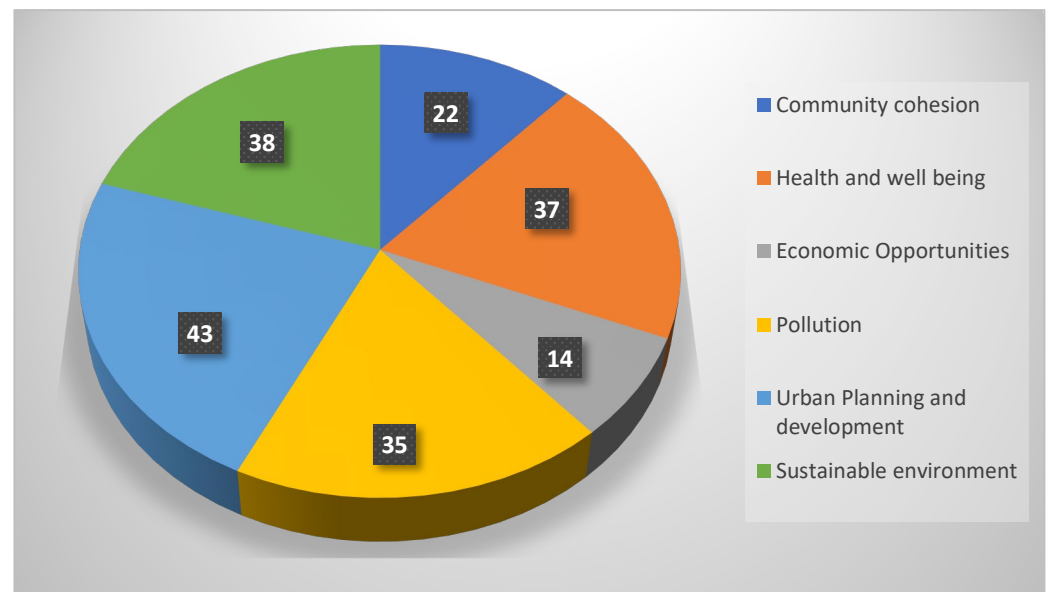


Figure 4. The distribution of study topics in the literature review.



Figure 5. The spatial distribution of the countries where community cohesion was studied (made by Arcgis online authors).

Allotment gardening is becoming increasingly popular and visible, whether as an activity with educational or rehabilitative goals or as a hobby for highly motivated gardeners, individuals or groups, who have no previous experience but want to experiment with growing methods. The phenomenon seems to be a response to a variety of needs that go far beyond the production of food, as it often contributes to the promotion of social integration and the protection and restoration of urban green spaces. In analysing the studies conducted in this area, three major research directions can be identified (Figure 6): place of meeting and integration, non-formal education, and social capital.

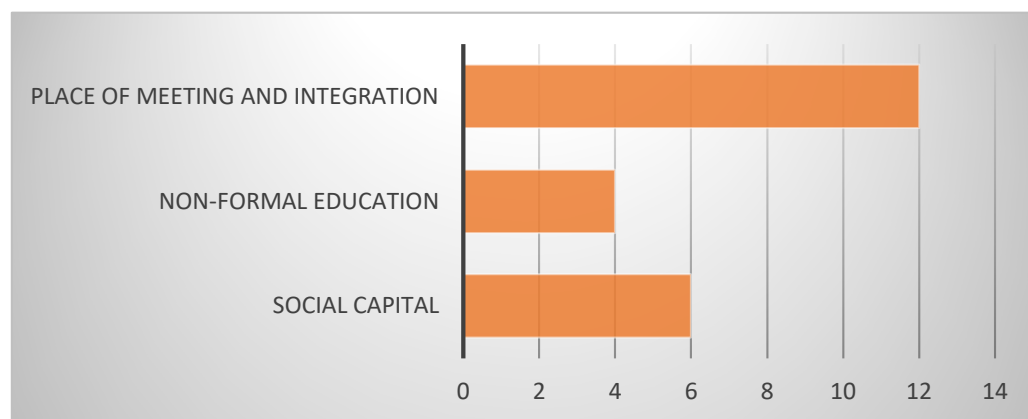


Figure 6. Classification of community cohesion studies in relation to allotments.

Place of meeting and integration

Allotments become a gathering place for the elderly [27] or an outdoor classroom where children can discover and learn about nature [28]. Community gardens have thus become an example of places where people meet, discover old and new production techniques, and exchange traditions and cultures [29]. Urban agriculture is proving to be a tool for involving people in the planning and management of facilities, as it requires the presence of users on site [30]. It has also been shown that a greater gardening experience increases the effect of emotional motivations on garden participation [31,32]. Allotment gardeners are often organised in different associations or clubs, which are perceived both as a formal organisation of a space and as communities characterised by solidarity, interaction, and community spirit [3]. Several studies conducted in European cities have shown that urban gardens contribute to the social inclusion of immigrants [33] and gardeners with disadvantaged personal backgrounds [34,35]. On the other hand, they contribute to the diversification of biodiversity by growing plants specific to the country of origin [36]. In Japan, public–private partnerships are proposed to reduce the financial burden while increasing the social, economic, and environmental benefits of allotment gardens [37].

Informal education

On the other hand, allotment gardens represent an excellent opportunity for informal education. They help to improve children’s relationship with the natural environment and build a community around a garden and an outdoor learning centre. Various experiences of associations and schools show that projects raise children’s awareness of natural cycles and gardening and help to provide education on healthy eating and taking care of the soil. Allotment gardens are welcome places to play, learn together, and build a multicultural community through collaboration [37,38]. Sometimes they are also transformed into learning spaces where socially organised, intergenerational non-formal and informal learning takes place [39,40].

Social capital

The revival of the urban allotment represents a form of resistance to the associated disembedding processes and an explicit attempt by urban dwellers to (re)connect with traditional forms of knowledge, land, and practice (food production systems), but more importantly to (re)connect with others, create a sense of community, and restore a sense of belonging to the city [4]. Gardeners show high levels of social and community activity, including sharing knowledge or surplus food [41]. Even COVID -19 created opportunities for gardening development: gardeners had more time to work in their plots and greater community cohesion as garden neighbours cared for each other [42]. Special cases have also been studied—in a community garden created for people with cancer [43] and for young adults who were “in care” for a time [44]. Results suggest increases in social capital, self-identity, and well-being. In [45], urban allotments are discussed as one of the alternative frameworks for urban development—Slow City. The concept of urban allotments and the

Slow City Agenda is to protect and promote strong community relationships, decision-making, civic engagement, group learning, and recreation for people of all ages in close proximity to green space.

