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Crisis and Green Urban Development: Urban Agriculture and Post-Earthquake Urban Resilience in Christchurch, New Zealand

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1 ABSTRACT

The paper examines urban agriculture and local food initiatives in post-earthquake Christchurch, New Zealand and discusses their role for urban resilience. Like many other coastal cities in the world, Christchurch is prone to a range of natural and anthropogenic disasters including earthquakes, floods, extreme weather events, and sea-level rise. In 2010 and 2011, the Canterbury region was struck by two major earthquakes and a series of aftershocks. It was one of the most devastating natural disasters in the history of New Zealand killing 185 and injuring 7000 people. 90 per cent of residential properties were damaged, resulting in the demolition of around 8000 households and 80% of central Christchurch. In addition, recurrent flood events have been devastating large areas of the city on a regular basis.

Shortly after the experiences of the 2010/11 Canterbury earthquakes, various bottom-up urban agriculture initiatives sprung up and have led to the development of a network of organisations and spaces across the city. With the help of exemplary case studies, the paper discusses post-earthquake urban agriculture initiatives in Christchurch against notions of urban resilience. It critically reflects on knowledge gaps, potential areas for future research and related barriers and enablers for green urban development.

Keywords: green sustainable urban development, food networks, urban resilience, urban crisis, urban agriculture

2 INTRODUCTION

In the context of both natural and anthropogenic crises and disasters, urban gardens and farms can play an important role for community recovery (Fox-Kämper, 2016, p. 365). In disaster situations, urban gardens can help mitigate food shortages when supply chains are interrupted, for examples after earthquakes (Sioen, Sekiyama, Terada, & Yokohari, 2017). Urban agriculture can be "a survival strategy for displaced people to obtain food on a temporary basis, but also a valuable livelihood strategy for those who settle permanently, and for those who eventually return to their home cities" (Adam-Bradford & van Veenhuizen, 2015, p. 407). In the context of Hurricanes Katrina and Rita in Southern Louisiana, Sims-Muhammad (2012) demonstrated the role of urban community gardens in minimizing food insecurity when conventional food sources became unavailable. Following natural disaster, open spaces are often considered safer than built structures that may be damaged, unusable, unreliable, or unsafe. For example, when Hurricane Sandy devastated New York City in 2012, community gardens were considered as safe "multi-purpose community refuges which hosted meaningful and restorative greening practices" (Chan, DuBois, & Tidball, 2015, p. 625). Social activities in gardens help address physical and mental health issues in times of severe stress by increasing "psychosocial resilience after a disaster" (Heather A Okvat & Zautra, 2014, p. 85) and providing post-trauma therapy to "alleviate negative emotions and […] engage in experiences that enhance positive emotions" (p. 81).

Urban gardens encourage social interaction and help build networks between people through collaborative action (Firth, Maye, & Pearson, 2011, p. 565). Kato, Passidomo, and Harvey (2014) observed that community gardens empowered local communities in deprived urban areas to counteract socio-economic injustice in New Orleans following Hurricane Katrina. Disaster resilience depends on "the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures" (UN/ISDR, 2004). Social interaction encourages social capital construction and thus disaster preparedness (Aldrich, 2012). With regard to disaster risk reduction and disaster preparedness, cities have been urged to include urban agriculture as part of their climate change strategies and plans (Dubbeling, van Veenhuizen, & Halliday, 2019). Urban gardens do not only provide benefits following a disaster, but can help prepare cities for future crises by increasing "the resilience of urban social–ecological systems" (Barthel & Isendahl, 2013; see also Barthel, Parker, & Ernstson, 2015; Bendt, Barthel, & Colding, 2013; Chan et al., 2015, p. 632; Colding & Barthel, 2013).

In this paper, urban agriculture is broadly defined as "the cultivation, processing and distribution of agricultural products in urban and suburban areas" (USDA, 2023). The paper presents a case-study informed discussion of urban agriculture projects in Christchurch since the 2010/11 Canterbury earthquakes against notions of urban resilience. It critically reflects on potential knowledge gaps, areas for future research, and barriers and enablers.

