Journal of Vasyl Stefanyk Precarpathian National University
http://jpnu.pu.if.ua
Vol. 5, No. 2 (2018), 45-54

UDC 349.6
doi: 10.15330/jpnu.5.2.45-54

CONTRIBUTING TO NATURE'S RECOVERY THROUGH URBAN AGRICULTURE

JAMIE MATTHEWS, AFSHIN AKHTAR-KHAVARI

Abstract. The paper analyses the legally established practice of agriculture has been forced out of the urban environment as land value increases with higher population densities. It's stated, that cities and surrounding urban environments have grown dependent upon regional areas and industrial agricultural practices to provide food for their increasing populations. Most commonly, urban agriculture is practiced by third world nations as a first line of defence against hunger and malnutrition or as poverty alleviation in times of economic stress. This paper argues that the practice of urban agriculture contributes to vital environmental recovery necessary in this, the geological age of the Anthropocene. As human activity continues to impact the functioning of earth systems at the planetary scale, we must actively assist nature to recover rather than assume that our existing environmental protection and conservation strategies are effective in preserving the natural environment.

Keywords: urban environment, urban agriculture, Anthropocene.

1. INTRODUCTION

Today, the practice of agriculture has been forced out of the urban environment as land value increases with higher population densities [1, p.114]. Cities and surrounding urban environments have grown dependent upon regional areas and industrial agricultural practices to provide food for their increasing populations [2, p. 48–49]. As a result, 50% of Earth's habitable land area is utilised for agricultural production [3], and 'agribusinesses' employ mechanically and chemically intensive farming methods to produce a maximum yield for both domestic and international markets [4]. Unfortunately, the industrial practice of agriculture negatively impacts upon farming land and the surrounding environment. Increased use of fossil fuels and indiscriminate use of chemicals lead to air pollution, groundwater contamination, soil erosion, depletion of soil nutrients and considerable impact upon insect populations [4, p. 208]. Furthermore, the import of food from regional areas to urban environments requires motorized transport or airfreight and often, non-recyclable packaging. This promotes additional use of fossil fuels, air pollution and plastic or non-recyclable waste in the process of food production [5, p. 45]. On the other hand, urban agriculture is the practice of growing, processing and distributing food and non-food products to an urban environment by re-using resources, products and services from within that urban environment [6, p. 85]. Put more simply, urban agriculture involves food production for cities in cities where production activities are integrated into

the local urban ecological system [7, p. 190]. The practice closes an 'open loop' system where produce has typically been imported into cities and remaining waste is dumped instead of being reused or recycled [8, p. 141]. Individuals or organizations may engage in activities such as growing vegetables and fruit, raising livestock, beekeeping, aquaculture, hydroponics and aquaponics in an attempt to cultivate fresh produce closer to home [9]. These activities are generally conducted in urban or backyard gardens, community plots or urban farms operating with the purpose of generating profit [10, p. 224–225].Most commonly, urban agriculture is practiced by third world nations as a first line of defence against hunger and malnutrition or as poverty alleviation in times of economic stress [9, p. 153]. Families will grow crops and livestock in their homes for their own consumption or for sale as a predominant or supplementary source of income [2, p. 49]. Urban agriculture can be particularly beneficial where valuable produce, such as fruit trees, medicinal or ornamental plants, silkworms and mushrooms, is cultivated on small pockets of urban land [11]. However, first world nations are now recognising that there are many social and environmental benefits to the urban agricultural practices that sustain life and communities in poorer countries. Urban agriculture in first world nations typically constitutes backyard or community gardens operating with the purpose of teaching sustainable living practices and promoting the consumption of local and nutritious produce.

The potential for urban environments to produce food is immense despite cities appearing to lack the required space and resources to do so [12]. Even where urban agricultural practice may not produce significant quantities of fresh produce, the practice in itself performs vital functions that enrich city life and assists in recovering the natural environment [13, p. 225]. In particular, urban agricultural practice promotes improved air quality, waste and water management, nutrient recycling and biodiversity in urban environments [14, p. 47].There are also many social benefits to the practice of urban agriculture. The opportunity to conduct agricultural practices in urban environments allows for transparency in food production and increased literacy of the community in food and health sciences [11, p. 225]. Furthermore, consistent gardening within the community instills environmental ethics [4, p. 215] and promotes political activism [15, p. 13].

This paper argues that the practice of urban agriculture contributes to vital environmental recovery necessary in this, the geological age of the Anthropocene. As human activity continues to impact the functioning of earth systems at the planetary scale, we must actively assist nature to recover rather than assume that our existing environmental protection and conservation strategies are effective in preserving the natural environment [16, p. 737]. In recent years, a significant amount of research has considered environmental recovery issues through the conceptual framing of ecological restoration and rewilding [46]. In this paper, the term 'recovery' is used more broadly to refer to activities that contribute to reducing the likelihood of tipping any of the nine established earth systems at the planetary scale [43]. As such, recovery initiatives can include a wider range of activities such as the practice of urban agriculture. The first part of this paper discusses the concept of urban agriculture and briefly explores how the practice contributes to environmental recovery efforts. It then goes on, in the second part, to consider how urban agriculture operates in a Western democratic system like that of Australia. Overall, this paper argues that the successful implementation of agriculture in Australian urban centres requires all tiers of the Australian Government to develop more robust initiatives to encourage environmentally-friendly food production, health of urban citizens and more broadly, environmental recovery efforts. By viewing urban agriculture through this recovery lens, this paper demonstrates that urban agriculture is more than food production and should be valued by Western democratic countries like Australia.