3.2. Health and Well-Being

Studies conducted over time show that in underdeveloped countries and among poor populations, the economic benefits of cultivation are a determining factor for urban agriculture, while in developed countries, with the exception of immigrant communities or disadvantaged areas, active outdoor recreation is the main attraction of urban agriculture. In analysing the studies conducted in this area, three major research directions can be identified: outdoor recreation, improving physical and mental health, and emotional motivation for self-fulfilment (Figure 7).



Figure 7. Classification of research directions.

Recreation

Allotment gardening in Europe is currently very diverse and varies according to the historical, legal, economic, and social conditions of a given country and also because of its geographical location. A survey conducted in seven European countries (Austria, Estonia, Germany, France, Portugal, Poland, and the United Kingdom) was used to assess the motivations of users regarding the use of plots and gardening practices [46]. The survey revealed that, in addition to the provision of high-quality food, active recreation and contact with nature are becoming increasingly important among the many motives for urban gardening in Europe.

This spatial distribution of AG, which is mainly recreational, is suggested by the areas/countries where this type of impact has been studied. Figure 8 shows the countries where the recreational impact of AG has been studied.

As can be seen in Figure 9, in general, gardening in developed countries is often referred to as an important leisure activity and a special form of outdoor recreation, a great way to reconnect with nature, blow off steam and escape the hustle and bustle of everyday life [28], relieve stress [11,47–49], and engage in physical activity [10,49]. Sometimes the reasons for urban gardening are simply the desire for a safe play environment for children and direct contact with nature [50] or a safe place for family gatherings [51]. In Lausanne (Switzerland) [39] or Oslo (Norway) [50], for example, residents prefer gardening as a leisure activity and environmentally friendly gardening practices. German gardeners can be described primarily as urban farmers and ecologists, while Polish allotment gardeners seem to use their gardens more for recreation (and as a holiday spot) [52,53].



Figure 8. Countries where the recreational impact of AG has been studied (made by Arcgis online authors).

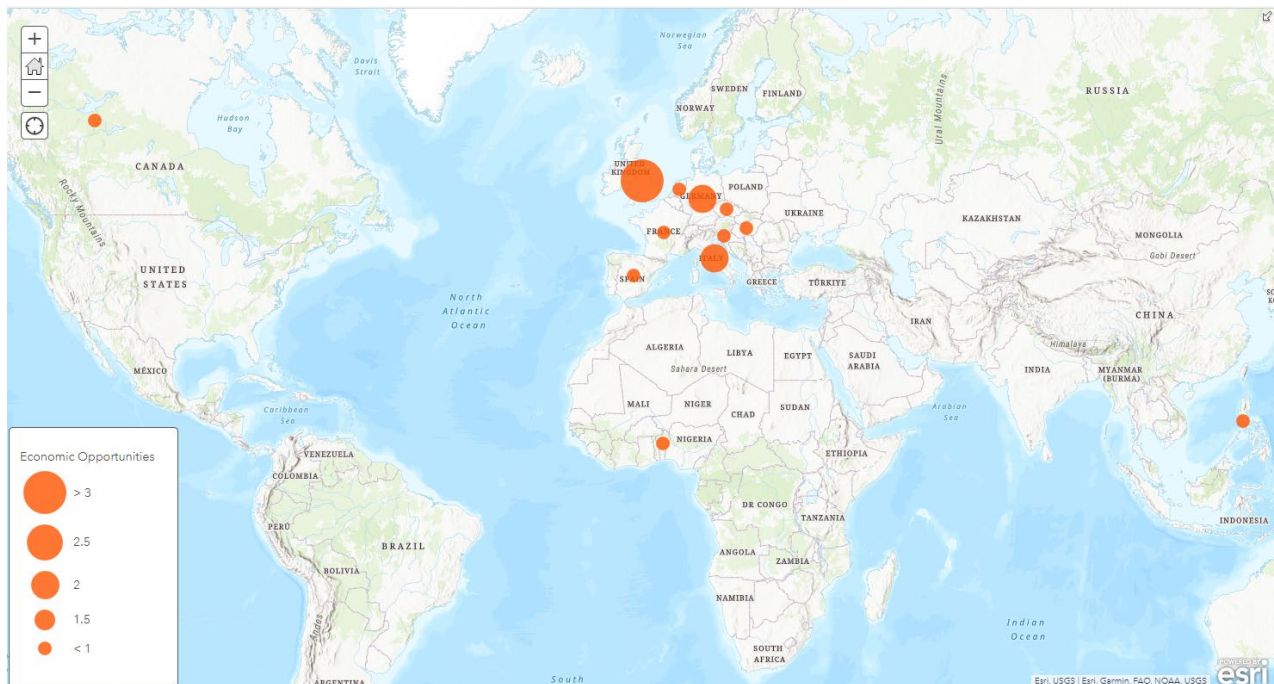


Figure 9. Countries where the economic impact of allotments has been researched (made by Arcgis online authors).

Improvement of physical and mental health

The aim of the study presented in [54] was to evaluate the contribution of urban allotment gardens (AG) in Portugal to the happiness and well-being of the urban population. The increasing frequency of garden visits was positively related to higher perceptions of subjective happiness. Allotment gardeners who visited AG more frequently rated themselves and their environment as happier. It can be assumed that urban ecology of allotment gardens is a means to increase citizens' well-being, contribute positively to their

happiness and life satisfaction, change behaviours, and develop personal skills [16,54,55]. Allotment gardening offers the opportunity for physical activity in the fresh air [10,11] but also play a key role in promoting psychological well-being and could be used as a preventive health measure [12,14,56–58]. Other studies investigated levels of physical activity during gardening among older adult allotment gardeners proving that it can be an effective form of regular exercise for improving physical and mental health in old age [9,59]. Research conducted in Switzerland focused on reducing income-related health inequalities by providing gardens to residents of lower socioeconomic status [60] and analysing the psychological impact of losing an allotment [8,15].

