



# Rapid Evidence Review: Urban and Peri-Urban Agriculture in Scotland

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Gardens at Bonnymuir Green Community Trust, Aberdeen (author's photo)

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## Glossary of Terms and Meanings

### Production

**Urban agriculture** – food production located within and on the periphery of urban areas that produces edible food and ecological services using resources largely found within that urban area, and predominantly supplying products and services back into that same area.

**Community garden** – a subset of urban agriculture characterised by the non-commercial production of food (and flowers) by a group of community members in public open spaces in a way that shares resources and responsibilities. Community gardens take a wide variety of forms.

**Allotments** – Allotments are divided into multiple plots and rented at a low annual cost to individuals. UK allotments are protected by various acts of parliament that date back to the early 20<sup>th</sup> century and the vast majority of allotment sites are located on public land managed by local councils.

**Food forest** – also a forest garden, is a multistorey, perennial polyculture specifically designed and managed to function like a self-sustaining natural forest. It attempts to mimic a young woodland ecosystem and makes use primarily of edible vegetation. Food forests utilise a layer system of trees and shrubs of varying sizes, herbaceous perennial vegetation, annual vegetation such as vegetables, root crops, and vertical vegetation such as climbers, legumes, fungi.

**Vertical farming** – any system where plants are stacked vertically either on shelves or trays, or on balconies or up walls. It is frequently used in **controlled environment agriculture** where water, humidity, light and pests are closely controlled.

### Food systems

**Community-supported agriculture** – a partnership between farmers and consumers in which the responsibilities, risks and rewards of farming are shared. CSA members are closely linked to the farm and the production of their food, providing support that goes beyond a straightforward marketplace exchange of money for goods. Customer-business involvement may be through ownership or investment in the farm or business, sharing the costs of production, accepting a share in the harvest or providing labour.

**Market gardening** – a small farm (up to a few acres), which sells vegetables, salad or fruit directly to consumers and/or restaurants. A variety of different plants are grown, with the emphasis on continual production throughout the year. Labour inputs are usually high – horticultural techniques, rather than agricultural, generally predominate. Modern market gardens usually use glass or polytunnels to extend their growing season.

**Vegetable Box Schemes** – an operation that delivers fresh fruit and vegetables, often locally grown and organic, either directly to the customer or to a local collection point. Typically the produce is sold as an ongoing weekly subscription and the offering may vary week to week depending on what is in season.

**Farmers' Market** – a regular, recurring market, usually at a certain time/day each week or month, where local farmers and growers sell their produce directly to the public.

## Highlights



There is very little information on urban and peri-urban agriculture in the Scottish context. This is consistent with the situation in other comparable countries with the exception of the USA.



Scottish studies link urban and peri-urban agriculture with community gardening and allotment growing activities rather than with small-scale or commercial agriculture activities.



Community garden and allotment growing projects seek to combine small-scale food production with social, community and environmental benefits such as reducing isolation, training people back to work, repurposing vacant land and increasing biodiversity, rather than with economic outcomes.



Most community gardening is not commercially viable: projects are run by volunteers on a patchwork of public funding from local and national sources. Further research is needed to understand if and how such projects have commercial potential.



The biggest barrier for urban agriculture is access to suitable land and securing that access for the long-term. Land reform, community empowerment and asset transfer are policy areas closely linked with urban agriculture.



There is emerging evidence of innovative and experimental forms of production and distribution, often at a micro scale and for niche products, that potentially could develop micro-businesses producing food products in urban areas.



Policy challenges in upscaling urban agriculture include not only production but also creating viable local food economies that include retail and distribution. Food partnerships, linking a variety of actors, can play a role here.

## Summary

This report considers urban agriculture in the Scottish context. In Scotland, urban agriculture (UA) consists mainly of community gardens and allotments (Crossan *et al.*, 2016; White and Bunn, 2017). The term community gardening encompasses a wide range of activities, including: repurposing vacant land; building social cohesion; contributing to environmental and food sustainability; and providing participation space for marginalised groups (White and Bunn, 2017). Potential benefits of UA in the form of community gardening include: addressing social isolation; physical regeneration; creating new public greenspaces; tackling environmental injustice; economic development and reducing poverty & health inequalities. However, while these are widely given in the literature, it is difficult to find quantitative or qualitative evidence of these benefits of urban and peri-urban agriculture (UPUA) to support such claims. What evidence there is, is largely anecdotal and on a case-by-case basis.

Other types of urban agriculture include the food forest (Nytofte and Henriksen, 2019) and private gardens. There is also an emerging body of literature on vertical farming and other innovations in small scale agriculture that could be practiced commercially in urban and peri-urban areas. While not yet developed in Scotland, we consider the potential for such innovations in the Scottish context.

