REVIEW ARTICLE

Urban Farming in Vacant Land for Sustainable Development: A Systematic Review

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Abstract

As urbanization has accelerated since the 21st century, generating a large amount of vacant land that hinders sustainable urban development. Urban farming emphasizes the use of existing vacant land in the city. However, its contribution to the city's production function, economic benefits, and social value still lacks a comprehensive discussion. The results show that the hot topics on urban farming in vacant land in the last decade have been almost exclusively centered on sustainability and have been published in countries concentrated in the United States and some countries in Europe. We categorized the articles into seven themes corresponding to the United Nations and the Sustainable Development Goals (SDGs). Food security and improved nutrition were the most discussed, followed by urban sustainability. Quality was the least mentioned. While there is a substantial basis for a positive benefits perspective, there are still gaps in quantitative assessments and in-depth case studies on sustainable contributions.

Keywords: *vacant land ; urban farming ; sustainability*

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Introduction

The expansion of urban areas contributes to various environmental challenges, including increased frequency of floods, hurricanes, heat waves, food security issues, and growing inequality (Pelling et al., 2021). As indicated in the World Cities Report, the rate of urbanization worldwide is anticipated to persist and accelerate over the next three decades. By 2050, the proportion of the global urban population is projected to reach 68%, a significant increase from 56% in 2021. It would represent an expansion of 2.2 billion urban residents ("World Cities Report 2022," 2022). The continued migration of the population to urban centers endowed with natural resources facilitates the expansion of urban areas (Pandey & Seto, 2014).

Furthermore, as industrial, economic, and political zones undergo transformation and relocation, a concomitant increase in job losses, expropriation of residences, abandonment of established urban areas, and a reluctance or inability of property owners to maintain their properties is observed. Additionally, there has been a notable shift in the population's preference for new housing options (Kim, 2017). These factors have led to a loss of functionality, lack of funding, and reduced economic value of urban spaces, resulting in increased vacant land in urban areas (Kremer et al., 2013). However, these events have become commonplace in today's cities. They have become part of the urban fabric (Kim, 2017).

The term “vacant land” describes any land within an urban area that has been underutilized, unused, or abandoned by humans for a certain period. It can include bare fields, brownfield sites, greenfield sites, and uncultivated (Song et al., 2020; Bowman & Pagano, 2004; Németh & Langhorst, 2014; Pagano and Bowman, 2000). According to neighbors, planners, and academics, vacant land is a sign of urban disease that needs to be cured through reuse. It has been described as “one of the most dramatic declines and depressing phenomena in the inner city (Accordino & Johnson., 2002). Indeed, vacant land is frequently disregarded and is more susceptible to public littering, illicit squatting, human trafficking, violence, and criminal activity (Dubeaux & Sabot, 2018; Sanches & Pellegrino, 2016), and it creates a fire hazard that could harbor drug trafficking activities (Cohen, 2001), adverse effects on community health and safety (Chaix, 2009; Cohen et al., 2003; Hannon & Cuddy, 2006; Spelman, 1993; Wei et al., 2005), causes a deterioration of neighborhood relations (Goldstein et al., 2001). It is a nuisance to the city and the living environment of the residents.

The issue of vacant land has emerged as a significant challenge to sustainable urban development, with the vacant land itself often perceived negatively (Cohen, 2001). It underscores the urgent need to address the problem of urban vacant land and urban sustainability. One potential solution is transforming vacant land into a sustainable resource (Herrmann et al., 2018). Notably, urban farming provides a means to achieve this objective (Smith et al., 2017). Urban farming is the production, processing, distribution, and marketing of food and livestock in the inner-city (Van Veenhuizen & Danso, 2007; McEldowney, 2017; Smit, 1996; Mougeot, 2001; Pölling et al., 2015; Roggema 2016; Skar et al., 2019).

Using vacant land for urban farming is a prevalent practice, as it is regarded as the most suitable location for such endeavors in urban settings (Ferreira et al., 2018). Furthermore, it has gained traction as an instrument for advancing public well-being and economic growth, fostering social cohesion, and reclaiming underutilized real estate (Santo et al., 2016). Urban farming in vacant lands can enhance several aspects of urban life. It can bolster food security, enrich biodiversity, foster social cohesion, promote civic engagement, provide ecosystem services, and elevate the image of the city (Dubeaux & Sabot, 2018; Herbst & Herbst, 2006; Németh & Langhorst, 2014; O’Callaghan & Lawton, 2015). Using vacant land for urban farming can bolster local food production, curtail the environmental impact of food miles, and facilitate economic development (Türker & Akten., 2023). Consequently, integrating urban farming and vacant land addresses the challenge of vacant land as a hindrance to urban development while advancing cities’ sustainability.

Urban farming, frequently occurring on vacant land, can address land vacancies (Ferreira et al., 2018) and mitigate numerous urban challenges while conferring positive benefits (Dorst et al., 2019; Lin et al., 2015). Nevertheless, research on urban vacant land is limited, preliminary, and subjective. However, urban farming on such land can respond to cities’ crises concerning sustainable development (Song et al., 2020). There is a notable absence of comprehensive and systematic discourse and analysis. Accordingly, this study employs a systematic literature review to comprehensively explore the application of urban farming in vacant land and its impact on urban environmental, economic, and social sustainability. The specific research objectives are as follows: 1) What is the current knowledge on urban farming in vacant land over the past ten years? 2) To examine urban farming ‘s sustainable well-being and outcomes in vacant land. 3) A critical examination of the limitations of existing studies and recommendations for future research directions.

Methods and Materials

The present study employed the PRISMA 2020 methodology (Page et al., 2021). The literature screening process entailed the following steps: a literature search, de-duplication, initial screening, full-text review, and flowcharting. Two databases, "Web of Science" and "Scopus," were selected for the literature search. The search terms "urban farming," "sustainability," and "vacant land" were entered on August 22, 2024 (Table 1).

Table 1: Search Terms

Urban Agriculture + Sustainable Cities + Vacant Land	
"Urban Agriculture"	peri-agriculture, urban farming, urban farm, city farm, rooftoop gardens, community garden, community farming, Community Farm, Vertical gardening, green wall
Urban sustainability	"carbon emission" "natural resources" "biodiversity" "waste" "pollution" "urban greening" "heat island" "education" "public health" "equitable distribution" social services" " social diversity" " social inclusion" "cultural preservation" "community participation" "economy" "entrepreneurship" employment opportunities"
land type	abandon land, vacant land, waste land, unused land, underrutilized land, idle land, neglected land, abandoned lots, disused land, vancant lots, forsaken land, anbandoned area, nacant area, underutilized area, idle area, neglected area, forsaken area, disused area, abandoned district

This study initially obtained 2,029 papers from two databases (854 results from Web of Science Core Collection and 1,175 articles from Scopus), and four restrictions were added: 1. Documents published in 2015-2024; 2: Articles; 3. Language: English; 4. Open Access: In all Open Access, there were always 641 documents that met the conditions, and then 228 duplicates were excluded, at which point only 413 papers remained. Then we read the title, abstract, and keywords of the literature, and only for this study: the literature discusses urban farming in vacant land and explains the well-being it brings to the three pillars of sustainable urban development, which reduces the number of literatures to 72 articles, in addition, we have added nine new research articles through other methods. We then conducted an in-depth review of these articles, which resulted in 26 articles that included (Figure 1) the topic of the current study. Despite our extensive search of the relevant literature, the limited number of studies that were ultimately reviewed indicates the lack of this research (Abdillah et al., 2023).the topic of the current study. Despite our extensive search of the relevant literature, the limited number of studies that were ultimately reviewed indicates the lack of this research (Abdillah et al., 2023).

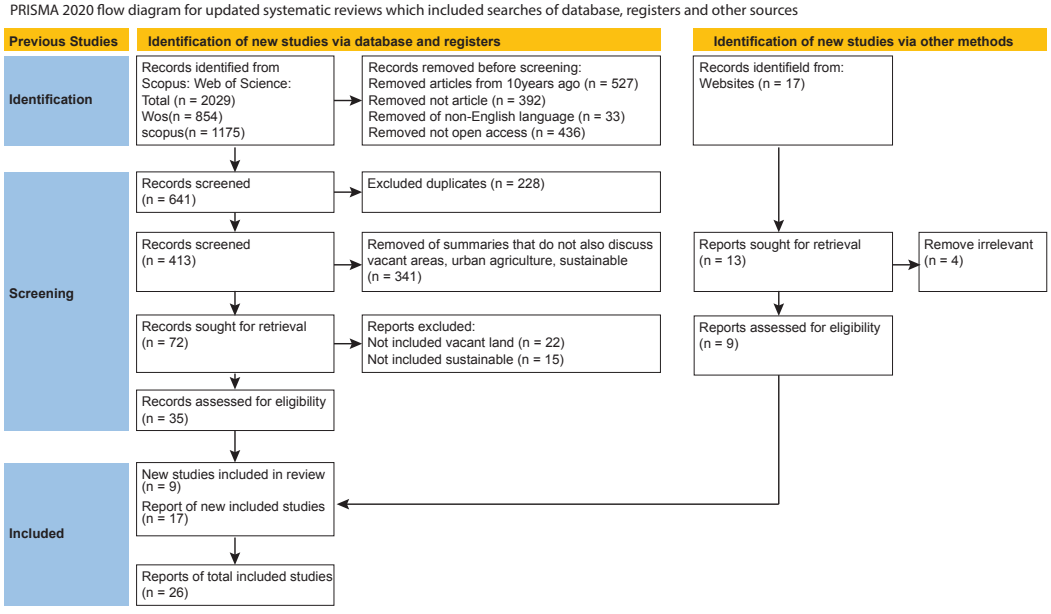

Figure 1: Flowchart of the Literature Screening Process.