Emotional motivation for self-fulfilment

In Denmark, allotment gardening is perceived through the prism of self-realisation and the care of nature [3]. In Greece, according to [61], meanings, feelings and memories are anchored in the garden. In the Czech Republic [62], the motivation of members is not plant production per se, but rather recreation, social contact, and relaxation. In Israel, gardening is about an ideological commitment to nature and environmentally friendly issues [63]. Another study [64] quantified the relationships between social dimensions of urban agriculture, farm and garden types, and participant characteristics in six allotments in Paris, Nantes (France), the Ruhr Area (Germany), Gorzów Wielkopolski (Poland), and New York (USA). The different motivations and impacts were examined using four basic dimensions: general well-being, healthy eating, socialisation, and economic benefits. Respondents indicated that their strongest motivations for participating in urban agriculture were environmental improvement, access to fresh food, and relaxation or stress reduction. Economic impact was less important to respondents. Although food production is no longer the primary purpose in many countries for financial reasons, allotment gardeners still enjoy growing vegetables, either for their quality or because they are organic. However, allotments offer many benefits beyond food production. The plant richness and multiple uses of allotments, the therapeutic and nutritional value, and the psychological benefits to gardeners and residents should be emphasised [46,57,58,65–67].

3.3. Economic Opportunity

As mentioned above, the concept of allotment gardens emerged and developed to improve the standard of living of the underprivileged classes, a dimension that it has maintained in developing countries and/or among emigrants (Figure 8). In the meantime, however, many studies based on interviews with allotment gardeners have shown that in developed countries such as the United Kingdom, the United States of America, or in the European Union, allotment gardens are considered recreational spaces associated with the productive activity of cultivation.

Despite the community, social, and recreational components, allotment gardens have not lost their traditional role, the economic role of self-sufficiency and increasing the resilience of gardeners [68,69]. According to [5] urban farming represents a response to the food crisis in terms of socioeconomic issues and provides an instrument for combatting material and immaterial poverty. The main benefit of allotment gardeners is the production of fresh vegetables and fruits to enrich the diets of gardeners and their families. In the Western context, food self-sufficiency is often mentioned along with other alternative food networks [70]. In the United States, community-managed urban farms have recently gained an advantage over individual allotments, which require years of waiting [71].

In addition to food production, the allotment holder can limit transportation and storage and also has control over waste. Furthermore, the allotment gardener can achieve some level of sustainability by composting and collecting their own seeds. Allotments offer both tangible and intangible benefits: they provide a space for exercise or rest, companionship or solitude, and contemplation or work. Last but not least, they provide healthy food, and accordingly, many allotment gardeners consider allotment gardening as a hobby with benefits [72].

Times of crisis, such as the COVID-19 pandemic, have brought many benefits and opportunities to allotment gardeners around the world: new markets to sell food locally; more time for gardeners to work in their allotments; and stronger community cohesion, as neighbouring gardeners provide many benefits to each other's owners. However, COVID-19 has also brought numerous challenges to allotments, such as the loss of ability to provide support services, loss of income, and decreased production because of the reduced labour supply [42].

During and after a crisis, in addition to food production and increased income, urban agriculture has the potential to create jobs or transitional occupations for people while they look for new jobs [73].

The economic importance of urban gardens depends on how they are organised and managed [74]. In Rome, for example, they are characterised by voluntary community activities, while in Tokyo, commercial services are provided to give an opportunity not only to those who have the desire to grow vegetables, but also to those who have less time and skills to grow plants [75]. In Benin, however, gardeners join together in cooperatives and make decisions collectively. The economic benefits to gardeners are obvious: their bargaining power is strengthened, transaction costs are reduced, and credit opportunities are increased [76].

Sometimes the allotments represent an economic opportunity not only for the gardeners but also for the owners. In [77], the willingness to pay for the ownership of an allotment and the factors that influence the valuation were studied. In the Philippines [78] or in Spain [79], landowners have converted their land into allotments and lease it to allotment holders. Private allotments tend to be more expensive for gardeners, but less regulated, so they are preferred by many [79].

3.4. Pollution

Urban allotments are on the rise worldwide, especially in large cities, because of the many benefits described in the previous sections. However, growing vegetables in cities raises major concerns about the risks to human health from existing urban pollution: pollution from road traffic, contaminated urban soil, air pollution, or contaminated irrigation water [80]. Therefore, numerous studies have attempted to evaluate the potential transfer of various pollutants such as heavy metals from soil, air, or water to plants grown in urban gardens (Figure 10).

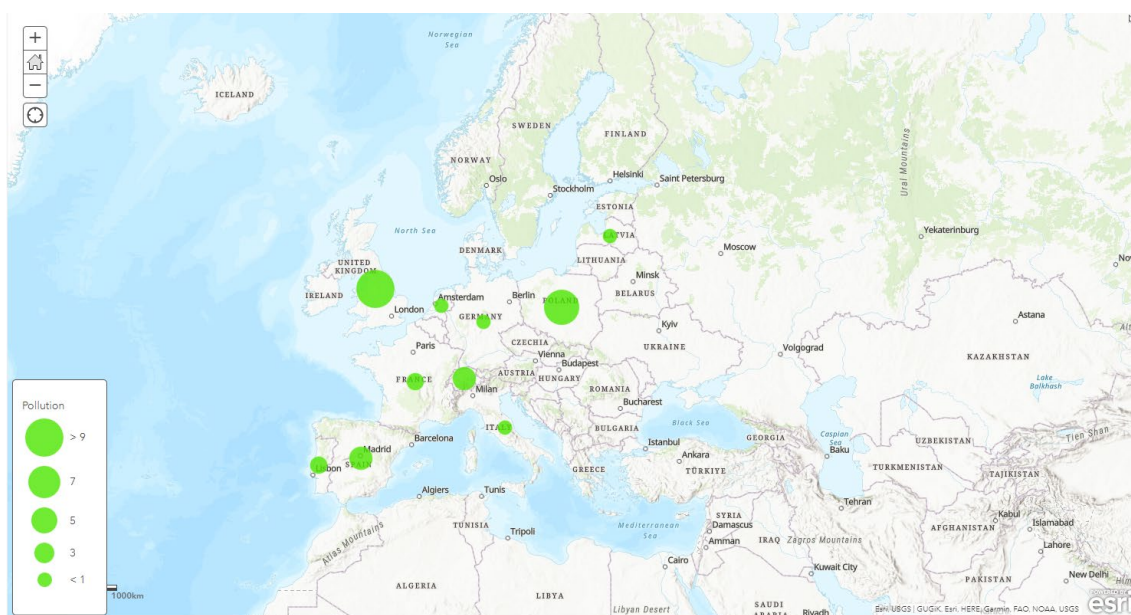


Figure 10. The spatial distribution and number of articles analysing pollution in allotments (made by Arcgis online authors).