Policy approaches to upscaling urban agriculture include developing (urban) food strategies that combine urban agriculture with broader food system transformation and wider social changes and ways of purchasing, trading or consuming food in sustainable urban spaces. Urban policies and Good Food Nation local plans should take a food systems approach, looking at production through processing, delivery and distribution. Policies to support upscaling of urban agriculture should seek to balance 'top down' approaches with grassroots aspirations and community benefits of small scale projects, while still finding ways to encourage a local food economy through strengthening alternative routes to market and retailers.

# 1. Introduction

This review was undertaken to investigate the extent to which urban and peri-urban agriculture (UPUA) in Scotland has the potential to address two key policy areas relating to food and drink. The first was whether UPUA has the potential to partly address Pillar 1 – ‘Connecting people with food’ – of the Local Food for Everyone Plan. Second, whether UPUA has the potential to partially address Scottish food security with the hope that it offers a means to increase the scale of production of certain crops that are vulnerable to supply shocks. Implicit in the latter is the expectation that having diverse types of production offers a means to bolster greater resilience in Scotland’s food supply chain.

The terms urban and peri-urban agriculture are used to refer to a wide range of practices relating to food-growing, from growing vegetables in a garden to vertical farming for pharmaceuticals. It is therefore necessary to understand how these terms are being used in the Scottish context and the practices to which they refer in order to provide a definition that can be used in the Scottish food policy context.

## 2. Objectives

This report aims to provide a definition of UPUA that can be used in the Scottish food policy context and a typology of the kinds of UPUA which exist (or have potential to exist) in Scotland. It is based on a Rapid Evidence Review of the literature on UPUA in Scotland, and other comparable countries (e.g. USA and Europe). By looking at existing definitions and descriptions of UPUA, the evidence review will provide a definition, or definitions, modified for the Scottish context. This definition(s) should relate to UPUA only in the context of food production rather than its use for other outputs such as pharmaceuticals. The report considers the extent to which it is feasible for UPUA to be measured or quantified in a Scottish context, drawing out potential opportunities and challenges, thereby recognising that there are other benefits offered by UPUA activities (e.g., health, wellbeing, etc.). It will also focus on understanding the prevalence and scale of UPUA in an economic context.

## 3. Methodology

The project took the form of a rapid evidence review of recent literature (2000-present; including peer reviewed and public/grey literature) relating to urban and peri-urban agriculture in Scotland. Search terms using key words were used to identify scientific articles (Web of Science; Google scholar) and grey literature (Google) which were scanned for relevance to the objectives. Relevant articles were read in-depth and summarised according to their main themes<sup>1</sup>.

A Web of Science search returned a total of 106 papers from the search string ‘Scotland AND (urban OR peri-urban OR vertical OR city) AND (agri\* OR farm\* OR garden\* OR cultivat\*)’. Once the title and abstract of each paper was reviewed, five papers were relevant to the objectives of the review (Table 1).

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<sup>1</sup> The search strategy did not include developing countries in the global south as it was felt that this context was socially and economically different to Scotland and would yield a large number of results.

Authors	Title	Year	Content
Nytofte, JLS; Henriksen, CB	Sustainable food production in a temperate climate – a case study analysis of the nutritional yield in a peri-urban food forest	2019	Assesses the food production potential of a peri-urban Food Forest.
White, JT; Bunn, C	Growing in Glasgow: Innovative practices and emerging policy pathways for urban agriculture	2017	Study of four urban community garden projects in Glasgow.
Carey, L; Bell, P; Duff, A; Sheridan, M; Shields, M	Farmers' Market consumers: a Scottish perspective	2011	Consumer drivers and motivations for using farmers markets both in Urban and Rural Scotland.
Crossan, J. et al.	Contesting Neoliberal Urbanism in Glasgow's Community Gardens: The Practice of DIY Citizenship	2016	Community gardening and citizenship in Glasgow (same study as White above)
Vávra, J; Megyesi, B; Duzí, B; Craig, T; Klufová, R; Lapka, M; Cudlínová, E	Food Self-provisioning in Europe: An Exploration of Sociodemographic Factors in Five Regions	2018	Sociodemographic factors that affect food self provision in rural and urban NE Scotland.

**Table 1:** Scientific papers on UPUA in Scotland

The three highlighted papers were considered relevant for the purposes of this review and are included in the Results section below.

A similar search exercise was conducted using Google scholar and then Google to identify any further literature which may have been missed, and to scope for grey (non-scientific) literature. This returned over 175 million hits. We reviewed the first 30 due to limited time and repeating results after the first page.

A more directive Google search (using the terms 'Scotland commercial urban agriculture') was conducted to identify specific urban agriculture projects and especially innovation/entrepreneurship in Scotland that may not be present in the academic literature. This search generated over 640 million hits and so we focused on the first 30 links. This search produced a range of organisations that allowed for a clearer picture of urban agriculture in Scotland and the potential for commercial viability. The search returned examples of local, small-scale projects that combine food production with social objectives and community development, mostly located in Glasgow, Scotland's largest urban area, although there is evidence of similar projects in other urban areas in Scotland.