Review findings

Describe the Country-Published

An analysis of the search results in the database (Figure 2) reveals that the discussion of 'Urban Farming in Derelict Spaces for Sustainable Development' originates from numerous countries across the globe, spanning almost every continent. However, most articles can be attributed to the United States, Germany, the United Kingdom, Spain, France, India, the Netherlands, Ghana, China, Australia, Portugal, and Brazil. The countries in question are primarily concentrated in the Americas and Europe, with fewer in other regions such as Asia and Africa. This phenomenon may be explained by the fact that only English literature was selected for this study. On the other hand, North America and Europe urbanized earlier than other regions. By the 21st century, Europe and the United States will have 80% urbanization, creating vacant land earlier than other regions.

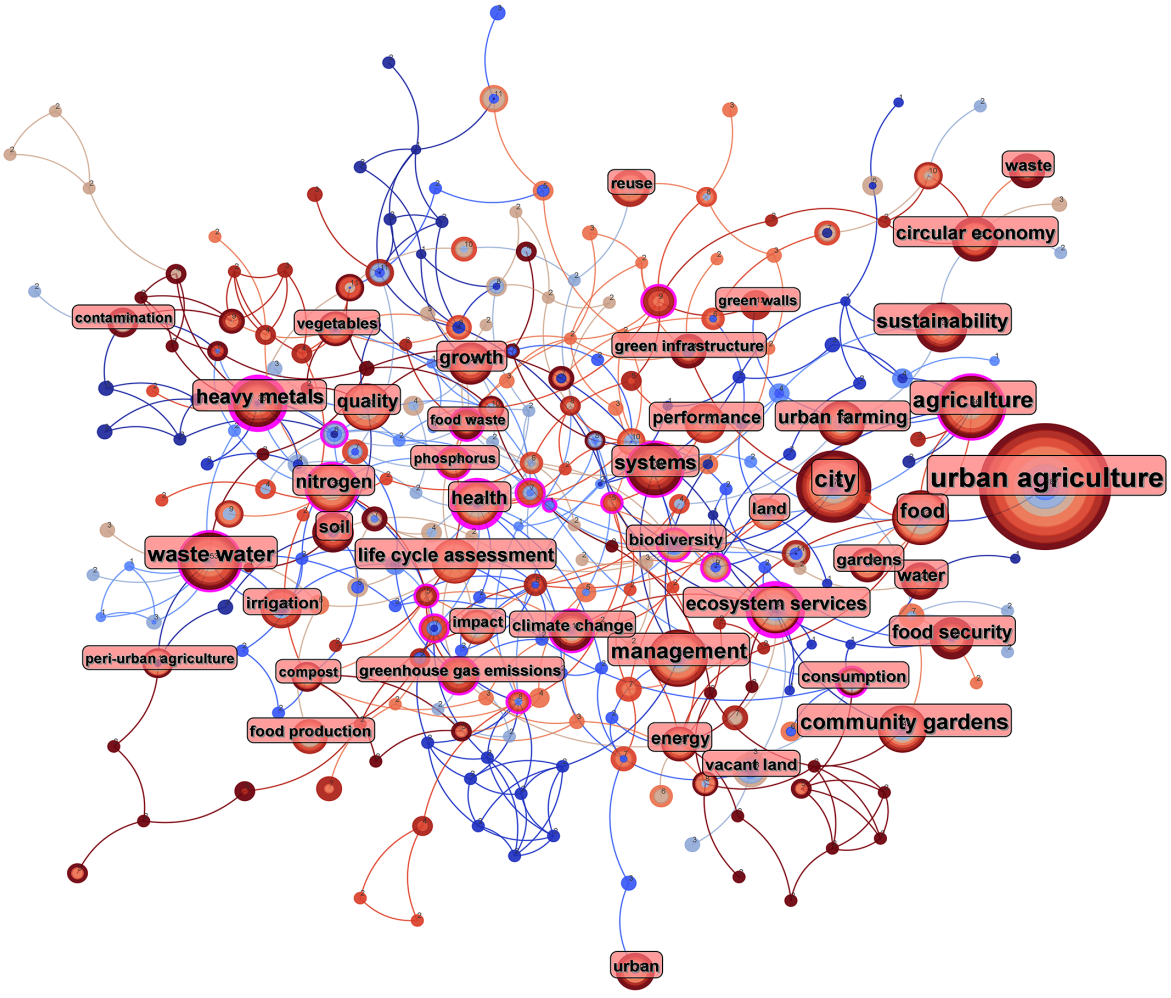

Figure 2: Distribution of Papers by Country.

Furthermore, global cities are concentrated in the mid-latitudes of the northern hemisphere between 20°N and 60°N, which accounts for 79.68% of the global urban land area. This situation also affects the region in which the article was published.

Keyword Co-occurrence

The keyword co-occurrence analysis reveals that the most frequent word is “urban agriculture,” followed by “city,” “agriculture,” “wastewater,” “management,” “community gardens,” “food,” “sustainability,” “heavy metals,” “ecosystem services,” “urban agriculture,” “food security,” and “sustainability.” The frequency of these keywords exceeds 30 times. Most of these high- Frequent words are related to urban sustainability, urban agriculture, and urban sustainability, which remains a prominent area of future research (Figure 3). The term’ vacant land’ is used 18 times, a relatively low frequency. It is more closely associated with ecosystem services, confirming the point made above that vacant land is often overlooked.

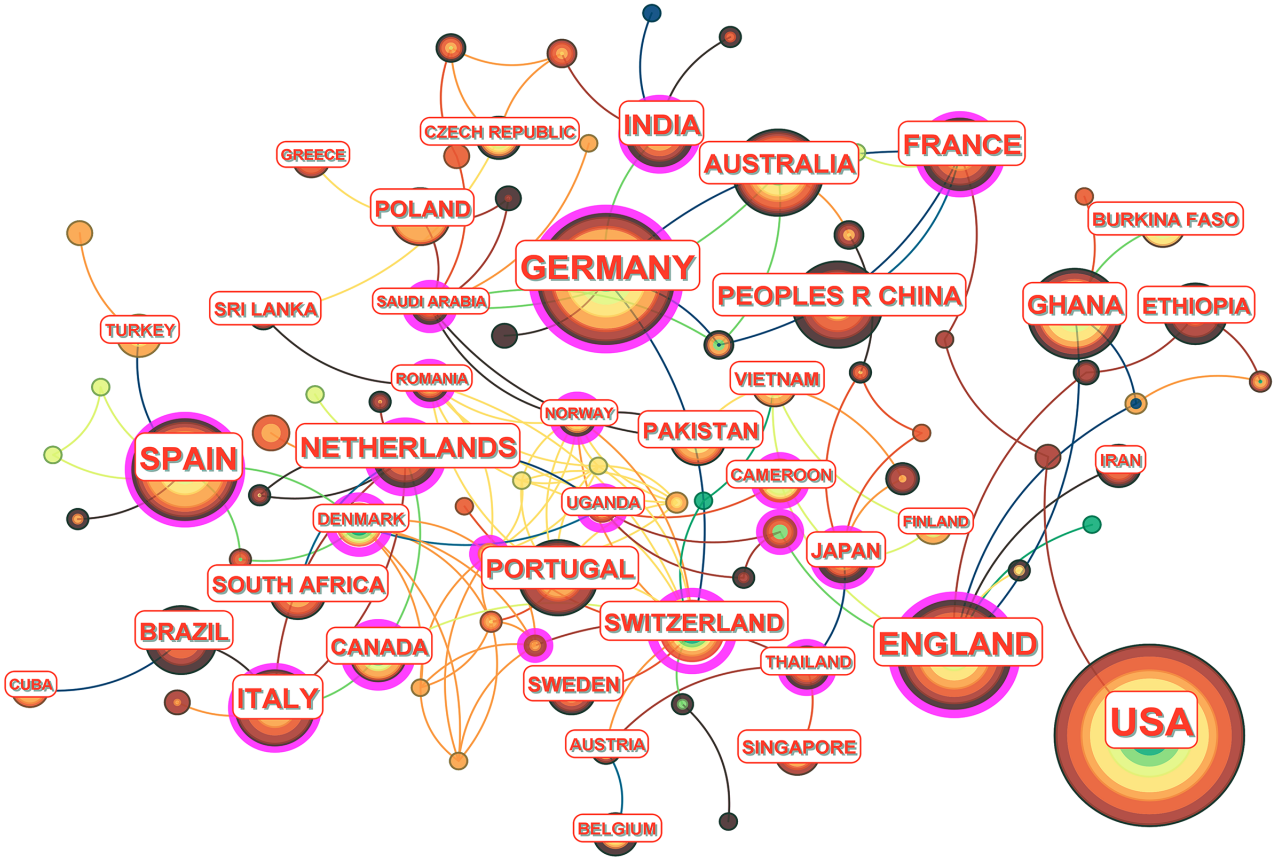

Figure 3: Keyword Co-Occurrence.

Keyword Clustering

The density of nodes in (Figure 4) indicates that the most discussed topics are primarily environmental, encompassing environmental sustainability, heavy metals, soil contamination, and food security. Urban farming, urban agriculture, cropping systems, food sharing, and the circular economy follow these. Topics related to the peri-urban agriculture are less frequently discussed.