Environmental pollution often leads to the accumulation of potentially harmful trace elements in the soils of urban gardens, which may have elevated concentrations of pollutants, including heavy metals and various metalloids caused by urban activities such as industry, traffic, and house fires. As a result, numerous studies have examined the effects of pollution and polluted soils and whether vegetables grown in urban areas accumulate these pollutants. In analysing the studies conducted in this area, five major research directions can be identified: the spatial variability of the distribution of trace elements, studies on the content of heavy metals in the soils of allotments and the vegetables grown there, studies on the content of a single specific element in the soils of allotments and crops, and studies of soil quality and proposals for remedial actions.

As can be seen from the above diagram (Figure 11), most of the studies investigated the effects of soils contaminated with heavy metals on plants grown in Poland [81–85] and the United Kingdom [86–88], but other studies were conducted in Switzerland [89], Germany [90], Brazil [91], Spain [92], and Latvia [22]. Soil quality studies were presented in [93–95].

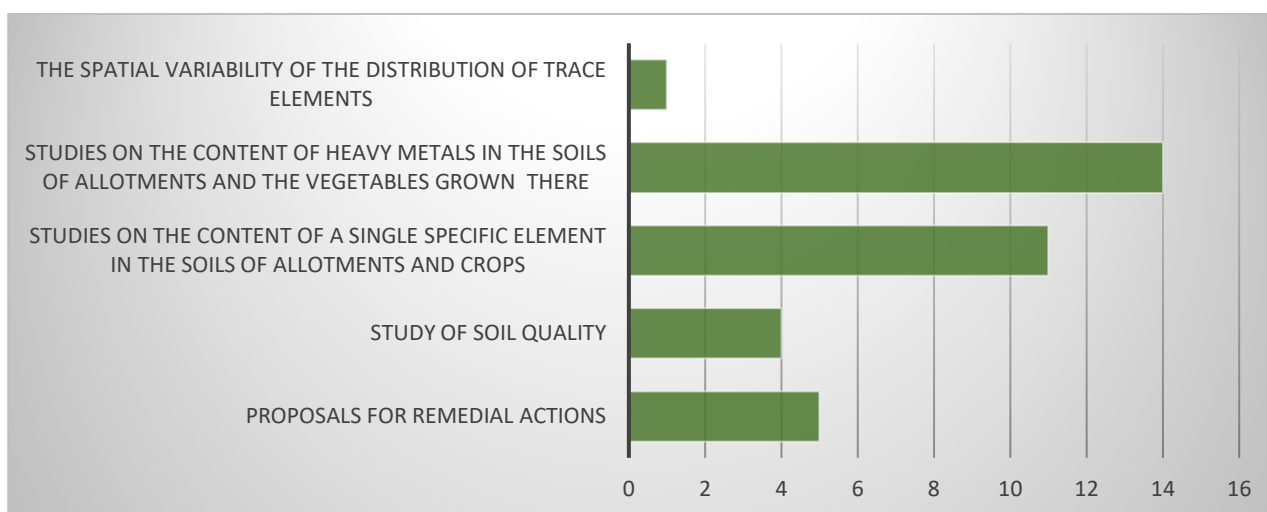


Figure 11. The classification of topics in relation to the articles that analysed pollution in allotments.

The effects of a particular element have also been studied in detail, most notably lead [23,85,96–99], but also elements such as cadmium [23,98], zinc [100], chromium [101], or arsenic [102]. Lead is one of the most common urban pollutants, and many countries set limits for allowable concentrations in food. Soils and plants from allotments mainly in Poland, the United Kingdom, and the Netherlands, originating from potentially contaminated areas, have been analysed for their lead content. Even the mean Cd and Pb concentrations in the soil samples were higher than in normal soils used for agriculture and horticulture. The Cd and Pb concentrations in the crops were rather normal.

In heavily polluted areas or where there is historical pollution, various agricultural systems can be adapted to reduce the health risks associated with soil pollution:

- Conducting soil tests prior to the establishment of urban gardens [103],
- Educating urban gardeners about sustainable growing techniques is a priority for a safe environment [103],
- Growing plants for nonedible products such as flowers [104,105],
- Selecting plants that do not accumulate metals in their edible parts (e.g., many fruit plants) [81,104,105],
- Planting plants in raised beds on contaminated soil [104,106],
- The extent of metal accumulation by earthworms in compost allows them to be used as potential bioindicators of metals in the environment [106]
- Replacing polluted soils with clean soils [105].

3.5. Urban Planning and Development

One of the greatest challenges in urban planning is to create multifunctional spaces that meet the needs and preferences of residents while protecting the environment. Excessive urbanisation in recent decades has driven up the value of land in cities and put pressure on local authorities to use all available land for real estate investment [2]. In Spain, during the real estate boom, all available land was proposed for investment, but after 2008, many plots were converted into private allotments [79]. Nowadays, edible landscaping can be considered as a strategic, sustainable, and multifunctional component of urban plans, urban design plans, urban development projects, urban modernisation initiatives, and housing projects, which can be designed in a variety of ways and provide enormous benefits not only to residents but also to urban dwellers [104]. Figure 12 shows the countries where urban planning of allotment gardens has been studied.