3 POST-EARTHQUAKE URBAN AGRICULTURE IN CHRISTCHURCH

Christchurch is historically known as the 'garden city' thanks to an abundance of public parks and private gardens in the context of low suburban residential densities. While the development of allotment and community gardens started in the early 1980s, the majority of gardens became established since the early 2000s with a clear upwards trend in recent years. In 2016, Christchurch City Council published community garden guidelines to "encourage community gardens throughout the city" (CCC, 2016, p. 1). In 2019, the Canterbury Community Gardens Association (CCGA) listed about 30 community gardens on their website within the Greater Christchurch metropolitan area (Shimpo, Wesener, & McWilliam, 2019). By January 2023, the number of gardens had grown to 52 (CCGA, 2023), an indication that community gardens in post-earthquake Christchurch have become increasingly popular.

Shimpo et al. (2019), who studied an urban community garden in New Brighton, a coastal suburb of Christchurch, argued that "community gardens may help secure food supplies and provide essential infrastructural support following a disaster. However, first and foremost, community gardens help strengthen social interactions, relieve stress and build the social capital that is needed when a disaster strikes" (p. 31). Wesener (2020), who studied eight urban community gardens in post-earthquake Christchurch, discussed three commonly experienced benefits against the backdrop of the 2010/11 earthquakes: First, community gardens became post-earthquake sanctuaries and places for social exchange. They were perceived as safe and accessible places to meet other people, work and talk together, participate in shared activities and events and "escape from the difficult situation – at least for a few hours" (p. 82). Second, community gardens provided food to those who needed it. Examples include transporting food supplies by helicopter from a community garden in Kaiapoi to a cut-off coastal suburb in Christchurch, participating in food donation schemes such as the delivery of food packages via local charity organisations, and contributing directly to the food supplies of people in need. And finally, local community gardens became post-disaster learning spaces where people could explore practical skills such as cooking, DIY repairs, or how to save water and install a composting toilet if regular infrastructure had become dysfunctional.

Following the Canterbury earthquakes, a variety of community groups developed projects for the temporary use of vacant urban spaces across the destroyed city with the idea to re-activate spaces until permanent urban redevelopment started (Wesener, 2015). One of these projects was 'Agropolis', a "scalable transitional urban farm" (LIVS, 2015) and collaborative community initiative that opened in 2013, conceptualised as a temporary urban space. Agropolis continued for about three years featuring regular working bees, workshops and community events. However, more importantly, it became an inspiration and incubator for other urban agriculture projects such as a vertical pop-up garden (LIVS, 2016) and 'Cultivate Christchurch', an urban farm that started on a vacant central city site in 2014 and extended to a network of urban farms combining urban food production with social work around youth development and community engagement. Cultivate merged with a larger commercial organic farm in 2021, realising "that our small scale model of urban farming is not robust enough for supporting our youth programme over the long term, nor a viable business in the competitive Canterbury organic veggie market" (Cultivate Christchurch, 2021). The Ōtākaro Orchard project is another example of a post-earthquake urban agriculture project with a distinct educational rationale. It combines a food forest and edible garden with a food information centre, a restaurant, office, event spaces and outdoor educational facilities (Ōtākaro Orchard, 2023). Other types of edible urban gardens in Christchurch include traditional indigenous Mahinga kai sites (Ngāi Tahu, 2023), community orchards and food forests, institutional and school gardens, and food foraging sites (CCC, 2016, p. 2).

Outside the central city, particularly in the Eastern suburbs, large areas were affected by earthquake-related soil liquefaction and lateral spreading causing widespread damage to land and properties. After the February 2011 earthquake, the decision was made to 'red-zone' these areas, and to demolish existing structures and prevent future rebuild (CERA, 2016). The largest residential red zone, the Crown-owned 'Ōtākaro Avon River Corridor', is a vast 602-hectare area in the East of Christchurch that has become home to various food

projects and edible gardens. The 2019 Ōtākaro Avon River Corridor Regeneration Plan lists as preferred land uses "farming and food-based opportunities" including commercial farming, horticulture, market and community gardens, food forests, and "plot to plate" facilities including cafes and restaurants (DPMC, 2023, p. 46). An example for urban agriculture in the Ōtākaro Avon River Corridor is the 2015 established Richmond Community Garden. The garden provides a range of community services and activities from a recycling drop station to community composting, olive oil production, spring fairs and dog-friendly 'day-outs' in the red zone. Another example, the 'Moon River Flower Farm', is the first commercial nursery in the residential red zone "selling cut flowers and bouquets to the public" (Harvie, 2021). Christchurch City Council (CCC) encourages food foraging in the Ōtākaro Avon River Corridor and publishes a web-based fruit tree map that allows people to find specific fruit tree species across Christchurch.