The same search strategy as mentioned above was used to look for papers on UPUA across Europe, North America and rest of the UK<sup>1</sup>. Unsurprisingly, we got 621 hits from North America and 1940 from Europe and 617 from the UK, however due to limited time for this review, we only looked at the first 30 links from each search and selected relevant papers. Not all of the papers that were returned by the search engine were relevant to our review.

The authors also drew on their own knowledge and previous work on food growing and production in Scotland (e.g. Enhancing Food Security work package in the SRP 2011-2016).

## 4. Results

### 4.1. Urban Agriculture in the Scottish and UK Context

The term urban agriculture (UA) is used to describe a wide variety of practices including guerrilla landscaping<sup>2</sup>, farmers markets, beekeeping and market gardening (Mendes *et al.*, 2008), but can be most closely identified as community gardening (Firth *et al.* 2011). In North America, the term ‘community garden’ is used to describe a wide variety of spaces, including allotments with plots tended by individual holders and gardens where volunteers work communally (Wakefield *et al.*, 2007). Carrad *et.al.* (2023) identify five kinds of community gardens in Australia, indicating that community gardens exist in various forms and in different settings.

In the UK, including Scotland, a distinction can be made between community gardens and allotments; with the latter being subject to statutory rules which do not apply to other UA practices (Firth *et al.*, 2011; Wiltshire and Geoghegan, 2012). UK allotments are protected by various acts of parliament that date back to the early 20<sup>th</sup> century. Specifically in Scotland, the Part 9 of the Community Empowerment Act (2015) updates and simplifies previous legislations on allotments in order to protect allotments and increase access to them. This includes the development by each local authority of a local food growing strategy with provision for allotment sites and making more plots available should demand start to outpace availability. The vast majority of allotment sites are located on public land managed by local authorities through an allotment holders’ association. Recently there has been a growth in private allotments which do not have the same statutory obligations but often follow a similar governance model as local authority sites, i.e. management through an association. Allotment sites are divided into multiple individual plots<sup>3</sup> which are then rented at a low annual cost to individuals. Sites vary in size from 3-5 plots to over 100. Most allotments are designated for personal use and produce cannot be sold for personal profit to the plot holder (Firth *et al.*, 2011; Mok *et al.*, 2014). At peak production times surplus produce can be donated and The Allotment Market Stall (TAMS) (see Case Study 1) has operated a successful collection and redistribution of excess produce in Aberdeen for several years.

While their popularity has ebbed and flowed, allotments are currently in high demand and many sites have long waiting lists (Wiltshire and Geoghegan, 2012).

Community gardening – in the UK and Scottish context – refers to collective spaces where gardeners work together to grow food (Firth *et al.*, 2011). There are no statutory protections for community gardens in the way that there are with allotments. Consequently, community gardens have emerged ad hoc to take a wide variety of social and organisational forms and are operated

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<sup>2</sup>Guerilla gardening or landscaping refers to gardening activities – raising food, plants, or flowers – on land that the gardeners do not have the legal rights to cultivate, such as abandoned sites, areas that are not being cared for, or private property. It includes a diverse range of people and motivations, ranging from gardeners who spill over their legal boundaries to gardeners with a political purpose, who seek to provoke change by using guerrilla gardening as a form of protest or direct action.

<sup>3</sup> A full size plot is around 250m<sup>2</sup>. Many local authorities also sub-divide plots for people who want a smaller plot.



by various volunteer organisations and social enterprises, including some small-scale commercial market gardens, that sell produce to businesses and people in the local area.

**Case Study 1: The Allotment Market Stall, Aberdeen** ([TAMS Aberdeen | Food for the community](#))

The Allotment Market Stall was started in Aberdeen in 2013. A network of volunteers collect surplus produce from local allotments to sell to the wider community through stalls located in local parks. The money raised is redistributed back to the allotment association to purchase tools, seeds or compost, or to improve their site. The aim is to give people access to homegrown locally sourced food rather than to make money. Run as a not for profit organisation, all money made is either given back to the growers association to maintain and improve the allotment or to help run the market stalls in parks throughout the city during the summer months.

## 4.2. Community Gardening in Glasgow

The most comprehensive study of urban and peri-urban agriculture in Scotland comes from a study of four community gardening projects in Glasgow conducted by Crossan and White in 2014 (and reported in Crossan *et al.* 2016). The four case study projects in the research revealed a diversity of activities and objectives encompassed by community gardening. The projects included temporary gardening projects organised by local volunteers, a community and market garden operated by a charity, a food shop and vegetable distribution service run by a social enterprise, and a permanent growing space for charities and schools provided by local government. Objectives included repurposing vacant land, building social cohesion, contributing to environmental and food sustainability, and providing participation space for marginalised groups (see Case Study 2). Crossan *et al.*, (2016) identify two policy pathways to support community gardening/UA activities, one local and one national. They argue that local policy should be used to preserve the self-organising spirit of UA in Scotland as new national legislation comes into force.