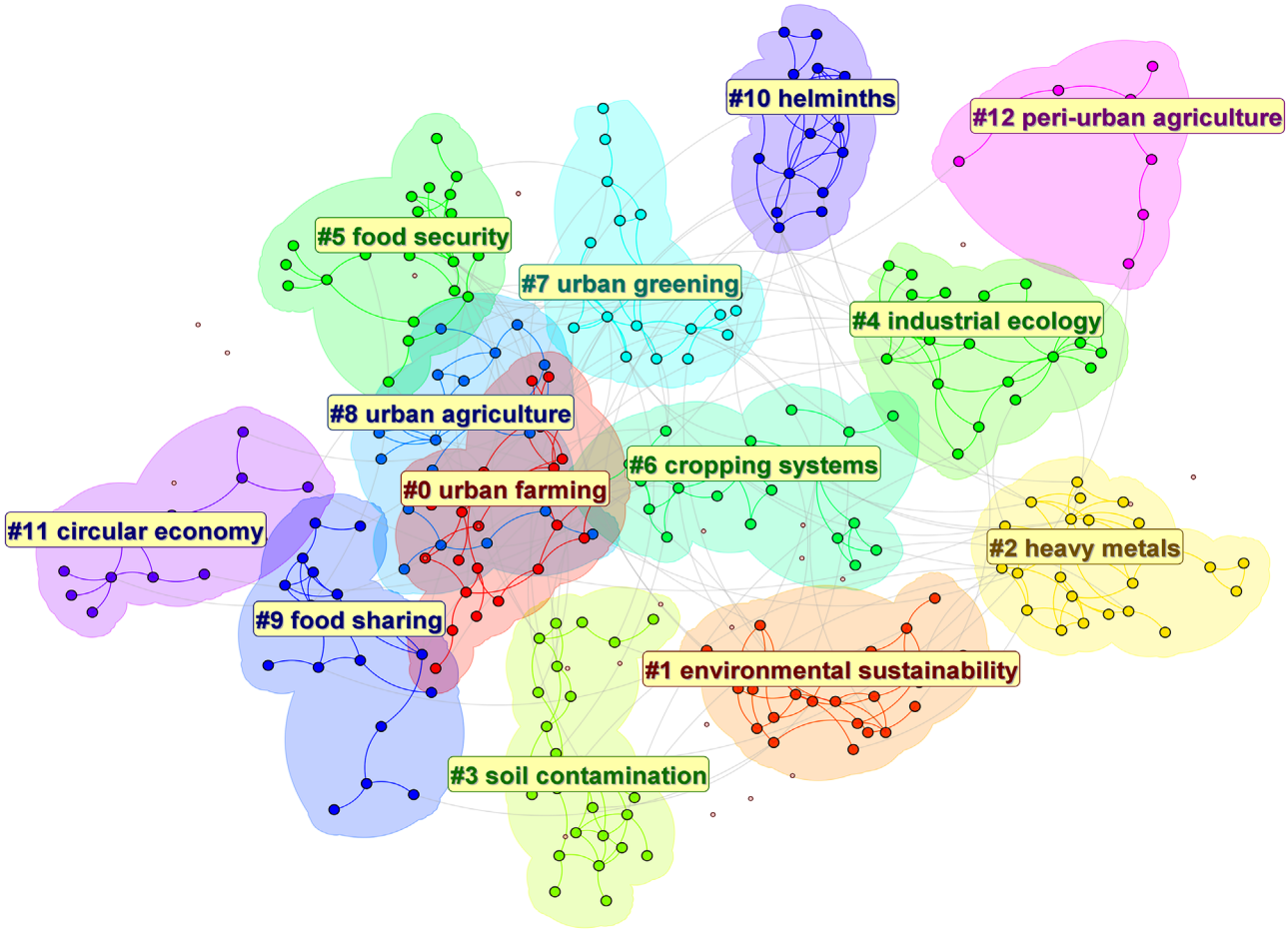

Figure 4: Keyword Clustering

Number of Publications

To ensure the accuracy of the theme of this study, in the following section, we have narrowed down the literature to those that match the research theme after screening (N=72) to ensure that the trend of research in the literature reflected is accurate. This approach provides accurate and pertinent research trends. The amount of literature published is increasing (Figure 5), and this trend may be related to urbanization, as UN-HABITAT has stated. Urbanization is unstoppable, and the pattern of urban development up to 2020 is unsustainable in many ways. Facing the challenges, we must build a sustainable urban future (THE 17 GOALS | SUSTAINABLE DEVELOPMENT, n.d.). (Development, n.d.). It is widely acknowledged among scholars that the advantages of integrating urban farming with vacant land contribute to sustainable urban development. This approach has been advocated for enhancing public health and economic growth and reusing urban open space (Santo et al., 2016).

Furthermore, the most significant number of publications in the literature between 2019 and 2022 may have been influenced by the impact of global epidemics on food and nutritional security issues (Lal, 2020). There is an increased public demand for vegetables, fruits, etc., accessible within the city to enhance the ability to cope with risk. The city's vacant land may provide food access (Kafle et al., 2022). In general, there is a lack of research on 'Urban Farming in Derelict Spaces for Sustainability.'

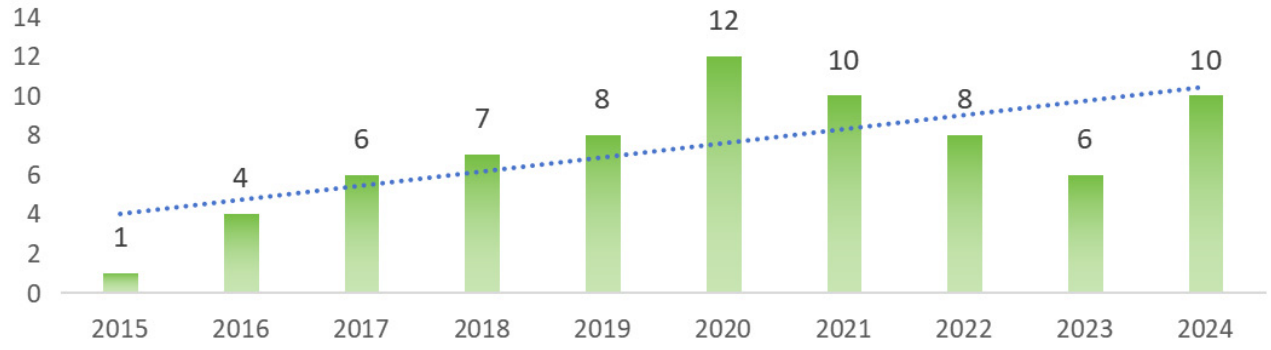

Figure 5: Number of Publications During the Period 2015-2024

Thematic Classification and Analysis of Literature

Given the objective of this study, which is to examine the economic, social, and environmental sustainability and well-being outcomes of 'urban farming in vacant land,' the 26 papers selected for the final in-depth review have been categorized thematically and discussed in detail. Thematic categorization and detailed discussion of the 26 final screened documents will follow. Seven goals were selected as themes based on the Sustainable Development Goals (SDGs) proposed in the United Nations 2030 Agenda for Sustainable Development. The themes above encompass the following areas: zero hunger, good health and well-being, decent work and economic growth, reducing inequality, sustainable cities and communities, climate action, and terrestrial biology (Figure 6).

Figure 6: The Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development

SDG2 Zero Hunger

Of the 26 articles, 20 made reference to food security and improved nutrition as an essential contribution of 'urban farming in vacant land,' with the evidence base for this assertion being drawn from a variety of research methods, including experiments, evaluations, mathematical modeling, reviews, and case studies.

Several scholars have proposed that using vacant land for urban farming and sustainable food systems could solve inner-city food insecurity issues (Pothukuchi, 2017). It is recommended that support be provided to local food production (Türker & Akten, 2023; Giyarsih et al., 2024), that the efficiency of regional food systems be enhanced (Orsini et al., 2014), that food security be promoted (Dubeaux & Sabot, 2017), and that access to fresh food increase (Steenkamp et al., 2021; White & Bunn, 2017) Enhance food security and nutritional status of urban populations (Roitman & Bifarello, 2007; Orsini et al., 2013; Pothukuchi, 2017; Thapa et al.,

2021; Vieira & Panagopoulos, 2024), thereby facilitating food sustainability (White & Bunn, 2017). The geographical areas where food security contributions are made are polarised, ranging from developed to poorer, more disadvantaged regions (Table 2). It can be seen that the practice of 'urban farming in vacant land' can be applied in various areas to alleviate the problem of food security.