2. Analysis and Discussion

2.1. Economic, Environmental and Social Impacts of Urban Agriculture Food Production and Enrichment of City Life

Urban agricultural ventures enrich city life for individuals, families and communities by providing fresh food for consumption or sale whilst beautifying the surrounding urban environment.

Despite the limited size of urban allotments, urban agricultural plots actually have the potential to out-produce industrial agricultural plots. Industrial agriculture promotes monoculture cultivation and the intensive use of chemicals in fertilisers and pesticides. Firstly, monoculture farming is known to deplete and degrade the integrity of nutritious soil [49, p. 156] Also, when chemical fertiliser or pesticide is used excessively, it can result in nutrient loss, surface and groundwater contamination, soil acidification or basification and reductions in useful microbial communities in farming [14, p. 137]. However, urban agricultural practice promotes polyculture and the rotation of crop species, as well as the use of recycled organic, household or human wastes as fertiliser [5, p. 49]. These processes replace nutrients in the soil as well as improve the structure of soil, increasing its ability to hold water and nutrients. Therefore, the more fertile soil of urban agricultural projects should be capable of producing a larger and more nutritious yield than the soil of industrial agricultural land.

This yield may be sold within the community to fund the ongoing costs of a venture or to generate profit. In larger ventures, additional income may also be derived through community gardening workshops or garden tours [4, p. 210]. Whilst volunteers from within the community tend to most community gardens, larger ventures have the potential to provide full time, part time or paid work opportunities. For example, workers may assist in gardening, teaching workshops or delivering fresh produce donated or sold to local organisations and restaurants [4, p. 210].

Another benefit of urban agricultural practice is the indirect beautification of the surrounding urban environment. Garden plots can replace vacant or abandoned city land that is oft prone to discarded rubbish and destructive vandalism [4, p. 213]. Also, the addition of green space, foliage or flowers adds diversity and aesthetic appeal to the urban landscape [4, p. 210]. It is reported that the natural, repetitive patterns of trees and plants radically reduces stress levels in humans [4, p. 210]. Furthermore, the introduction of green space in urban environments encourages physical activity and leisure time spent outdoors in nature [4, p. 210].

2.2. Recovery of the Natural Environment

However, most significantly, urban agricultural practices show great promise in recovering the natural environment devastated by the development of cities and urban sprawl. As discussed above, the organic farming practices utilised in urban agriculture return nutrients to the soil in which they started [4, p. 210]. For example, when organic household waste is turned into fertiliser, composted food scraps are absorbed back into the soil and enrich new crops. This practice keeps urban soil systems in balance as well as redirects waste otherwise intended for landfill [4, p. 210]. Similarly no-organic household waste such as wood, old carpet and glass can be recycled as production infrastructure in agricultural activities [4, p. 210]. In particular, old tyres and wood offcuts can be repurposed as troughs or containers, barrels can store irrigation water and plastic bottles can hold plants in vertical gardens. Also, plastic bags or sheeting can be shredded and used as mulch to conserve water and reduce the growth of weeds in garden bed [4, p. 210].

Secondly, the addition of plants and green space within cities assists in improving a city's microclimate [5, p. 48]. Green foliage increases humidity levels and intercepts direct solar radiation to reduce temperatures in otherwise hot, concreted areas. Furthermore, foliage captures dust and gases from polluted city air whilst introducing more pleasant odours into the urban environment [5, p. 48]. In particular, plants will absorb a greater amount of carbon dioxide during their growing phase. The continuous practice of crop production will allow for more carbon dioxide to be captured from city air than in natural, established systems such as tropical forests [5, p. 53–54].

And lastly, the addition of plants and green space promotes flora and fauna biodiversity within the urban environment [5, p. 53]. Firstly, urban green spaces connect fragmented habitats across cities creating new habitat and wildlife crossings, which divert migrating or foraging animals away from busy roads and intersections [21, p. 194–195]. Secondly, different urban agricultural ventures introduce a range of plant species not typically found in cities or developed areas. In particular, ventures may promote the growth of aquatic plants, edible produce and ornamental native and exotic species. The introduction of these plant species encourages pollinating insects, such as bees and butterflies, into the

urban environment [21, p. 193]. Similarly, tall, native and fruit or seed-bearing trees encourage wildlife [21, p. 194] and provide a resting place for migratory bird species.

Urban agriculture also promises to assist flora and fauna biodiversity in regional areas once cities grow less reliant upon industrial agriculture. Where regional agricultural land is left to recover from monoculture cultivation, soil erosion and intensive chemical use, wildlife may recolonise natural habitats. Also, a variety of native flora species may flourish where non-native or monoculture crops typically grow in great volumes [21, p. 193].