Urban agriculture, in the form of community gardening, attracts a wide diversity of supporters from different sectors (health, education, social care) yet support from national government has been patchy, meaning that community gardening occupies a precarious physical, social & political space. Crossan *et al.*, (2016) point out that community gardening in Glasgow takes the form of 'DIY citizenship' building a new 'material environment'. They argue that local, regional and national governments have a collective role to play in creating the conditions for UA community gardening projects to thrive as both grassroots and state-supported entities.

### **Case Study 2: Glasgow's Southside** (Crossan *et al.*, 2016)

Depopulated area of vacant/derelict land where a patchwork of community gardens have emerged as well as some small businesses selling local produce through farmers' markets, events and festivals. This loose network includes the following groups:

**Urban Roots** - a community led environmental charity started in 2004 when three local residents set up 'Toryglen Gardening Club' to improve their neighbourhood and address environmental concerns. Since then, the team has expanded to develop further food growing spaces and to run a wide range of activities in communities across the Southside of Glasgow. They are supported by a patchwork of public funding with the aim of generating more of their own income from activities (*Urban Roots* - <https://www.urbanroots.org.uk/>)

**South Seeds** – a community led charitable organisation based in the South Central area of Glasgow working in partnership with residents and organisations within the local community to help improve the look and feel of the area. Their mission is to enable Southsiders to lead more sustainable lives. As well as gardening projects they help people with their energy needs (*South Seeds* - <https://southseeds.org/>)

**Locavore** - a social enterprise which the aim of building a more sustainable local food system which is better for the local economy, the environment and local communities. Starting in 2011, they have been working to develop ideas and practical solutions which can be used to deliver a better food network. They have opened a shop, developed a market garden, established a veg box scheme and engaged people in thinking about issues around food, where it comes from, and the fairness and sustainability of mainstream supply chains (*Locavore* - <https://locavore.scot/about/about-us/>)

**Bellahouston Demonstration Garden** – a project managed by Glasgow City Council with the aim of using gardening and horticulture to give people the skills to enable them to move into employment or an apprenticeship (*The Garden Project | Sacro* - <https://www.sacro.org.uk/post/the-garden-project>)

Community gardens are a source of fresh local food, and contribute to social connection and community cohesion, physical activity, mental wellbeing, environmental education and regeneration, information sharing, increased property value for nearby land and housing, and other benefits (Carrad *et al.*, 2023). The wider benefits attributed to community gardening contribute to the claim that it is as much a tool of community development as it is a means of sustainable food production (White and Bunn, 2017). However, evidence of their ability to meaningfully address food insecurity, and matters of the right to food, equity and justice are inconsistent or limited (Carrad *et al.*, 2023).

Despite these claims (and rather limited evidence), a review of the literature suggests that in Scotland much UA in the form of community gardening remains a grassroots activity that operates without sustained funding or secure income generation. In instances where state actors do get involved, this tends to be on an individual case basis and has the effect of changing the politics of UA from a largely self-organised, grassroots activity to a form of co-governance. Collaborations between community gardeners, small scale commercial market gardens and local food policy networks are beginning to challenge the 'corporatist food agenda' typically favoured

by national governments, food producers and large retailers (e.g. see [Locavore](#)). However, UA on its own is not enough to foster such alternative food spaces; food policy councils, food justice movements and sustainable agricultural collectives are also necessary if the aim is to focus attention on local food and strengthen supply chains and routes to market. One of the biggest challenges for the development of UA is access to land. Local authorities and possibly others such as local food policy partnerships, have a crucial role to play here in identifying stakeholders who share concerns relating to sustainable cities, food security, climate change and UA.

### **4.3. The Urban Food Forest**

The literature review of urban agriculture in Scotland included a report on the actual food production potential of a 0.08 ha peri-urban food forest in Coldstream, Scotland (Nytofte and Henriksen, 2019). Nowhere near as numerous as allotments and community gardens, the authors argue that food forests have the potential to contribute to food security in urban and peri-urban areas. Their paper sets out to determine the annual level of food production of an urban food forest and estimate its food supply capacity in terms of energy and macronutrients. In that way it is one of the few papers we came across that actually tries to estimate the food production of a particular space and method of production. They estimate (based on records kept by the land owner since 1991) that the forest could potentially feed 10 people. They also give the sustainability, social, health and economic benefits. They argue that although economic benefits would not be seen in the short term they could be beneficial in the long term alongside increased biodiversity. They conclude that for urban food forests to have a significant effect on food supply and nutrition security, as well as environmental sustainability, significant upscaling is required as well as further study on the workload involved in production of food and emergence of a market for selling produce. Food forests contribute to biodiversity and crop variation, and may contribute to community benefits as well as environmental and social sustainability.