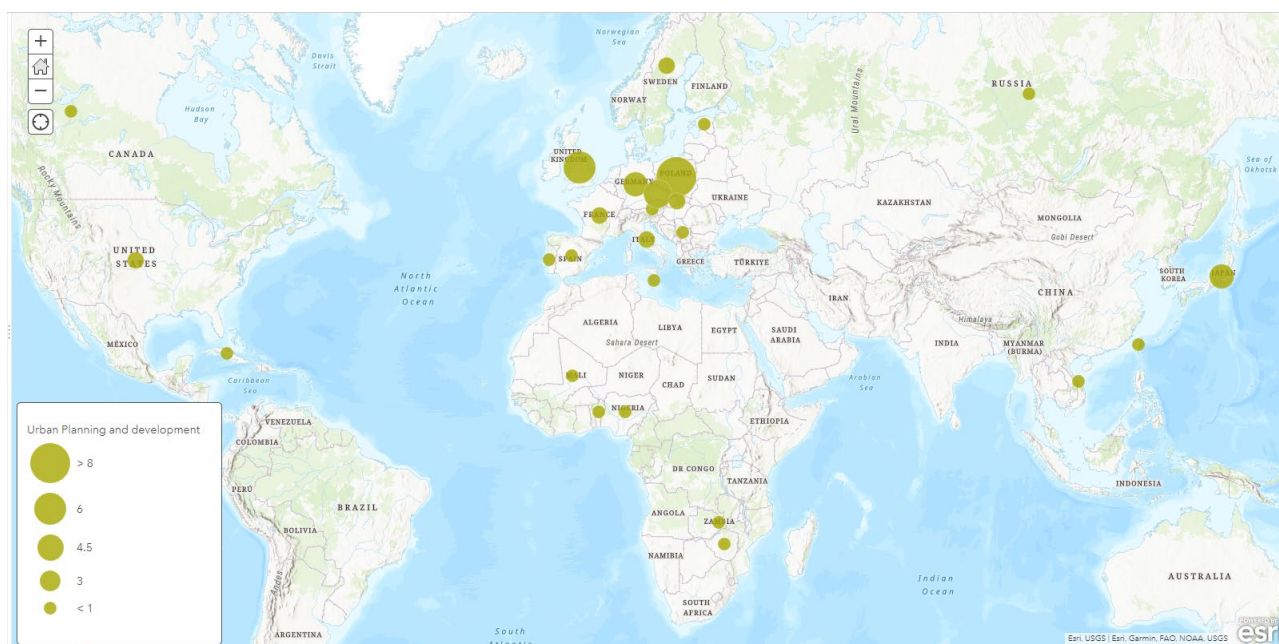


Figure 12. Countries where urban planning of allotment gardens has been studied (made by Arcgis online authors).

The studies carried out in this field on the integration of urban agriculture in development and urban planning projects reveal four main research directions: the conversion of allotments into built-up areas, analysis of existing allotments, the establishment of allotments, and proposals for the location of allotments.

Most of the studies conducted focused on the evaluation of existing allotments and the problem of their downsizing because of increased land values and demand for investment land. Figure 13 shows the distribution of these four topics among the research articles.

Conversion of allotments into built-up areas

Urban sprawl inevitably displaces some agricultural land, and landowners expect to make profits from selling or converting this land into built-up areas or other nonagricultural uses. In most urban areas in low- and middle-income countries, there is no strategic planning framework for land use, so urban areas sprawl uncontrollably and indiscriminately, taking up agricultural land. Urban agricultural land conversion is not limited to low-income countries: in many countries, urban policies reflect the commercialisation of urban land, displacing gardens without ensuring the survival of the gardening community. In Paris, urban agriculture struggles to find permanent sites [107]. In Ljubljana, city officials already anticipate that allotments will disappear in locations deemed unsuitable [108]. Uncertainty about land ownership is one of the biggest obstacles to the future of allotments and community gardens in the Czech Republic [109]. In Prague, the number of allotment

gardens has decreased significantly since 1989. Allotment gardens are converted into recreational areas or permanent residences, or used for the construction of housing projects, transport infrastructure, or commercial facilities [110]. One of the greatest threats to the existence of allotment gardens within the spatial structure of cities in Poland is investment pressure [111,112]. Even gardens identified in research as very important for the integrity and expansion of the urban green space system are to be dissolved [113]. In the UK, a significant proportion of urban agriculture takes place in allotments, and these are a historically important part of the landscape. However, the supply of allotments has declined significantly since its peak in the mid-20th century [114]. More and more allotments are being lost in London, about three times as many as 10 years ago. This decline can be largely attributed to rising land prices and pressures associated with restrictive funding from local authorities [115].

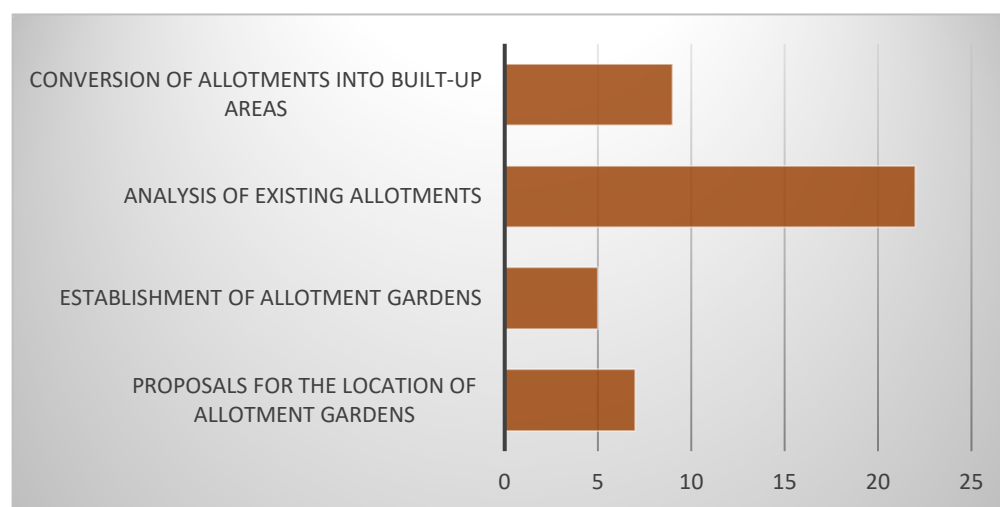


Figure 13. The classification of topics related to articles on the urban planning of allotment gardens.

Analysis of existing allotments

The planning of future development must always be based on a correct and complete analysis of the present situation. Therefore, many researchers have analysed existing allotments around the world, including a comparative analysis of the aspects of the operation of allotments in different countries. Although allotment gardens are influenced by different political levels, they have many common features, including the long struggle to include these gardens as an integral part of urban spatial planning [116]. In [117], the authors studied six municipal urban gardening initiatives from five EU countries representing different planning systems and traditions. They selected cases that took a locally unique or innovative approach to addressing urban challenges. A cross-case comparison revealed a range of success factors, from clearly articulated goals and regulations, to municipal support, financial resources, and social capital, to the availability of local food advocates and community-building facilitators.