Table 2: Countries of Practice and Project Objectives

	Area	Objective
Developing Country	Rosario	Food Security and income generation for the urban poor
	Turkish Usak	Determining the potential for urban agriculture in open spaces in the city centre of Usak, Turkey
	Indonesia	Food Safety Issues A survival strategy for the urban poor
Developed Country	Toryglen, UK	Improve access to fresh food in the area and provide employment opportunities for local people
	Oakland, California, USA	Supplementary vegetable requirements
	Cleveland, Ohio, USA	Achieving food self-sufficiency
	Phoenix, AZ, USA	Addressing food deserts
	Detroit, Michigan, USA	The pursuit of food security\
	New York, USA	Food production

In developing countries, The Argentinean urban farming project, which situates agroecological farming practices on vacant and underutilized land, has yielded positive outcomes concerning food security for city dwellers, increased access to fresh food, provided additional income and improved the quality of life of the local low-income (Steenkamp et al., 2021; Roitman & Bifarello, 2007). A GIS assessment of the potential for urban farming on vacant land in the center of Usak, Turkey, reveals a considerable amount of vacant land that can facilitate urban farming and contribute to the advancement of sustainable agriculture (Türker & Akten, 2023). In Indonesia, residents are farming on vacant land behind their homes to provide the local population access to healthy, fresh, and nutritious food.(Giyarsih et al., 2024). In developed countries, an inventory of public underutilized parks and vacant land suitable for agricultural use in Auckland City indicates that the potential contribution of vegetable demand would be between 2.9% and 7.3% of current consumption (McClintock et al., 2013). The vacant land in Cleveland is utilized for urban farming, which has the potential to fulfill the fresh produce requirements of city residents by up to 50% or even in its entirety (Grewal & Grewal, 2011). The 'Urban Roots' club in Glasgow, United Kingdom, has established a long-term market garden on a previously unused plot of land. The initiative aims to enhance accessibility to fresh produce in the surrounding area and create employment opportunities for residents. The South Seeds project, which encourages residents of the surrounding area to become involved in food production and increase their intake of vegetables, represents another initiative in this field (White & Bunn, 2017). The city of Phoenix, Arizona, USA, has implemented a strategy to address the issue of food deserts in the Phoenix area by establishing community gardens (Smith et al., 2017). Furthermore, the city of Detroit, which has a well-documented history of success in urban farming, has a sufficient quantity of vacant land that residents are actively adopting horticulture to achieve food security (Colasanti et al., 2012; Palmer et al., 2016). Ackerman's proposal to dedicate all suitable vacant land in New York City exclusively to food production could satisfy the production needs of between 103,000 and 160,000 people (8.4 million residents out of the city) (Ackerman et al., 2013). Cecília Delgado posits that vacant land in Portugal could be repurposed as urban farming, thereby addressing the food crisis.

SDG4 Quality Education

Researchers less extensively discussed the 26 articles regarding the contribution of urban farming in vacant land to education, with only seven articles addressing this topic. The concept of vacant land has been described as a source of intimacy and education within contemporary culture, which can be challenging to abandon (Pyle, 2002). Empirical research has demonstrated that the reclamation of vacant urban spaces can facilitate the multifaceted education of residents (Drake & Lawson, 2013; Vieira & Panagopoulos, 2024). Educational activities are considered an integral component of community gardens on vacant land. A case in point is the community garden "I Colori dell'Orto" on vacant land, which offers residents insight into agricultural practices and a chance to engage in biodiversity conservation. The OrtoCircuito community garden is situated in an area previously abandoned during the period of industrial decline and is characterized by a high level of biodiversity. It offers educational opportunities for local schools and residents (Gasperi et al., 2016). SDG8 Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.

A substantial number of urban areas are undergoing sustained declines in population and economic activity, frequently concentrated in the regions that are socially and economically vulnerable or underserved (D. Herrmann et al., 2018). Urban farming in shrinking cities represents a productive method of managing and utilizing vacant land. This approach has been advocated to advance public health and economic development, safeguard the well-being of socio-economically disadvantaged groups, foster social capital, and repurpose vacant land (Santo et al., 2016; Walker, 2015). Of the 26 articles reviewed, 13 addressed the economic benefits of vacant land in urban farming, including job creation and enhancing the local economy. Several of these articles highlight the potential for urban farming on vacant land to drive economic growth and development. This could include the creation of new businesses to support the local economy, the generation of employment opportunities, the stimulation of micro-enterprise development, the enhancement of property values, the attraction of capital investment and redevelopment, the creation of wealth, the reduction of poverty, and the delivery of economic benefits to communities that have been underserved by traditional food systems (Delgado, 2015; Joubert, 2014; Krikser et al., 2016; Moustier, 2015; White & Bunnb, 2017; Kameshwari Pothukuchi, 2017; Santo et al., 2016). Additionally, the articles address the context of urban farming activities in vacant land, including the economic crisis, the substantial amount of unused land that reflects the economic depression, and the utilization of urban farming in abandoned areas to mitigate the economic situation in the city.

In response to the economic crisis of 2002, Argentina implemented an urban farming program to reuse vacant land. This initiative has generated additional income for the population (Roitman & Bifarello, 2007 ; Jorinda Steenkamp et al., 2021). The local population of Poznań has spontaneously transformed a vacant plot of land into a vegetable garden, which they subsequently sold. WI projects in Milwaukee contribute to the city's sustainability. A green crop project in Detroit offers summer employment and training for young people while benefiting the local population (Kim, 2017). In the U.S., charities help unemployed people find work on vacant land. Gardeners believe urban farming on vacant land can create jobs, training, and economic opportunity for locals (Riddell, 1998). Urban farming in Detroit, Cleveland, and Philadelphia could address food security concerns and foster local economic growth and social resilience (Colasanti & Hamm, 2010; Grewal & Grewal, 2012; Kremer, 2011).

Not all projects have been easy. Despite growing interest in urban farming to cope with the economic crisis, there is a strong political and policy dependency. Urban farming on vacant land must consolidate this potential through financial support and appropriate public and land use policies.

SDG10 Reducing Inequalities

The positive impacts of production and food in vacant land promote social equity and equitable access to healthy food. However, of the 26 articles examined, only three referenced social equity. Urban farming in vacant land can improve access to healthy food and green space for disadvantaged groups and residents of impoverished areas, contributing to social issues like environmental justice, infrastructure, and health equity (Thornbush, 2015; Schilling & Vasudevan, 2013). Urban farming in vacant land is instrumental in addressing inequality and ensuring the well-being of socio-economically disadvantaged groups. Urban farming in vacant land is a growing area of focus for scientists, planners, and urban policymakers (Górna & Górny, 2021). Moreover, while vacant land urban farming is not a comprehensive solution to food system issues, it has the potential to facilitate the evolution of a revitalized food system that is more socially and sustainable (Santo et al., 2016).

SDG11 Sustainable Cities and Communities

Twenty articles discuss the support vacant land urban farming provides in sustainable cities. The articles have strong connections with goals NO1, NO8, and N10. They also synthesize the seven chosen themes.

Using vacant land for urban farming helps make cities more sustainable. It has many benefits, including educating people about nature, improving people's health and well-being, making food more secure, encouraging social interaction, getting people involved in their communities, improving the quality of life in cities, and reducing stress (Sri Rum Giyarsih et al., 2024 ; Mabon et al., 2022 ; Gałecka-Drozda & Raszeja, 2018). Furthermore, cultivating food on vacant land helps reduce reliance on external food supplies, enhance community stability, and boost urban resilience (Hara et al., 2013).

The presence of vacant buildings and land can have a detrimental impact on community health and safety. However, evidence suggests that using vacant land for urban farming may benefit crime rates (Kondo et al., 2015; Santo et al., 2016; Kameshwari Pothukuchi , 2017; Song et al., 2020). A quasi-experiment in Philadelphia showed that urban farming reduced gun assaults and vandalism. Residents also reported less stress and more physical activity (Branas et al., 2011). The greening effect produced by urban farming has also been found to enhance a sense of security among residents living in the neighborhood, with those surveyed reporting feeling safer in greener areas than in abandoned urban spaces (Garvin et al., 2012).

Those transforming Detroit's vacant land believe this benefits the environment and community. Urban Roots, the South Seeds project, reuses vacant land to foster social cohesion, enable neighborhood enhancement, and contribute to food sustainability. They also support marginalized groups (White & Bunn, 2017). An interview in Indonesian cities found that urban farming benefits the environment, air quality, recreation, mental health, and more. One resident said that transforming a vacant lot behind his house improved air quality and his ability to relax. Another respondent collaborated with other families to renovate vacant land, increasing its productivity and fostering integration and harmony in the neighborhood (Sri Rum Giyarsih et al., 2024).

A study for Cleveland found that fully utilizing local vacant land (80% vacant, 62% covered, 6% residential) for food production could meet all local demand for fresh produce, eggs, poultry, and honey (Grewal & Grewal, 2012), achieving urban food self-sufficiency improves the city's ability to withstand disasters. Therefore, vacancies have multidimensional and multiscale benefits, which can contribute to sustainable urban development and solve local problems (Louis Fontenot, 2020).

SDG13 Climate Action

Climate change complicates urban development 11 articles describe how urban farming on vacant land can contribute to the solution of climate change. These articles highlight the negative impacts of climate change on sustainable urban development and describe coping strategies and outcomes. Climate change can disrupt food access, production, processing, storage, and consumption, seriously affecting urban sustainability (Brown et al., 2015). Local authorities must act now to optimize land use (IPCC 2019). Vacant land urban farming provides a novel approach to mitigating environmental threats and climate change (Hollander et al., 2009; Ostrom, 2010). U.S. cities use those long-standing vacant lots for community gardens to mitigate the urban heat island effect (Bowman & Pagano, 2004; Heckert & Mennis, 2012). The research on the urban heat island in central Phoenix indicates that the optimal utilization of vacant land and the implementation of community gardens may result in a more pronounced cooling effect, with localized reductions of up to 2 °C and more significant area reductions of 0.5 °C (Smith et al., 2017c; Zhang et al., 2017). The perspectives mentioned above are derived from studies in developed countries concerned about climate impacts and pursuing sustainable urban development, including land reuse policies. Furthermore, the topics most closely related to climate are urban farming and food security, which may be critical for survival or adaptation to a changing environment (Clinton et al., 2018; Oberndorfer et al., 2007). Urban farming on vacant land provides an additional avenue for food sources and a buffer against climate change (Ostrom, 2010).