4 URBAN RESILIENCE

Urban resilience is a contested and politicized concept often involving different narratives (Amin, 2014; Leitner, Sheppard, Webber, & Colven, 2018; Wilson & Jonas, 2018). However, despite many conceptual differences, most urban resilience narratives involve a high and continuous level of preparedness: "The resilient city – depending on local affordance – is imagined as the city of active citizens, intelligent technologies, and vigilant governance, a body on full alert" (Amin, 2014, p. 310). Likewise, urban resilience narratives rely on "the many bureaucracies, supply chains and metabolic systems" that work "constantly in the silent background" (ibid: , p. 311). In the context of urban agriculture in post-earthquake Christchurch, there are at least two relevant sub-categories of urban resilience that require attention: food resilience and community resilience.

4.1 Food Resilience

The Canterbury earthquakes became a catalyst to reflect upon the production and distribution of food in Christchurch. The Food Resilience Network was born in 2013 "from a range of organisations who all had an interest in food resilience" (Edible Canterbury, 2023). The Food Resilience Network developed a 'Food Resilience Strategy', that was adopted by the City Council in November 2014 with the key objective to provide "healthy, affordable and locally grown food for all people" (CCC, 2014a). The related 'Food Resilience Network Action Plan' seeks to establish a "patchwork of food growing at local hotspots, linked together like a ribbon and woven into the fabric of our communities" by growing networks and partnerships across organisations, educating people, and supporting and strengthening the local food economy, for example by developing supportive policy frameworks (CCC, 2014b). In 2015, the 'Edible Canterbury Charter' was signed by a range of organisations including CCC and the Canterbury District Health Board setting out "guiding principles of our collective efforts to create a more food resilient region". The Edible Canterbury web-portal was developed "as a one-stop shop for information about growing and enjoying local food" (Edible Canterbury, 2023). CCC defines food resilience as "[p]hysical and economic access, by all people, at all times, to enough food to maintain an active and healthy life" based on a "local food production and distribution system based on ecological sustainability, able to withstand natural and man-made shocks" (CCC, 2014a). This definition makes a distinct connection to natural and anthropogenic disasters. This is echoed by local urban agriculture initiatives such as the Ōtākaro Orchard who reflect on their website that following the earthquakes "we realised that supermarkets carry only 3 days' worth of food and if our supply chains get disrupted, we go hungry" (Ōtākaro Orchard, 2023). Similarly, Edible Canterbury defines food resilience as "the ability to prepare for, withstand, and recover from disruptions in the food supply chain in order to make food accessible for all" (Edible Canterbury, 2023). The specific connection between food and disaster resilience prevalent in above definitions is contextually interwoven with the history of a city and region that went through a major earthquake in its recent history.

4.2 Community Resilience

Community resilience (CR) is a concept of collaborative action at various levels (Daly, Becker, Parkes, Johnston, & Paton, 2009) to obtain and utilise resources to cope with and thrive under unpredictable and continuously changing circumstances (Magis, 2010). At an institutional level, CR requires governance arrangements that enable community action, empower communities, and provide support from and collaboration with governmental and civic agencies (Daly et al., 2009). Urban gardens, in particular community garden, are places that encourage community action and empower communities. They can help

increase "the resilience of urban social–ecological systems" (Chan et al., 2015, p. 632) before a disaster "by providing the structure and practices to support social–ecological diversity, learning, and community support networks to better respond to future disturbances" (Chan et al., 2015, p. 633). After a disaster, they can provide "psychosocial resilience […], especially by enhancing cognitive capacity, positive emotions, and community engagement" (Heather A Okvat & Zautra, 2014, p. 85) and encouraging neighbourhood social interaction to help build social capital (Aldrich & Meyer, 2015). Community gardens are accessible open spaces with multiple opportunities for collaborative action that can strengthen the role of a community within the complexity of local and regional power relationships following a disaster: "By expanding their social network and deepening their extant social ties, community gardens were able to mobilize resources (ranging from grant money to volunteers) to support their garden, their members, and their neighbourhood" (Chan et al., 2015, p. 632).