The problem of urban gardening from the planning perspective has also been analysed in developing countries [118,119]. Allotment gardens in the countries of southern Africa, West Africa, and Asia have also been analysed and studied [120].

The characteristics of urban gardens in Taipei City (Taiwan) and their accessibility to locals and non-locals have also been studied [121]. In [122], the current status of Japanese allotment gardens was analysed from the viewpoint of the management of these gardens and the needs of their users.

The task of preserving allotments in urban ecosystems lies with local land-use planning [111]. Analyses of allotment gardens in the European context, from the planning perspective, have been presented in many articles [123–127], highlighting their main functions, services, and benefits and the necessity for protection and legal status regulation [128].

The number of gardens per city and the size varies from city to city because of land-use planning, size and distribution of urban land, sensitivity of local authorities, and the presence of complementary/alternative services and facilities for citizens. Some studies examined the development of allotments [129,130] others the acceptability and feasibility of potential urban environments for community food growing [131–134]. Legislation and land-use regulations, many of which were created after the development of allotments, show a continuous process of negotiation between informal practices and planning authorities. A similar theme was addressed in the article [135]. An attempt was made to define the processes and phenomena that have occurred in the operating of allotment gardens in attractive locations in close proximity to the coastline of Gdańsk Bay. Gardens in attractive locations are subject to several phenomena that do not occur to a greater extent in other locations; for example, there are many investments related to the construction of new garden houses, which often exceed the legal level.

The establishment of allotment gardens

To select the optimal site, a decision support tool was developed to evaluate the suitability of cadastral units and informal plots for allotments in urban and peri-urban areas. This was tested for three fast-growing cities in Benin, a low-income country in West Africa [136]. The aim of the study [137] was to present different aspects of the location of allotments in the urban landscape in Poland. The exploratory study presented in [138] investigated the feasibility of community allotments on abandoned agricultural land in the small island nation of Malta. The study presented in [139] intended to analyse the provision of allotments and the factors that influence them in Tokyo. The policy implication of this study is that policymakers need to consider the location strategy of allotments based on the spatial characteristics of allotments. Research in the Campania region of Italy has shown that urban planners in the urban ecosystem actively promote urban agriculture after more unused land is available for it [48].

Proposals for the location of allotment gardens

The great demand for collective urban gardens in the city of Belgrade [140] led to the spontaneous (mostly illegal) creation and development of urban gardens as self-organised actions of citizens. They are still considered as marginal and certainly not representative urban practices, overshadowed by planned urban concepts and social policies [141]. Currently, there are no institutional tools to support the development of such gardens in Serbia, despite that urban planning experts have been advocating for collective urban gardening for almost a century. The results indicate a potentially high demand for collective urban gardens, with a slight preference for individual plots over community gardens. In 2012, the Municipal Network for Urban Allotments was launched in Vila Nova de Gaia (Portugal) [142]. The establishment of allotment gardens in these areas is seen as a way to satisfy the demand for such spaces in urban areas and to solve the problem of maintaining these gardens while improving the environmental, aesthetic, and social quality of the landscape.

Another reason for the increased interest in allotments is the pandemic, which has significantly hindered the use of community green spaces [143]. Urban agriculture offers a new opportunity for land-use planners and landscape designers to engage in urban development and redevelopment to support community farms, allotments, rooftop gardens, edible landscaping, urban forests, and other productive elements of the urban environment [104]. Currently, futuristic design provides inspiration for architectural design and the opportunity to enhance buildings with appropriate infrastructure to support green spaces, so why not gardens? The large number of patio roofs could serve as a platform for urban agriculture. Green roofs designed or adapted to buildings to support a growing environment, provide drainage, and support plant life could be used for edible crops [104].

The spatial analysis of allotments using geographic information systems (GIS) and land-use could provide useful applications to assess a city's green infrastructure and expand green spaces also used for urban gardening [104,135,144]. GIS could be used for suitability analysis, land-use inventories, locating sites for new allotments, and also to increase institutional awareness and political support for urban agriculture.

3.6. Sustainable Environment

Urbanisation is considered the main enemy of agriculture, as agricultural land is lost to the expansion of cities and the development of technical and urban infrastructure. Modern cities promote sustainable planning and management that take into account all three major dimensions: the social, environmental, and economic dimensions [73]. As discussed in the previous subsections, allotment gardens, like urban agriculture in general, meet the specific goals of sustainable urban development and contribute to poverty alleviation, subsistence food production, health, and community development.

In addition to their primary function of growing vegetables, there are other direct benefits of urban agriculture, such as poverty alleviation, providing recreational areas, community cohesion, economic opportunities, health and well-being, and a sustainable environment. The impact of allotments on helping to make a sustainable environment has been researched mainly in Europe, as shown in Figure 14.



Figure 14. The spatial distribution of research on the impact of allotments on a sustainable environment (made by Arcgis online authors).

The studies carried out in the sustainable environment field in relation to allotment gardens consist of four main research directions (Figure 15): ecosystem services, sustainable development, climate mitigation, and environmental impact.

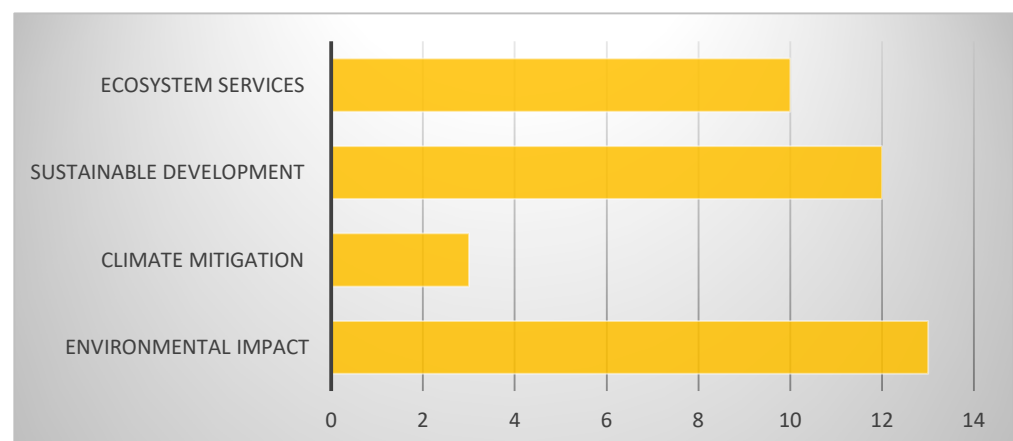


Figure 15. The classification of topics covered in sustainable environment-related articles.