SDG13 Life on Land and Biodiversity

Here, nine focus on ecosystems and biodiversity out of these 26 papers. Although vacant land may be perceived as a potential source of environmental risk and desolation, it can also be regarded as an invaluable ecological resource. Restoring suitable habitats can enhance ecosystem services (Anderson & Minor, 2016). There has been an increasing incorporation of vacant land into the urban ecological paradigm, with such space promoting a network of environmental linkages and enhancing the city's natural systems (Gałecka-Drozda & Raszeja, 2018).

In global urbanization, ecologists have underscored the necessity of prioritizing biodiversity conservation (Chapin et al., 2000). Because habitat loss is a significant factor in species extinction, urban farming on vacant land can provide a suitable habitat for many species and contribute to biodiversity conservation (Dana et al., 2002). The potential benefits of vacant land include the enhancement of urban biodiversity and the provision of a habitat for rare and endangered species (Harrison & Davies,2002; Muratet et al., 2007; Sanyé-Mengual et al., 2015; Kamvasinou, 2011; Whittinghill & Rowe, 2012). An abundance of vegetation in vacant urban farms provides a favorable habitat and survival resource for small mammals, insects, and birds (Anderson & Minor, 2016; Carlet et al., 2017; Magle et al., 2010; Louis Fontenot, 2020).

In particular, studies conducted in Cleveland and Akron, Ohio (Grewal et al., 2011; Yadav et al., 2011) have demonstrated the existence of a diverse underground community that flourishes on vacant land through urban farming practices. The repurposing of vacant land has resulted in a high level of biodiversity in the Italian community garden, "OrtoCircuito," a view that residents share in Indonesia.

Furthermore, while vacant land urban farming contributes to biodiversity, the richness of the flora and biodiversity can provide ecosystem services with direct economic value. For example, attracting insects for pollination has increased crop yields (Lowenstein et al., 2015). Reducing soil pollution through bioremediation has similarly improved food security and the population's health (Weitzman et al., 1993). It is common among authors that exposure to nature and life's actual

or perceived diversity may confer some advantages on humans. These include enhanced psychological well-being, better physical health, and improved cognitive performance (Anderson & Minor, 2016).

While the impact of vacant land urban farming on biodiversity and ecosystems has been extensively studied and documented in academic literature, some researchers have highlighted a dearth of research exploring the restoration of biodiversity through this practice (Anderson & Minor, 2016). Consequently, future research directions could prioritize investigating this aspect of urban farming.

Discussion

This article's objective is to answer the following question: What is the current state of research on "urban farming in vacant land"? What are the economic, social, and environmental sustainability and well-being outcomes of "urban farming in vacant land"? In the current study, to answer the above questions, this research conducted a systematic literature review to identify the most relevant articles to the topic of this study. It gains insight into the salient issues, core elements, categories, geographical regions, and outcomes presented in the "Urban Farming in Vacant Lands" report. Following an exhaustive examination of the 26 articles, this study used the seven United Nations Sustainable Development Goals (SDGs) goals for thematic categorization. These SDGs align with the three pillars of sustainability: economic, social, and environmental. The key findings are presented below for the reader's consideration.

While the final number of articles included in this literature screening is relatively limited, the overall trend of publications is still increasing, particularly during the pandemic. Most literature in this field is produced by European countries, focusing on urban air quality, particularly in neighborhoods. Moreover, community gardens are the predominant form of urban farming on vacant land. While these articles predominantly delineate the myriad advantages of urban farming, there is a lack of discourse concerning the function of urban farming in urban vacant lands, as postulated by McPhearson (2012). An average city frequently excludes vacant lands from its urban planning.

The evidence indicates that "urban farming in vacant land" plays a substantial role in ensuring food security. However, the underlying reasons for this phenomenon vary across different contexts. For instance, "poverty" is frequently referenced in literature from countries such as Argentina and Indonesia. The term "poverty" is referenced in the literature from Argentina and Indonesia. "Urban farming in vacant land " appears to be a strategy for alleviating urban poverty by addressing the most basic human needs and increasing income generation for the economically disadvantaged (Jorinda Steenkamp et al., 2021). In this context, the negative impacts of food insecurity and low incomes appear to outweigh the potential benefits of vacant land. People are more concerned about food and income security, and low-cost vacant land is perceived as a means to address these needs. In Detroit, Cleveland, and Phoenix, the article repeatedly references the "vast amount of vacant land," the discussion focuses on reusing these vacant land resources for urban sustainability. Urban farming is identified as a viable method for repurposing unused land (Kameshwari Pothukuchi, 2017). Although several urban case studies are presented here, a similar shortcoming is the absence of precise quantification of yields from urban farming in vacant land and improved nutrition.

There is a lack of evidence regarding the benefits of "quality education." The limited content in this section may be influenced by the fact that, as in SDG 3, economic growth also contributes to the development of social equity. Furthermore, numerous practical initiatives in urban farming on vacant land have demonstrated that facilitating educational activities necessitates the involvement of volunteers, government agencies, and pertinent organizations, in addition to

the active engagement of residents. In certain instances, the organizing personnel subsequently abandon and desert the site once they have concluded their duties (Gasperi et al., 2016). The potential for uncertainty is significantly heightened in the context of vacant land restoration projects, particularly regarding the extension of time, the availability of financial resources, and the composition of organizational staffing. Even after a project has commenced, challenges such as the necessity for ongoing maintenance, cumbersome bureaucratic processes, and the dynamics of the social environment will likely persist and have a lasting impact (Bullock et al., 2011).

Notwithstanding the laudable outcomes of urban farming in vacant land across the three SDGs 8, 11, 13, and 15 a lack of studies employ quantitative methods to assess the benefits generated. It is remarkably accurate in terms of data on the assessment of economic costs and benefits. This dearth of research impedes policymakers' ability to incorporate "vacant land urban farming" into mainstream urban planning to reuse vacant land resources (Jürkenbeck et al., 2019). This absence diminishes the probability of recognizing the multifaceted values associated with vacant land and acknowledges the rationale that evidence supporting these values is of limited quality. In particular, they address the topic of biodiversity, and it is evident that there is a paucity of literature dedicated to restoring biodiversity in open spaces (Anderson & Minor, 2016). In addressing contentious matters about the restoration and utilization of vacant land, collectively, these factors provide a rationale for the lack of policy action.

It is well-established in the literature that vacant land represents a substantial ecological and social resource. In light of this, some commentators have recommended that authorities have legal rights to use vacant space. It is a fact that cannot be disputed. However, it is perplexing that these rights have been repeatedly disregarded, particularly in the absence of comprehensive strategies to leverage them fully (McPhearson, 2012). Fortunately, urban farming has contributed to formulating policies to revitalize unused urban land (Corcoran et al., 2019). The authors further hope that the report will prompt governments, urban planners, and residents to consider the potential of vacant land and to reexamine land-use planning policies in light of this potential. In addition, the authors suggest that governments regulate, plan, and clarify financial, social, institutional, and legal incentives.

Additionally, a significant body of literature has identified the positive benefits of vacant land urban farming. Yet, there has been limited examination of the ecological, economic, and social challenges encountered during the development process. It may result in the references failing to recognize the comprehensive content, affecting judgment and decision-making processes. Furthermore, it could lead to the blind implementation of urban farming practices and reforms in vacant land, ultimately resulting in the failure of the project and a significant waste of funds and resources. Therefore, this topic requires further discussion and analysis in the future.

Conclusion

In conclusion, urban farming has remained a prominent area of investigation over the past decade. Yet, there is a lack of research examining the sustainable advantages of integrating it with underutilized land. There are notable regional variations in the literature, with programs and empirical studies from the United States constituting a significantly more significant proportion than those from other countries, particularly Detroit, which is the most illustrative and successful case. Numerous other works of literature discuss these instances. A thematic categorization of the data reveals that "vacant land urban farmin" is the most significant contributor to food security, followed by sustainable cities and communities. The papers demonstrate a notable

absence of discussion regarding quality education and reducing inequality. Notably, papers from developed countries prioritize food security, climate change, and community integration outcomes. In contrast, papers from developing countries focus on the positive impacts on livelihoods.

The analysis of the themes reveals the contribution of farmland urban farming to the Sustainable Development Goals (SDGs) in terms of increasing access to food, reducing the cost of access to food, improving food security and nutritional status (SDG1), and providing educational activities to make education accessible to all (SDG4). The remaining SDGs linked to urban farming are SDG 8, SDG 10, SDG 11, SDG 11, and SDG 15.

In urban areas, vacant land represents a significant ecological and social resource, yet frequently regarded as an eyesore, a potential hazard, and a wasteland (Anderson & Minor, 2016). Nevertheless, the present study illustrates that they can serve as an economic, social, and ecological resource. Converting vacant land to urban farming can enhance cities' sustainability by improving the balance between environmental protection, economic development, and social well-being (Wu, 2009). In support of the above, conducting more comprehensive case studies and quantitative assessments is imperative to enhance the credibility and assurance of stakeholders, including participants, organizers, planners, and decision-makers, that urban farming in vacant land can offer a sustainable contribution. It will facilitate a shift in the prevailing negative perceptions surrounding the availability of vacant land and foster collaboration between urban farming and vacant land.