#### **Case Study 3: The Urban Food Forest**

This study estimated the actual food production potential of a 0.08 ha peri-urban food forest based on average annual yield records of 99 species grown in the food forest from 2011–2017. The results show that the average annual yield is 713 kg, corresponding to 415,075 kcal, 9868 g protein, 8394 g fat and 85,627 g carbohydrates. Assuming a carbohydrate rich diet where the maximum recommended 60% of energy comes from carbohydrates and the remaining 40% is divided between 25% from fat and 15% from protein, one hectare of food forest with the same species composition as the Garden Cottage food forest would be able to supply up to 7 males or 9 females with carbohydrates, 4 males or 5 females with fat, and 3 males or 4 females with protein. This is somewhat lower than previous assessments and estimates of the food supply capacity of food forests ranging from 6 to 10 people, but since the studied food forest has a relatively low production of protein and fat compared with carbohydrates, this could potentially be increased by incorporating more protein and fat crops, such as legumes and nut trees.

## 4.4. Vertical Farming

Our search returned a number of articles referring to vertical farming and controlled environment agriculture. This is an emerging technology in which produce is grown in stacked trays in an environment where the light, water and humidity are strictly controlled. It has several advantages over field agriculture in terms of space, disease control and water usage. However, it is also energy intensive and the crop range is limited (Dinnie and MacLean, 2022). Interest in vertical farming in controlled environments has increased recently with improvements in the technology making it more economically viable at different scales. However, most vertical farming projects in Scotland are still at a research and development phase and are not yet commercially producing food.

## 4.5. Innovation and Niche Experimentation

We identified a range of small-scale innovations that might not always be identified through searches of urban agriculture because they are innovative (socially or technologically) and operate outside of the community garden/allotment food production models. Such innovations could potentially be commercially viable with scaling-up. The search returned examples of local, small-scale projects that combine food production with social objectives and community development. Mordin *et al.* (2022) highlighted a number of organisations, again primarily based in Glasgow as Scotland's largest urban area. [The Wash House Garden](#) is an organic market garden and basketry workshop. They also run a veg box programme using produce grown in their gardens and run workshops to teach the community how to cook with the produce. [Blackhill's Growing](#) is a community growing project run by St. Paul's Youth Forum. Young people have set up their own small market garden and sell produce to raise money for youth club activities, they also run a weekly vegetable Barra to sell their own garden produce as well as fruit and veg from other local suppliers.

### **Case Study 4: Hope Organic Garden**

[Hope organic garden](#) are a community garden established by HOPE, a charitable trust started in 1994 by Cedric de Voil, a local GP, who saw the benefits of gardening for people with learning disabilities. The aim is to provide horticultural training and work experience opportunities for adults with learning difficulties and disabilities living in Angus whilst also offering the local community a reliable source of organically grown fruit and vegetables. Hope gardens run a small shop open Wednesday to Saturday selling fruit and vegetables as well as variety of plants, shrubs, herbs, fruit bushes, and veg plants. They also regularly sell at farmers markets. While making some profit these activities allow for the trainees to get involved with social, educational and recreational activities.

Very few of these organisations have set out with the primary objective of commercial selling, instead almost all have launched with social benefits in mind for their community and found opportunities along the way to make a small profit. In most cases this was used to retain volunteers, maintain plots, or otherwise keep the organisation running, according to the

organisation. Our review did not find any evidence of purely commercial community growing UA projects in Scotland. This potentially represents a gap in UA in the Scottish context.

There are potentially opportunities for urban farmers to develop viable commercial models of production that move away from community gardening to focus on increased use of technology, niche product development and specialised markets. [Agron-Pod](#) are a West Lothian based company that uses hydroponic technology and expert LED lighting to grow high value, nutritionally rich microgreens, leafy greens, herbs, vegetables, fruits, edible flowers and medicinal plants, inside a modular indoor farm system or utilising existing infrastructure. The Pods are custom-designed to the farmer's specifications, utilising the latest in horticultural technology to assure the highest yield. They are vandal-proof and equally suited to use on derelict or abandoned land in urban areas or in remote and island locations. Whilst a commercial model from this technology is possible, it is not reflective of the current picture of urban agriculture in Scotland.

North America and Southeast Asia (Singapore and Japan) are ahead of Europe in innovations and uptake of high-tech urban agriculture (Fox, 2022). The drive has come from the latest innovations in growing techniques e.g. hydroponics and LED lighting as a source of energy for efficient light for growing indoors. However, there are some interesting recent major European projects. Agropolis Paris spans 14,000 m<sup>2</sup> making it the largest urban farm in Europe producing around 1,000kg of fruit and vegetables daily, using entirely organic methods. Roeselare in Belgium has just opened a fully closed rooftop greenhouse built on top of a food market hall Fox, 2022).