Sustainable development

Due to the multiple direct and indirect benefits of urban agriculture in general, allotment gardens contribute to a sustainable environment: sustainable food production, green spaces, water conservation, and waste management (composting). Urban and peri-urban agriculture contributes to 8 of the 17 Sustainable Development Goals adopted by the UN General Assembly in 2015 [73]. The contribution of urban gardens to some of these goals, such as food production, health, and community cohesion, has already been discussed in this paper, but allotments also contribute to a sustainable environment.

The most important contribution is the current role of allotment gardens as an element of urban green areas [145,146]. Allotment gardeners manage neglected or polluted areas, thus contributing to making cities cleaner [73,103–105]. Experienced allotment gardeners consistently use management practices that promote high soil quality [93], and new gardeners learn them [147].

Others have attempted to answer the question of how urban allotments impact the sustainable development of cities and what more should be done to make this impact more effective (Spain) [148]. Many studies have examined the impact of allotments on sustainable urban development through their potential for sustainable food production in places such as the UK city of Brighton and Hove [73], the Czech Republic [149], Serbia [150] and Poland [151].

Ecosystem services

The growing importance of urban allotments in the planning and management of urban areas is due to their combined positive effects on ecosystem services, the economy, and human well-being, especially among groups of urban residents [103]. The ecosystem services provided by allotments can be classified into four categories: provisioning (food production, aromatic plants), supporting (habitat for species), cultural (community cohesion and other social relationships, recreation, aesthetics, etc.), and regulating [152]. The regulating ecosystem services of allotments provide various types of benefits such as erosion control, soil improvement [153], air purification [152], local climate regulation, or environmental education [154]. Allotment gardeners contribute to soil improvement by providing clean soil, composting (waste management), nutrients, and irrigation. Since many allotments do not have running water and many allotments are also located on polluted soils, gardeners often harvest rainwater to improve the soil [155]. Studies on ecosystem services are presented in [156] Austria, [157] the UK, [158] France, [157,159] Poland, and [160] Italy. Allotment gardens contribute to learning about the environment, which can improve the understanding of environmental issues and is an important learning area for climate change mitigation [154].

Climate mitigation

Similar to other green spaces, allotments contribute to climate regulation in urban areas, but due to regulation, only plants and small trees grow there, contributing little to carbon storage and climate regulation [155]. However, allotments also grow evergreen plants for ornamental purposes, which contribute much more. Allotments are able to mitigate the urban heat island effect by regulating temperature through night-time cooling, as plants cannot retain heat. In addition, allotments are often irrigated in the summer, which contributes even more to cooling the air, not only in the allotments but also in the surrounding area [153]. According to [161], urban agriculture in Australia has the potential to mitigate the effects of extreme climate change while providing many benefits, such as improved well-being, human-nature connection, and food security.

Environmental impact

The growing presence of allotment gardens is not accidental, as they aim to respond to the challenges of modern urban societies in terms of sustainable development [162]. Allotment gardens have the potential to be considered as nature-based solutions [163]. Maintaining and expanding green infrastructure in the city through allotments has several ecological benefits: the restoration of green spaces [140], absorption of dust and carbon monoxide [73], the reduction in the negative effects of the urban heat island [153,161], and

the increase in urban biodiversity [164,165]. The ecological value of allotment gardens comes from the green and cultivated area itself and the enrichment of the local biodiversity [146].

Allotment gardens create a mosaic of habitats and can serve as refugia for biodiversity in an urban environment. In general, biodiversity in urban areas is lower, but urban agriculture enriches plant diversity and also provides habitat for small wildlife such as hedgehogs, birds, and insects [104,164] or even man-made habitats (bird houses, insect hotels) [155]. The impact of allotments on wildlife has also been the subject of research [164,166,167]. Although allotments occupy a relatively small proportion of urban land, they provide high quality and diverse habitats for many groups of species.

4. Discussion

Allotment gardens, born out of the need for subsistence food production in times of crisis, have evolved differently according to the social, economic, and urban contexts, and are constantly influenced by the political context. Allotment gardens have experienced a renaissance in the last decade because of their undeniable positive effects on the physical and mental health of gardeners.

Allotments provide food production and outdoor physical activity, but also have implications for the reuse of neglected land or community development. Allotments have therapeutic and nutritional benefits, as well as psychological benefits for allotment gardeners and their residents. A detailed review of the literature enabled the identification of six main research areas: (1) community participation and cohesion, (2) health and well-being, (3) economic opportunities, (4) environmental pollution, (5) urban planning and development, and (6) a sustainable environment.

Research on allotments is being conducted around the world, but much of it involves developed countries where the establishment of allotments has been practiced for decades. They have been established on the outskirts of cities and enrich their green infrastructure. There are many allotment gardens in the United Kingdom, Germany, Poland, Norway, and the Netherlands. They can also be found in many other places such as the United States and Japan. Since allotment gardens have been functioning for years in these countries, the research topics here differ from those in developing countries or countries that are just implementing the idea of establishing allotment gardens in urban areas.

Most of the studies analysed deal with urban planning and development issues. In developed countries, one of the main topics is the analysis of existing allotment gardens and the problem of replacing allotment gardens with urban areas. In developing countries, there are also studies on the analysis of existing allotments, but much space is devoted to the issue of location and the establishment of allotments.

Somewhat fewer publications concern two related topics: health and well-being and environmental sustainability. The results of these studies clearly show the positive effects of allotments on people and the environment.

The issue of soil pollution by allotments is also quite frequent in the analysed publications. However, this issue largely concerns only the developed European countries where these gardens have existed for decades and are located in highly urbanised environments, sometimes near industrial plants. In these countries, this is an important issue because scientists want to ensure that the positive aspects of people's use of allotments are not negated by the contaminated food that grows there. Therefore, much of the research is focused not only on contaminant testing but also on finding ways to prevent or reduce the transfer of contaminants to plants [103–106].