References

Abdillah, A., Widianingsih, I., Buchari, R. A., & Nurasa, H. (2023). Implications of Urban Farming on Urban Resilience in Indonesia: Systematic Literature Review and Research Identification. *Cogent Food & Agriculture,* 9(1). https://doi.org/10.1080/23311932.2023.2216484

Accordino, J., & Johnson, G. T. (2000). Addressing the Vacant and Abandoned Property Problem. Journal of *Urban Affairs,* 22(3), 301–315. https://doi.org/10.1111/0735-2166.00058

Ackerman, K., Dahlgren, E., & Xu, X. (2013). Sustainable Urban Agriculture: Confirming Viable Scenarios for Production. *New York State Energy Research and Development Authority*, Report 13-07. http://www.nyserda.ny.gov/Publications/Research-and-Development-Technical Reports/Environmental-Reports.aspx

Anderson, E. C., & Minor, E. S. (2016). Vacant lots: An Underexplored Resource for Ecological and Social Benefits in Cities. *Urban Forestry and Urban Greening,* 21, 146–152. https://doi.org/10.1016/j.ufug.2016.11.015

Bowman, A.O.; Pagano, M.A. Terra Incognita: Vacant Land and Urban Strategies; *Georgetown University Press: Washington*, DC, USA, 2004; Volume 103.

Branas, C. C., Cheney, R. A., MacDonald, J. M., Tam, V. W., Jackson, T. D., & Have, T. R. T. (2011). A Difference-in-Differences Analysis of Health, Safety, and Greening Vacant Urban Space. *American Journal of Epidemiology,* 174(11), 1296–1306. https://doi.org/10.1093/aje/kwr273

Brown, M. E. (2015). Climate Change, Global Food Security, and the U.S. Food System. U.S. *Department of Agriculture.* Retrieved June 22, 2018, from www.usda.gov/oce/climate_change/FoodSecurity2015Assessment/FullAssessment.pdf

Bullock, J. M., Aronson, J., Newton, A. C., Pywell, R. F., & Rey-Benayas, J. M. (2011). Restoration of Ecosystem Services and Biodiversity: Conflicts and Opportunities. *Trends in Ecology and Evolution*, 26(10), 541–549. https://doi.org/10.1016/j.tree.2011.06.011

Carlet, F., Schilling, J., & Heckert, M. (2017). Greening U.S. Legacy Cities: Urban Agriculture as a Strategy for Reclaiming Vacant Land. *Agroecology and Sustainable Food Systems,* 41(8), 887–906. https://doi.org/10.1080/21683565.2017.1311288

Chaix, B. (2009). Geographic Life Environments and Coronary Heart Disease: A Literature Review, Theoretical Contributions, Methodological Updates, and a Research Agenda. *Annual Review of Public Health*, 30(1), 81–105. https://doi.org/10.1146/annurev.publhealth.031308.100158

Chapin, F. S., III, Zavaleta, E. S., Eviner, V. T., Naylor, R. L., Vitousek, P. M., Reynolds, H. L., Hooper, D. U., Lavorel, S., Sala, O. E., Hobbie, S. E., Mack, M. C., & Díaz, S. (2000). Consequences of Changing Biodiversity. *Nature*, 405(6783), 234–242. https://doi.org/10.1038/35012241

Clinton, N., Stuhlmacher, M., Miles, A., Uludere, N., Wagner, M., Georgescu, M., Herwig, C., & Gong, P. (2018). A Global Geospatial Ecosystem Services Estimate of Urban Agriculture, *Earth's Future,* 6. https://doi.org/10.1002/2017EF000536

Cohen, D. A., Mason, K., Bedimo, A., Scribner, R., Basolo, V., & Farley, T. A. (2003). Neighborhood Physical Conditions and Health. American Journal of *Public Health,* 93(3), 467–471. https://doi.org/10.2105/ajph.93.3.467

Cohen, J. R. (2001). Abandoned Housing: Exploring Lessons from Baltimore. *Housing Policy Debate*, 12(3), 415–448. https://doi.org/10.1080/10511482.2001.9521413

Colasanti, K. J. A., & Hamm, M. W. (2010). Assessing the Local Food Supply Capacity of Detroit, Michigan. Journal of *Agriculture, Food Systems, and Community Development*, 1(2), 41–58. doi:10.5304/jafscd.2010.012.002

Colasanti, K. J. A., Hamm, M. W., & Litjens, C. M. (2012). The City as an "Agricultural Powerhouse"? Perspectives on Expanding Urban Agriculture from Detroit, Michigan. *Urban Geography*, 33(3), 348–369. https://doi.org/10.2747/0272-3638.33.3.348

Corcoran, M. P., Kettle, P. C., & O'Callaghan, C. (2017). Green Shoots in Vacant Plots? Urban Agriculture and Austerity in Post-Crash Ireland. ACME: An International Journal for *Critical Geographies*, 16(2), 305–331. doi:10.14288/acme.v16i2.1400

Davidson M, Dolnick F, 2004. A Planner's Dictionary. Planning Advisory Service Report Number 521/522. Chicago, *IL: American Planning Association.*

Delgado, C. (2015). Answer to the Portuguese Crisis: Turning Vacant Land into Urban Agriculture. Digital Commons at Loyola Marymount University and Loyola Law School. http://digitalcommons.lmu.edu/cate/vol8/iss2/5

Dorst, H., Van Der Jagt, A., Raven, R., & Runhaar, H. (2019). Urban Greening through Nature-Based Solutions – Key Characteristics of an Emerging Concept. *Sustainable Cities and Society,* 49, 101620. https://doi.org/10.1016/j.scs.2019.101620

Drake, L., & Lawson, L. J. (2013). Validating Verdancy or Vacancy? The Relationship of Community Gardens and Vacant Lands in the U.S. Cities, 40, 133–142. https://doi.org/10.1016/j.cities.2013.07.008

Dubeaux, S., & Sabot, E. C. (2017b). Maximizing the Potential of Vacant Spaces within Shrinking Cities, a *German Approach*. Cities, 75, 6–11. https://doi.org/10.1016/j.cities.2017.06.015

Eden in a Vacant Lot: Special Places, Species, and Kids in the Neighborhood of Life. (2002). *In The MIT Press eBooks* (pp. 305–328). https://doi.org/10.7551/mitpress/1807.003.0013

Ferreira, A. J. D., Guilherme, R. I. M. M., Ferreira, C. S. S., & De Fátima Martins Lorena De Oliveira, M. (2018). Urban Agriculture, a Tool Towards More Resilient Urban Communities? Current Opinion in *Environmental Science and Health*, 5, 93–97. https://doi.org/10.1016/j.coesh.2018.06.004

Gałecka-Drozda, A., & Raszeja, E. (2018). Useful Wasteland - The Potential of Undeveloped Land in Modification of Urban Green Infrastructure Based on the City of Poznań. *Miscellanea Geographica,* 22(4), 225–230. https://doi.org/10.2478/mgrsd-2018-0016

Garvin, E. C., Cannuscio, C. C., & Branas, C. C. (2012). Greening Vacant Lots to Reduce Violent Crime: A Randomised Controlled Trial. *Injury Prevention,* 19(3), 198–203. https://doi.org/10.1136/injuryprev-2012-040439

Gasperi, D., Pennisi, G., Rizzati, N., Magrefi, F., Bazzocchi, G., Mezzacapo, U., Stefani, M. C., Sanyé-Mengual, E., Orsini, F., & Gianquinto, G. (2016b). Towards Regenerated and Productive Vacant Areas through Urban Horticulture: Lessons from Bologna, Italy. *Sustainability,* 8(12), 1347. https://doi.org/10.3390/su8121347

Giyarsih, S. R., Armansyah, N., Zaelany, A. A., Latifa, A., Setiawan, B., Saputra, D., Haqi, M., Lamijo, N., & Fathurohman, A. (2024). Interrelation of Urban Farming and Urbanization: An Alternative Solution to Urban Food and Environmental Problems due to Urbanization in Indonesia. *Frontiers in Built Environment,* 9. https://doi.org/10.3389/fbuil.2023.1192130

Global Urban Expansion and Land Cover Change. (n.d.). https://noda.ac.cn/geoarc/2020/C/C1/C1_2/index.html

Goldstein, J., Jensen, M., & Reiskin, E. (2001). Urban Vacant Land Redevelopment: Challenges and Progress. Cambridge, *MA: Lincoln Institute of Land Policy.*

Górna, A., & Górny, K. (2021). Singapore vs. the 'Singapore of Africa'—Different Approaches to Managing Urban Agriculture. *Land,* 10(9), 987. https://doi.org/10.3390/land10090987

Grewal, S. S., & Grewal, P. S. (2011). Can Cities Become Self-Reliant in Food? *Cities, 2*9(1), 1–11. https://doi.org/10.1016/j.cities.2011.06.003

Gupta, G., & Mehta, P. (2017). Roof Top Farming a Solution to Food Security and Climate Change Adaptation for Cities. *In Springer eBooks* (pp. 19–35). https://doi.org/10.1007/978-3-319-58214-6_2

Hannon, L., & Cuddy, M. M. (2006). Neighborhood Ecology and Drug Dependence Mortality: An Analysis of New York City Census Tracts. The American Journal of *Drug and Alcohol Abuse,* 32(3), 453–463. https://doi.org/10.1080/00952990600753966

Hara, Y., Murakami, A., Tsuchiya, K., Palijon, A. M., & Yokohari, M. (2013). A Quantitative Assessment of Vegetable Farming on Vacant Lots in an Urban Fringe Area in Metro Manila: Can it Sustain Long-Term Local Vegetable Demand? *Applied Geography*, 41, 195–206. https://doi.org/10.1016/j.apgeog.2013.04.003