#### **Case Study 5: Winchburgh community growing group**

[Winchburgh community growing group](#) is a fresh food destination just outside of Edinburgh, formed in 2018 that aim to grow food for the whole community in their village. Winchburgh is a historic village that is developing rapidly, with new homes, transport, schools and opportunities. John West and Vivian Maeda responded to a community consultation to recommend a growing space to be included in plans. This space would not be ready until 2021 so in the meantime planters were recycled using donated wood. Over 50 planters can be located across the village, at churches, pubs etc. These can be found by locals using this website: <https://www.winchburghcgg.co.uk/planter-locations>. Planters can be sponsored by local businesses, who can add logos and QR codes with information about what's growing and how it is being used. John has also developed an App which allows local people to locate their nearest planter, tells them what it contains, when it can be harvested, and displays a list of tasks that needs to be carried out to care for the crops. Users can then record what they've done so that others can continue their work. The initiative has brought the community together to improve their community, meet neighbours and gain access to fresh foods.

In summary, we would say that the literature on UPUA in Scotland is very limited, is focussed mainly on community gardening projects in Glasgow and on the social, environmental and

community benefits of such activity rather than quantifying economic or food supply benefits. A tension is identified between grassroots activities and national strategies to encourage more food production in urban areas, especially around secure access to land. Some social and technological innovations can be seen to be emerging around food production and urban agriculture but as yet these are small scale and fragile either because they have not been fully tested or because they rely on volunteers and public funding. Key to upscaling urban agriculture would be to provide secure access to land, reliable sources of funding and food systems transformation so that local food is widely available to all and that people know how to use it.

## 5. UPUA in Other Countries

Literature reviews of UA in other comparable countries (Europe, US, Canada and Australia) confirmed the broad findings from Scotland. Literature on community gardens was mostly based on the USA (57%) followed by Australia, Canada and the UK. The EU was hardly represented and we hypothesize this might be due to community garden as a term not being commonly used across Europe (Guitart, Pickering and Byrne, 2012). Thomaier *et al.* (2015) also found similar trends for Zfarms (zero acreage farming – a specific term used for urban farming done in very limited land) in the global north, where most of the farms mentioned in literature were from North America (44), followed by Europe (19), Asia (15) and Australia (1).

Community garden literature largely focusses on its use for food, flowers and native vegetation growing with the major benefits being social development or cohesion, enhanced health, access to fresh foods and education. Benefits claimed for UA are widespread but not routinely backed up by evidence. For example, Badami and Ramankutty (2015) conclude that UA is feasible in terms of urban land availability to grow basic daily vegetable intake for urban poor in high income countries but that it has low potential to meet daily vegetable intake in cities in low income countries characterized by large populations, majority of whom are poor, with high urban density levels and high malnutrition. We suggest that in large cities with dense populations there is a scarcity of land and space for growing sufficient produce that might explain this difference between high-income and low-income countries.

Increased biodiversity is also claimed as a benefit of urban agriculture, having a greater diversity of flora and fauna in urban spaces, the UK being the example (Clucas *et al.*, 2018). However a global review showed very little difference between biodiversity in urban agriculture and vacant lots (Clucas *et al.*, 2018). Comparison between parks in the UK and Poland showed lower species richness due to differences in land management practices (Speak, Mizgajski and Borysiak, 2015). Allotments and gardens also provide ecosystem services like pollination (Nicholls *et al.*, 2023) however further diversity was required if urban agriculture was to be expanded for large scale food production.

Saving or making money was also discussed but not demonstrated in the studies. Zfarming on the other hand had slightly more economic market use although still largely dominated by private use (Thomaier *et al.*, 2015). There were examples of farming done in collaboration with commercial businesses (e.g., a restaurant with a kitchen garden managed by the chef or rooftop greenhouse on a grocery store). These were 14 out of 73 cases and the authors mention that most of them were in commercial, industrial or manufacturing sites with a minimum size

requirement for economic viability. This type of growing in the global north was reliant on investment usually coming from the commercial end users (restaurants, shops etc). The focus was not to meet the basic needs of urban dwellers but more focussing on quality of produce (organic, innovative etc).

As mentioned previously, urban and peri urban agricultural grassroots initiatives in the global north, unlike commercial Zfarming are mainly focussed around community benefits. For residents in Philadelphia, among foreign born residents, they played a role in preserving native culture through maintenance and sharing of traditions, cuisine, and traditional knowledge (Pearsall *et al.*, 2017). They also act as gathering spaces for social life, providing opportunities for people to reclaim public space (Milbourne, 2021). In Europe, the concept of social farming is more common where it is used for social, health and community benefits (Tulla *et al.*, 2018). Although the sale of products from these farms brought in profits, these were reinvested in the community or used back in the farm to make them self-sufficient. This is also in agreement with literature that describes urban gardening in Barcelona as an adaptation to the 2008 financial crises (Calvet-Mir and March, 2019). The urban gardening movement in Barcelona is purposefully political with the aim to make use of gardens as a space for re-appropriation of public spaces to make use for food production, greenery and leisure rather than for profit making.