There are only 22 publications on the topic of community participation and cohesion, but the topic is important and comprehensive. It is as much about the creation of social bonds by gardeners as it is about the importance of allotments as a place for meeting, integration, and informal education.

The least researched topic is economic opportunity. This is especially important for places where allotments are just emerging or beginning to develop and their main function is food production. This certainly requires further research.

As we have argued in this article, allotment gardens currently face several challenges:

- The disinterest of city governments to develop such green infrastructure because of the high value of urban land; the high value of urban land and the lack of clear legal legislation have also led to the disappearance of existing gardens,
- Guerrilla gardening has led to gardens being established on abandoned lots without direct permission from the landowners,
- The conversion of garden houses into permanent residences,
- The lack of infrastructure in the communities makes it difficult to access and irrigate, but also to protect property from vandalism and theft,
- The pollution caused by urban pollutants: contaminated urban soil, air pollution or contaminated irrigation water, road traffic, or historical pollution.

The research presented here could form the basis for further studies related to allotments and community gardens to improve the inadequate legal and cadastral regulations that lead to the decline of the areas set aside for allotments. The decline of allotment gardens is sometimes caused by their conversion into residential areas of last resort in the absence of clear legal regulations. As mentioned above, allotment gardens developed remarkably during the economic crisis and in the post-crisis period, not only for food production but also when gardeners converted their plots into permanent residences. In these cases, recreational and agricultural activities have decreased and community houses built for seasonal use and the storage of tools and other needs related to temporary residence were converted into residential buildings [19,20]. People live in allotments despite the lack of public utilities because the uncertainty of their legal status and the lack of infrastructure contribute to low housing prices, and living in allotments is cheaper and more sustainable than living in the city, where the cost of public utilities is high and alternative resources are scarce [19,20]. The cadastral regulations for allotments do not allow permanent residence and therefore do not provide for such a situation, which is why they are often contradictory [19,20,132]. In Hungary, for example, the cadastral regulations prohibit the registration of a residential building in plots, but if an address is available, anyone can register a house under a valid postal address. Sometimes plots benefit from being in a very good location for tourist activities and are transformed into so-called “second homes” [14]. In Poland, in the Tricity area, garden cottages have been converted into vacation homes or tourist rentals because of their attractive location by the Baltic Sea [135].

In the past, when gardens were established in areas that are now sought after for investment, and municipalities seek profit and dissolve the gardens, legal regulations in countries such as Poland, the United Kingdom, the Czech Republic, and Germany do not sufficiently protect their existence. Therefore, the areas covered by allotment gardens are decreasing every year. The decrease in areas for urban gardens has led to an increase in demand, as in the United Kingdom [115], Norway [57], and the United States [71] or Spain, despite private initiatives of this type [79]. Since decision-makers do not recognise the benefits of urban agriculture, the areas dedicated to it are reduced in an effort to generate higher revenues. On the other hand, nongovernmental and environmental organisations promote community gardens to foster ecological literacy and civic engagement through various forms of community gardening, including guerrilla gardening, as in Serbia and Portugal.

In cases where municipal authorities, aware of the commitment and recognising the importance of green spaces in the city, could establish programmes or improve legal provisions to support and develop these allotments. Tools to support such decisions based on spatial analysis and GIS should be used more widely in the regulation, assessment, protection, and planning of new allotments.

5. Conclusions

The main objective of this systematic literature review was to analyse, understand, and appreciate the diversity of allotment gardens.

The primary focus of research on allotments has been to identify their multiple benefits. Therefore, the first conclusion highlights the difference between developed and developing

countries in the multiple benefits of allotments. Studies in developed countries have focused on recreational, social, health, and educational benefits, while in developing countries the focus has been more on subsistence food production. Thus, developing countries can learn from developed countries how to use allotments to improve the social, physical, and mental well-being of urban residents, while developed countries can learn from developing countries about traditional agriculture and collective agriculture.

The second conclusion refers to the challenges of urban planning in relation to allotment gardens. Being highly dependent on the local context, it is important to consider other factors such as beneficiaries, land ownership, government support, and challenges that could help minimise inconsistencies between the actual use of allotments in cities and planning intentions. Geographic information systems (GIS) should be used to provide applications for spatial analysis, assessment, and the expansion of allotments.

This review highlights the knowledge gaps in allotment gardening in developing countries. It shows the importance of having a more geographically diverse scientific database on the subject. Scientific data play a critical role in planning and decision-making. Therefore, we believe that future studies on allotments should focus more on developing countries. We also suggest that future studies in developing countries highlight the following benefits of allotments: health and emotions, social relationships, and education. In addition, we suggest they investigate how they can be integrated into urban planning to improve the well-being of urban residents.

Based on the results of the present study, we identified several gaps in the existing scientific knowledge about allotments. We suggest that future studies on allotments should focus on the following aspects to support the development of allotments in the city:

- Studies to identify challenges and constraints for allotments in different socioeconomic contexts,
- In-depth studies to identify other aspects such as land ownership, special user groups, and government support,
- Studies to identify legal constraints or insufficient legal regulations that lead to a decline in allotment gardening,
- More scientific attention to the practice of allotment gardens in developing countries,
- Spatial analysis using GIS should be used more widely in the assessment and planning of new allotments.

One of the main limitations of this review is that the topic is extremely broad, and we had to narrow our search to provide a comprehensive overview of the research in this area. However, we propose to conduct additional reviews in the future to develop a deeper understanding of this topic.

Bringing attention to this problem in academic studies may also be a good learning opportunity for government agencies. In the past, urban agriculture was officially supported by governments to increase urban resilience in difficult times: after the war, during and after financial crises, during COVID-19, and so on. However, governments' interest in allotments tends to wane as land values rise and gardens become desirable for new investment. Governments should accept the fact that allotments not only serve food production, community cohesion, and well-being, but at the same time reduce pressure on the natural environment and improve climate resilience. Therefore, local governments should support community urban gardening initiatives by not only focusing on rigid top-down control, while engaged citizens can increase the impact of community urban gardening by engaging not only in the practice but also in other areas too.

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