Harlan, S. L., Brazel, A. J., Jenerette, G. D., Jones, N. S., Larsen, L., Prashad, L., & Stefanov, W. L. (2008). In the Shade of Affluence: The Inequitable Distribution of the Urban Heat Island. *In Research in Social Problems and Public Policy* (pp. 173–202). https://doi.org/10.1016/s0196-1152(07)15005-5

Harrison, C., & Davies, G. (2002). Conserving Biodiversity that Matters: Practitioners' Perspectives on Brownfield Development and Urban Nature Conservation in London. *Journal of Environmental Management,* 65(1), 95–108. https://doi.org/10.1006/jema.2002.0539

Heckert, M., & Mennis, J. (2012). The Economic Impact of Greening Urban Vacant Land: A Spatial Difference-In-Differences Analysis. *Environment and Planning a Economy and Space,* 44(12), 3010–3027. https://doi.org/10.1068/a4595

Herbst, H. and Herbst, V. (2006). The Development of an Evaluation Method Using a Geographic Information System to Determine the Importance of Wasteland Sites as Urban Wildlife Areas. *Landscape Urban Plan* 77, pp 178195. https://doi.org/10.1016/j.landurbplan.2005.02.005

Herrmann, D., Chuang, W., Schwarz, K., Bowles, T., Garmestani, A., Shuster, W., Eason, T., Hopton, M., & Allen, C. (2018). Agroecology for the Shrinking City. *Sustainability,* 10(3), 675. https://doi.org/10.3390/su10030675

Hollander, J. B., Pallagst, K., Schwarz, T., & Popper, F. (2009). Planning Shrinking Cities. *Progress in Planning*, 72(4), 223–232.

Joubert, L. (2014). The Food Dialogues Report. Oranjezicht City Farm and Cape Town Partnership: Cape Town, South Africa.

Jürkenbeck, K., Heumann, A., & Spiller, A. (2019). Sustainability Matters: Consumer Acceptance of Different Vertical Farming Systems. *Sustainability,* 11(15), 4052. https://doi.org/10.3390/su11154052

Kafle, A., Hopeward, J., & Myers, B. (2022b). Exploring Conventional Economic Viability as a Potential Barrier to Scalable Urban Agriculture: Examples from Two Divergent Development Contexts. *Horticulturae,* 8(8), 691. https://doi.org/10.3390/horticulturae8080691

Kim, G. (2017). An Integrated System of Urban Green Infrastructure on Different Types of Vacant Land to Provide Multiple Benefits for Local Communities. *Sustainable Cities and Society*, 36, 116–130. https://doi.org/10.1016/j.scs.2017.10.022

Kondo, M. C., Keene, D., Hohl, B. C., MacDonald, J. M., & Branas, C. C. (2015). A Difference-In-Differences Study of the Effects of a New Abandoned Building Remediation Strategy On Safety. *PLoS ONE*, 10(7), e0129582. https://doi.org/10.1371/journal.pone.0129582

Kremer, P. (2011). Local Food Systems as a Strategy for Sustainability: Analysis of a Scale Dependent Sustainable Urban Food System A Case Study in Philadelphia. *University of Delaware.* Retrieved from http://gradworks.umi.com/34/65/3465799.html.

Kremer, P., Hamstead, Z. A., & McPhearson, T. (2013b). A Social–Ecological Assessment of Vacant Lots in New York City. *Landscape and Urban Planning*, 120, 218–233. https://doi.org/10.1016/j.landurbplan.2013.05.003

Krikser, T., Piorr, A., Berges, R., & Opitz, I. (2016b). Urban Agriculture Oriented towards Self-Supply, Social and Commercial Purpose: A Typology. *Land,* 5(3), 28. https://doi.org/10.3390/land5030028

Lal, R. (2020). Home Gardening and Urban Agriculture for Advancing Food and Nutritional Security in Response to the COVID-19 Pandemic. *Food Security,* 12(4), 871–876. https://doi.org/10.1007/s12571-020-01058-3

Lin, B. B., Philpott, S. M., & Jha, S. (2015). The Future of Urban Agriculture and Biodiversity-Ecosystem Services: Challenges and next steps. *Basic and Applied Ecology,* 16(3), 189–201. https://doi.org/10.1016/j.baae.2015.01.005

Lowenstein, D. M., Matteson, K. C., & Minor, E. S. (2015). Diversity of Wild Bees Supports Pollination Services in an Urbanized Landscape. *Oecologia*, 179(3), 811–821. https://doi.org/10.1007/s00442-015-3389-0

Mabon, L., Shih, W., & Jou, S. (2022). Integration of Knowledge Systems in Urban Farming Initiatives: Insight from Taipei Garden City. *Sustainability Science,* 18(2), 857–875. https://doi.org/10.1007/s11625-022-01196-x

Magle, S. B., Reyes, P., Zhu, J., & Crooks, K. R. (2010). Extirpation, Colonization, and Habitat Dynamics of a Keystone Species along an Urban Gradient. *Biological Conservation,* 143(9), 2146–2155. https://doi.org/10.1016/j.biocon.2010.05.027

Mc Phearson, T. (2012). Vacant Land in Cities Could Provide Important Social and Eoclogical Benefits. Published in *The Nature of Cities.* URL: https://www.thenatureofcities.com/2012/08/21/vacant-land-in-cities-couldprovide-important-social-and-ecological-benefits/

McClintock, N., Cooper, J., & Khandeshi, S. (2013). Assessing the Potential Contribution of Vacant Land to Urban Vegetable Production and Consumption in Oakland, California. *Landscape and Urban Planning,* 111, 46–58. https://doi.org/10.1016/j.landurbplan.2012.12.009

McEldowney, J. (2017) Urban Agriculture in Europe: Patterns, Challenges and Policies. In-Depth Analysis. Report European Parliament, EPRS (European Parliamentary Research Service), *Brussels.* PE 614.641. doi:10.2861/413185.

Morgan, K. (2009). Feeding the City: The Challenge of Urban Food Planning. *International Planning Studies,* 14(4), 341–348. https://doi.org/10.1080/13563471003642852

Mougeot, L. J. A. 2001 Urban agriculture: Definitions, Presence, Potentials and Risks. In: Growing Cities, Growing Food, Thematic Paper 1: Urban Agriculture on the Policy Agenda: A Reader on Urban Agriculture (Bakker, N. et al. eds). German Foundation for International Development (DSE), *Feldafing, Germany*, pp. 1–42. https://www.ruaf.org/sites/default/files/Theme1_1_1.PDF.

Moustier, P., & Renting, H. (2015). Urban Agriculture and Short Supply Chain Food Marketing in Developing Countries. In H. de Zeeuw & P. Drechsel (Eds.), Cities and Agriculture: Developing Resilient Urban Food Systems (pp. 121–138). *Routledge: London, UK*

Muratet, A., Machon, N., Jiguet, F., Moret, J., & Porcher, E. (2007). The Role of Urban Structures in the Distribution of Wasteland Flora in the Greater Paris Area, *France. Ecosystems,* 10(4), 661–671. https://doi.org/10.1007/s10021-007-9047-6

Németh, J., & Langhorst, J. (2013). Rethinking Urban Transformation: Temporary Uses for Vacant Land. *Cities,* 40, 143–150. https://doi.org/10.1016/j.cities.2013.04.007

Nowak, D. J., Greenfield, E. J., Hoehn, R. E., & Lapoint, E. (2013). Carbon Storage and Sequestration by Trees in Urban and Community Areas of the United States. *Environmental Pollution,* 178, 229–236. https://doi.org/10.1016/j.envpol.2013.03.019

Oberndorfer, E., Lundholm, J., Bass, B., Coffman, R. R., Doshi, H., Dunnett, N., Gaffin, S., Köhler, M., Liu, K. K. Y., & Rowe, B. (2007). Green Roofs as Urban Ecosystems: Ecological Structures, Functions, and Services. *BioScience,* 57(10), 823–833. https://doi.org/10.1641/b571005

O'Callaghan, C., Lawton, P. (2015). Temporary Solutions? Vacant Space Policy and Strategies for Reuse in Dublin. *Irish Geography,* 48(1), pp 69-87 http://irishgeography.ie/index.php/irishgeography/article/view/526/439

Orsini, F., Gasperi, D., Marchetti, L., Piovene, C., Draghetti, S., Ramazzotti, S., Bazzocchi, G., & Gianquinto, G. (2014). Exploring the Production Capacity of Rooftop Gardens (Rtgs) in Urban Agriculture: The Potential Impact on Food and Nutrition Security, Biodiversity and Other Ecosystem Services in the City of Bologna. *Food Security,* 6(6), 781–792. https://doi.org/10.1007/s12571-014-0389-6

Ostrom, E. (2010). Polycentric Systems for Coping with Collective Action and Global Environmental Change. *Global Environmental Change,* 20, 550–557.