However, not all aspects of increasing urban agriculture are positive. Newly acquired greenspaces play a role in neighbourhood gentrification, particularly in the US. An analysis of 28 cities in the global north revealed parks played a positive role in greenspace gentrification combined with other factors. This was linked to property prices being raised by land developers who saw green space, and particularly urban agriculture, as a form of revalorisation beneficial to urban neighbourhoods. This was also associated with a lack of anti-displacement and green inclusiveness policies. The space constraints of growing food in cities are also cited as limits to urban agriculture (Martellozzo *et al.*, 2014). Urban environments already have a lot of demands on land and space and questions remain over how much food could be produced in urban areas. Estimates suggest that UA would require roughly one third of the total global urban area to meet the global vegetable consumption of urban dwellers, with caveats that this varies between countries (see also above) and does not account for the presence of contaminated urban land (Martellozzo *et al.*, 2014). Land availability is one of the main constraints on the potential for urban greenspaces to provide food (Walsh *et al.*, 2022). The urban environment can offer a diverse set of spaces for the expansion of urban growing, including outdoor green spaces, brownfield sites, rooftops and facades, as well as indoor and underground spaces, with outdoor green spaces being the most cost effective and easiest to access, at least initially (Walsh *et al.* 2022). The majority of urban greenspace is made up of private gardens and amenities such as parks, golf courses and tennis courts. Research is needed to identify land suitable for cultivation within cities that is not currently being used for this purpose.

Urban agriculture is frequently linked with alternative economic models of distribution, such as alternative and short food supply networks, where the roles of producers and consumers are often blurred and in which swapping, gifting or labour exchange are a feature (Matacena, 2016). Examples of alternative economic models include community supported agriculture, box schemes and farmers markets. We mention these here but the focus of this review is on types of urban agriculture rather than the food systems to which it may or may not give rise. However, it

is interesting to note that in order to promote and upscale urban agriculture then policy changes and support may also be needed in other areas of the food system as well as production.

Some studies in the wider literature go further and consider urban agriculture in terms of a radical vision for transforming cities and urban spaces. Biel (2014) for example, propose a three-fold analytical division - the subsistence sector, the urban forest and the ultra-high productivity sector, each giving different visions of an urban future featuring different scales of urban food production<sup>4</sup>. For now, sustainable urban food strategies have focused on **adapting existing small-scale production** from e.g. allotments, community gardens, into more economically viable activity and utilising farmers' markets as retail spaces (Moragues *et al.*, 2013). Policy approaches to upscaling urban agriculture include developing food strategies that combine food system transformation with wider social changes and ways of purchasing, trading or consuming food in sustainable urban spaces (see Case Study 1 above). Urban policies should therefore be considering all aspects of food systems, from production through processing, delivery and distribution (Moragues-Faus and Morgan, 2015)(Nourish Scotland, 2021).

## 5.1. Critiques and Gaps in the Literature

Critiques of urban agriculture and in particular community gardening in developed countries include the claim that it is based on neoliberal rationalities, and encourages gentrification rather than food justice (McClintock and Simpson, 2014; McClintock *et al.*, 2018) The critique of neoliberalism hints at the lack of governance and regulation in relation to community gardening, and the idea that local, small-scale projects can address systemic failures such as food insecurity and poor quality urban environments (Tornaghi, 2014).

Gaps in the literature include the lack of systematic studies of urban agriculture as a movement. Much of the evidence is qualitative and case-study based rather than taking a food systems approach. The Scottish, UK and EU context is less well evidenced than the US. Processing, distribution, retailing and food waste components of the food system are noticeably absent in the literature, as is the role of technology and socio-technical innovations. For example, there is very little on the role of controlled environment agriculture and vertical farming and how this might be adapted for an urban environment. The literature is biased towards case studies of small-scale, hobbyist or labour-intensive production, often done for free by volunteers, and in which urban agriculture is seen as a way to deliver other social benefits and create better cities rather than better food systems. Challenges, including funding or investment, access to suitable land and the lack of horticultural skills and training are mentioned frequently but it is unclear who should take responsibility for providing these as they involve urban planners, national and local authorities and industry actors. In this respect the role of food policy partnerships and the Sustainable Food Places network could play a role in bringing together different actors to create more localised food systems which include urban agriculture. The literature tends to be broadly supportive of urban agriculture in the form of community gardening, as a normatively good thing