5 DISCUSSION

Looking at post-earthquake urban agriculture initiatives in Christchurch through the lens of urban resilience shows that urban gardens are part of systems that operate "in the silent background" (Amin, 2014, p. 311) and only expand their full potentials in a disaster situation (Wesener, 2020). The above discussion of urban agriculture initiatives in Christchurch shows that urban gardens strengthened community resilience in the immediate aftermath of the earthquakes by providing multiple benefits with regard to coping strategies. However, and perhaps more importantly, many of these projects have become learning spaces and incubators for future action. Such findings support studies that have highlighted the important role of urban gardens as educational hubs (e.g., D'Abundo & Carden, 2008; Gregory, Leslie, & Drinkwater, 2016; Surls et al., 2014; Wesener, Fox-Kämper, Sondermann, & Münderlein, 2020) for developing community resilience beyond an immediate crisis situation.

The Canterbury Earthquakes created also new opportunities for green urban development in Christchurch. However, there are opportunities to rethink the role of urban gardens and further develop their potential contribution to urban resilience. For example, in the context of urban design, landscape architecture and planning, new spatial networks that link existing urban gardens could become green corridors connecting with the Ōtākaro Avon River Corridor. Such a network of green spaces could provide far-reaching sustainable urban development opportunities, e.g., with regard to integrated green-grey infrastructure systems (Wesener & McWilliam, 2021), urban transport, biodiversity, stormwater management, and recreation.

There are plenty of other opportunities for urban agriculture to increase urban resilience. Climate change is one of the most imminent global threats to human survival. Many countries – including New Zealand – have signed the UN Framework Convention on Climate Change and passed corresponding national acts to address related issues. Cities need to adapt to climate change related adversities such as extreme weather events, droughts, and higher temperatures. At the same time, certain urban structures, processes and lifestyles can contribute to reduce greenhouse gases as a mitigation measure. Urban gardens can help cities mitigate and adapt to climate change, e.g. by sequestering carbon emissions (Heather A. Okvat & Zautra, 2011; Richter, Haase, Thestorf, & Makki, 2020), and reducing carbon footprints through the local production of food (Edmondson et al., 2020). In addition, urban gardens strengthen urban socio-ecological systems that are vulnerable to the adverse effects of climate change (Demuzere et al., 2014; e.g., Gill, Handley, Ennos, & Pauleit, 2007). Gardens could, for example, play a more vital role with regard to stormwater storage and filtration (Pauleit & Duhme, 2000), urban temperature reduction (Rost et al., 2020), and environmental education (Bendt et al., 2013). However, the (potential) role of urban gardens within local urban climate change policy frameworks has rarely been studied and represents a significant research gap (Clarke, Davidson, Egerer, Anderson, & Fouch, 2019).

6 CONCLUSIONS

The paper discussed urban agriculture through the lens of urban resilience in the context of crisis and disaster. However, disasters can also be catalysts to learn, rethink sustainable urban development and explore new development options. The international literature provides many examples of how urban gardens have contributed to urban resilience. However, while beneficial links between urban agriculture, sustainable food production, social interaction, community empowerment, education and urban resilience have been

discussed, national and local government agencies remain often unaware of the full potentials of urban agriculture and its abilities to make cities more resilient to natural and anthropogenic disasters. This opens up various opportunities for research. For example, it would be valuable to find out how community gardeners perceive the potential contribution of their garden and their own role with regard to climate change mitigation and adaptation strategies (bottom-up perspective). This would produce valuable insights about how urban gardens could be better integrated as part of local urban climate change policy frameworks.

Urban gardens remain underestimated assets for urban development. Garden initiatives suffer from a lack of funding, struggle to find affordable land to set up new gardens, and do not receive adequate administrative and political support to keep them running for a longer period of time (Fox-Kämper et al., 2018; Wesener et al., 2020). There are rarely comprehensive urban planning and design strategies that include urban gardens as core components of resilient green urban development at city scale. It is time to reconsider such attitudes and treat urban gardens as valuable tools to strenghten urban resilience and prepare cities better for crisis.

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