Pagano, M.A., Bowman, A.O.M. (2000). Vacant Land in Cities: An Urban Resource. In Center on Urban and Metropolitan City. *The Brookings Institution, Washington DC* https://pdfs.semanticscholar.org/e626/7b60f933dfea1630f02ac68782ffea8403ef.pdf

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., . . . Moher, D. (2021). The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews. BMJ, n71. https://doi.org/10.1136/bmj.n71

Palmer, A.; Santo, R.; Kin, B. (2016)Vacant Lots to Vibrant Plots; *Johns Hopkins University* Press: Baltimore, MD, USA

Pandey, B., & Seto, K. C. (2014). Urbanization and Agricultural Land Loss in India: Comparing Satellite Estimates with Census Data. Journal of *Environmental Management*, 148, 53–66. https://doi.org/10.1016/j.jenvman.2014.05.014

Pelling, M., Chow, W. T. L., Chu, E., Dawson, R., Dodman, D., Fraser, A., Hayward, B., Khirfan, L., McPhearson, T., Prakash, A., & Ziervogel, G. (2021b). A Climate Resilience Research Renewal Agenda: Learning Lessons from the COVID-19 Pandemic for Urban Climate Resilience. *Climate and Development,* 14(7), 617–624. https://doi.org/10.1080/17565529.2021.1956411

Pothukuchi, K. (2017). Vacant Land Disposition for Agriculture in Cleveland, Ohio: Is Community Development a Mixed Blessing? J*ournal of Urban Affairs*, 40(5), 657–678. https://doi.org/10.1080/07352166.2017.1403855

Pothukuchi, K. (2017a). "To Allow Farming is to Give Up on the City": Political Anxieties Related to the Disposition of Vacant Land for Urban Agriculture in Detroit. Journal of *Urban Affairs*, 39(8), 1169–1189. https://doi.org/10.1080/07352166.2017.1319239

Riddell, J. (1998). Urban Greening Strengthens Communities. *Community Greening Review*, 8, 64–70 (Reprinted in Community Greening Review, vol. 13, 2005).

Roggema, R. (2016) Sustainable Urban Agriculture and Food Planning, Routledge Studies in Food. In: Society and the Environment (Roggema, R. ed.). *Taylor and Francis,* Milton, https://doi.org/10.4324/ 9781315646039.

Roitman, S., & Bifarello, M. (2010). Urban Agriculture and Social Inclusion in Rosario, Argentina. Inclusive Cities Observatory. Retrieved from https://www.uclg-cisdp.org/sites/default/files/Rosario_2010_en_final.pdf

Rosenthal, J. K., Crauderueff, R., & Carter, M. (2008). Urban Heat Island Mitigation Can Improve New York city's environment (Rep.). *New York: Sustainable South Bronx*.

Safransky, S. (2016). Rethinking Land Struggle in the Postindustrial City. *Antipode,* 49(4), 1079–1100. https://doi.org/10.1111/anti.12225

Saldivar-Tanaka, L., & Krasny, M. E. (2004). Culturing Community Development, Neighborhood Open Space, and Civic Agriculture: The Case of Latino Community Gardens in New York City. *Agriculture and Human Values,* 21(4), 399–412. https://doi.org/10.1023/b:ahum.0000047207.57128.a5

Sanches, P. M., & Pellegrino, P. R. M. (2016). Greening Potential of Derelict and Vacant Lands in Urban Areas. *Urban Forestry and Urban Greening,* 19, 128–139. https://doi.org/10.1016/j.ufug.2016.07.002

Santo, Raychel, Anne Palmer, and Brent Kim. (2016) Vacant Lots to Vibrant Plots: A Review of the Benefits and Limitations of Urban Agriculture. Johns Hopkins Center for a Livable Future, Baltimore, MD

Sanyé-Mengual, E., Anguelovski, I., Oliver-Solà, J., Montero, J. I., & Rieradevall, J. (2015). Resolving Differing Stakeholder Perceptions of Urban Rooftop Farming in Mediterranean Cities: Promoting Food Production as a Driver for Innovative Forms of Urban Agriculture. *Agriculture and Human Values,* 33(1), 101–120. https://doi.org/10.1007/s10460-015-9594-y

Schetke, S., Haase, D., & Breuste, J. (2010). Green Space Functionality Under Conditions of Uneven Urban Land Use Development. *Journal of Land Use Science,* 5(2), 143–158. https://doi.org/10.1080/1747423x.2010.481081

Schilling, J., & Vasudevan, R. (2012). The Promise of Sustainability Planning for Regenerating Older Industrial Cities. In J. M. Thomas & M. Dewar (Eds.), The City After Abandonment (p. 400). *Philadelphia: University of Pennsylvania Press.*

Skar, S. L. G., Pineda-Martos, R., Timpe, A., Pölling, B., Bohn, K., Külvik, M., Delgado, C., Pedras, C. M., Paço, T. A., Ćujić, M., Tzortzakis, N., Chrysargyris, A., Peticila, A., Alencikiene, G., Monsees, H., & Junge, R. (2019). Urban Agriculture as a Keystone Contribution Towards Securing Sustainable and Healthy Development for Cities in the Future. *Blue-Green Systems*, 2(1), 1–27. https://doi.org/10.2166/bgs.2019.931

Smith, J. P., Li, X., & Turner, B. (2017). Lots for Greening: Identification of Metropolitan Vacant Land and its Potential Use for Cooling and Agriculture in Phoenix, AZ, USA. *Applied Geography,* 85, 139–151. https://doi.org/10.1016/j.apgeog.2017.06.005

Song, X., Wen, M., Shen, Y., Feng, Q., Xiang, J., Zhang, W., Zhao, G., & Wu, Z. (2020). Urban Vacant Land in Growing Urbanization: An International Review. Journal of *Geographical Sciences*, 30(4), 669–687. https://doi.org/10.1007/s11442-020-1749-0

Spelman, W. (1993). Abandoned Buildings: Magnets for Crime? Journal of *Criminal Justice,* 21(5), 481–495. https://doi.org/10.1016/0047-2352(93)90033-j

Steenkamp, J., Cilliers, E. J., Cilliers, S. S., & Lategan, L. (2021). Food for Thought: Addressing Urban Food Security Risks through Urban Agriculture. *Sustainability,* 13(3), 1267. https://doi.org/10.3390/su13031267

Thapa, S., Nainabasti, A., & Bharati, S. (2021). Assessment of the Linkage of Urban Green Roofs, Nutritional Supply, and Diversity Status in Nepal. *Cogent Food and Agriculture*, 7(1). https://doi.org/10.1080/23311932.2021.1911908

THE 17 GOALS | Sustainable Development. (n.d.). https://sdgs.un.org/zh/goals

Thornbush, M. (2015). Urban Agriculture in the Transition to Low Carbon Cities through Urban Greening. *AIMS Environmental Science,* 2(3), 852–867. https://doi.org/10.3934/environsci.2015.3.852

Türker, H. B., & Akten, M. (2023). Harvesting the Hidden Value of Vacant Lands: A GIS-Based Approach to Urban Agriculture. Journal of *Architectural Sciences and Applications*, 8 (1), 422-437. https://doi.org/10.30785/mbud.1292693

Van Veenhuizen, R., & Danso, G. (2007). Profitability and Sustainability of Urban and Periurban Agriculture. Rome, Italy: *Food and Agriculture Organization.*

Vejre, H., Eiter, S., Hernández Jiménez, V., Lohrberg, F., Loupa-Ramos, I., Recasens, X., Pickard, D., Scazzosi, L., Simon-Rojo, M., 2016. Can Agriculture be Urban? in: *Urban Agriculture Europe*. Jovis, Berlin.

Vieira, T. A., & Panagopoulos, T. (2024). Urban Agriculture in Brazil: Possibilities and Challenges for Santarém, Eastern Amazonia. *Land Use Policy*, 139, 107082. https://doi.org/10.1016/j.landusepol.2024.107082

Walker, S. (2015). Urban Agriculture and the Sustainability Fix in Vancouver and Detroit. *Urban Geography*, 37(2), 163–182. https://doi.org/10.1080/02723638.2015.1056606

Wei, E. (2005). Block Observations of Neighbourhood Physical Disorder are Associated with Neighbourhood Crime, Firearm Injuries and Deaths, and Teen Births. Journal of *Epidemiology and Community Health,* 59(10), 904–908. https://doi.org/10.1136/jech.2004.027060

White, J. T., & Bunn, C. (2017). Growing in Glasgow: Innovative Practices and Emerging Policy Pathways for Urban Agriculture. *Land Use Policy,* 68, 334–344. https://doi.org/10.1016/j.landusepol.2017.07.056

White, J. T., & Bunn, C. (2017b). Growing in Glasgow: Innovative Practices and Emerging Policy Pathways for Urban Agriculture*. Land Use Policy,* 68, 334–344. https://doi.org/10.1016/j.landusepol.2017.07.056

Whittinghill, L. J., & Rowe, D. B. (2011). The Role of Green Roof Technology in Urban Agriculture. *Renewable Agriculture and Food Systems,* 27(4), 314–322. https://doi.org/10.1017/s174217051100038x

World Cities Report 2022. (2022). In World Cities Report. https://doi.org/10.18356/9789210028592

Wu, J. (2009). Urban sustainability: An Inevitable Goal of Landscape Research. *Landscape Ecology,* 25(1), 1–4. https://doi.org/10.1007/s10980-009-9444-7

Yadav, P., Duckworth, K., & Grewal, P. S. (2011). Habitat Structure Influences below Ground Biocontrol Services: A Comparison Between Urban Gardens and Vacant Lots. *Landscape and Urban Planning,* 104(2), 238–244. https://doi.org/10.1016/j.landurbplan.2011.10.018

Zhang, Y., Murray, A. T., & Turner, B. (2017). Optimizing Green Space Locations to Reduce Daytime and Nighttime Urban Heat Island Effects in Phoenix, Arizona. *Landscape and Urban Planning*, 165, 162–171. https://doi.org/10.1016/j.landurbplan.2017.04.009