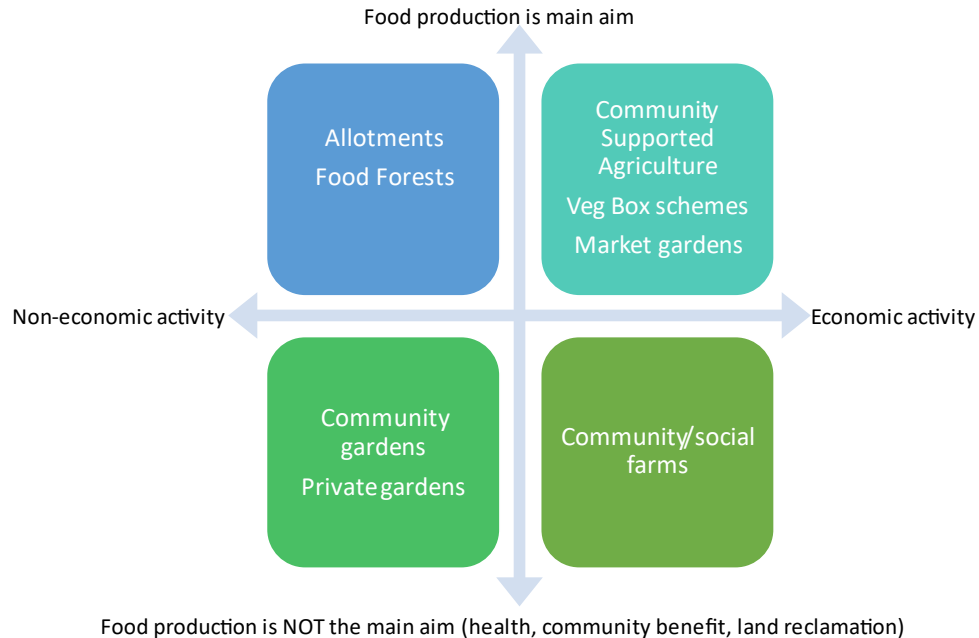
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<sup>4</sup> The National Food Strategy also called for a three-fold division for farming and land-use – sustainable intensification, agroecology and environmental projects.



which provides many social and environmental benefits, but lacks hard evidence of the scale and scope of the potential of urban agriculture and the resources needed to scale up production.

## 6. Definition and Typology of UPUA



**Diagram 1:** A Typology of Urban Agriculture

This review suggests that urban agriculture can be characterised along two axes – food production and economic/commercial activity. The different types of activities that are mentioned under the umbrella term can be classified according to where they sit on these two axes and some suggestions are given in Diagram 1. The current literature locates urban agriculture (in Scotland) on the bottom left of the diagram since it characterises urban agriculture as predominantly a non-economic activity in which social and environmental benefits are often the main aim rather than food production. We would suggest that increasing opportunities for people to engage with community gardening projects would achieve the policy objective of connecting people with food. However, such projects often occupy a precarious space between local and national priorities, and between different policy sectors (health, education, community development, urban planning). Policies to secure projects and make them a feature of the urban landscape would increase the number of people that they can reach. Local authorities could also increase the number of allotments available, and make sure that Local Food Growing Strategies (statutory under the Community Empowerment Bill) are in place to do this.

We would suggest that meeting the second policy objective of this review, namely addressing food security and supply shocks, could potentially be met by urban agriculture on the top right hand side of the diagram, i.e. through types of urban agriculture which are economically viable

and where food production is the main aim. These kind of socio-technical innovations are present in the urban landscape but at the moment are limited because they require a food systems change which includes new economic models of supply and distribution. The creation of a localised food system, which this type of urban agriculture implies, involves multiple actors and strategic planning, possibly through a local food policy partnership to address local needs and opportunities. Incentives and spatial planning policies to access land, link supply chain actors and manage storage and processing activities are necessary if urban agriculture is to be used as a tool to increase national food self-sufficiency.

## **7. Conclusion**

### **7.1. Upscaling UPUA and Recommendations**

This Rapid Evidence Review of the literature showed that evidence of urban and peri-urban agriculture (UPUA) in Scotland is limited and is focused on non-commercial growing initiatives such as allotments and community gardens. These types of initiatives are small scale, volunteer led and they provide social, community and environmental benefits through tackling social isolation, improving biodiversity and regenerating disused spaces. Increasing food production and tackling food insecurity are not always their main goal.

Evidence from outside Scotland suggests that there is potentially a role for urban agriculture to contribute to increased food production especially through the production of fresh fruit, vegetables and salads. Upscaling and commercialising urban agriculture would involve incorporating food growing into urban planning policies, creating and supporting markets and value chains and providing processing and storage facilities. A study by Walsh *et al.* (2022) suggests that introducing horticulture in urban spaces would require repurposing land for food growing from other purposes and this would require local and national policy support.

Our review also suggests that urban agriculture can be a catalyst for innovation for both production and creating new distribution models between producers and consumers. Innovations involving technology, such as controlled environmental agriculture, may be well suited to urban areas as they use limited space and can be sited in re-purposed building. Community supported agriculture and rooftop gardens bring consumers and producers together in new business models and networks.

Introducing commercial food growing in the form of urban agriculture into Scotland's towns and cities would thus require a commitment to land-use changes to create spaces for growing and support for new business models for supply and distribution of fresh produce within urban areas.

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