2.3. Community Engagement and Awareness

The practice of urban agriculture requires the community to come together in cooperation and partnership. In doing so, farming as a community increases community engagement and provides an opportunity for community education about nature, consumption and living in balance with the environment [2]. Some urban agricultural initiatives operate indefinitely, making sustained contributions to environmental recovery efforts and building communities around the venture where the venture has been strategically embedded into a community space.

However, urban agricultural practices go further to allow individuals to more intimately connect and interact with nature. By engaging in local farming, individuals are able to recognise the benefits of the practice and the human connection to the environment. When individuals better understand this connection, there is a heightened awareness of the human responsibility to implement change and reduce impact upon the natural environment [30, p. 215]. Therefore, urban agriculture has the potential to promote important change in the lifestyle and consumption behaviour of individuals who engage in the practice [5, p. 54]. Similarly, community activities around urban agriculture support discussions and interaction between different generations within the community. This practice can, in turn, enable future generations to assume responsibility over pressing environmental issues.

2.4. Urban Agriculture around the World and in Australia. International Examples of Urban Agriculture

As discussed above, it is typically the poorer communities of developing countries who practice urban agriculture [21, p. 194–195]. Individuals and families are reliant upon domestic produce for household consumption and sometimes engage in selling excess produce to supplement low income [21, p. 194–195]. Urban agriculture has also become necessary where a country suddenly faces food insecurity [23, p. 174]. In particular, cities in Cuba and the city of Detroit constitute model examples of how urban agricultural practice can supplement a city's reliance upon foreign or regional industrial agriculture.

Prior to 1990, Cuba was dependent on industrial agriculture and foreign imports for food supply. When the United States implemented an embargo interfering with Cuba's trade relations, Cuba experienced a chronic food shortage [21, p. 194–195]. The country had no food production infrastructure or land dedicated to growing produce, however, citizens began to plant crops in backyards and on balconies, rooftops and vacant land sites. The result was so effective that the Cuban Government amended city laws to allow citizens to use vacant public and private land lots as productive agricultural land [30, p. 233]. The Government also created the Urban Agriculture Department to aid and support development of urban farms. The Department specifically engages with the Government's research sector to effectively promote small-scale urban agriculture and educate farmers about sustainable farming methods. As a result, Cuban cities now produce more than 90% of the perishable produce consumed in those cities [30, p. 234].

Detroit has also resorted to urban agricultural practices following significant population decline and widespread poverty [35, p. 4–5]. When all large supermarket chains closed their Detroit branches, there was insufficient fresh produce to feed the majority of Detroit citizens. Citizens resorted to planting illegal gardens on side lots and vacant plots around the city in order to cultivate fresh produce [15, p. 502]. The Government did not penalise these citizens but actually adopted Urban Agriculture

Amendments into the city's zoning ordinance. Whilst the small-scale rearing of livestock is yet to be approved, urban farming is now a legal and encouraged practice [15, p. 504]. The Government leases properties to organisations such as the Detroit Black Community Food Security Network and the Earthworks Urban Farm who grow food and promote healthy eating and instill environmental awareness in citizens and volunteers. The Earthworks Urban Farm even accommodates court-ordered community service and a program to certify volunteers in safe food handling, food processing and restaurant work [37, p. 7–8].

Therefore, it would appear that governments are only receptive to urban agricultural practice in situations of high need. However, cities stand to benefit substantially from urban agricultural practice if governments and public policies promote such practice. Unfortunately, small-scale ventures in first world nations, such as the United Kingdom, the United States and Australia, have been impeded by government regulation and lack of consistent funding. Therefore, so long as Australia is perceived to be a food-secure country, it is unlikely that the Australian Government will allow for the unlimited adoption and promotion of urban agricultural practices.

2.5. Urban Agriculture in Australian Cities

Australia is one of the most urbanised nations in the world with over two-thirds of its population residing in capital cities [17, p. 12]. Each Australian city is reliant upon regional food sources to provide sustenance for its ever-increasing urban population. Whilst the country is fairly food secure and does not suffer from widespread poverty, Australia's adoption of urban agricultural practices should be based on the motivation of environmental awareness [3, p. 22]. It is argued that the legal implementation of urban agriculture would reduce Australia's reliance on industrial agriculture and assist in recovering the natural environment within Australian cities.

Australia's local governments typically exercise jurisdiction over planning, development and environmental protection issues that may influence the practice of urban agriculture. Local governments are enabled by State legislation such as Queensland's Local Government Act 2009 (Qld) or New South Wales' Local Government Act 1993 (NSW). However, Federal support of regional industrial agriculture suggests that Australia's governments will preference agribusiness and foreign exports over any local and environmentally friendly farming alternative [11].

In 2013, the Australian Government's Department of Agriculture, Fisheries and Forestry released 'the National Food Plan' [8]. The Plan only briefly considered Australian food consumption and processing matters, focusing predominantly on maximising export of produce for Australian industrial producers [11]. In particular, the Federal Government promised to reduce trade barriers with Asian countries and ensure that food producers have access to all the technology and resources required to increase production to export food to Asia [9, p. 4–5]. Whilst the economic advantages of industrial agriculture are significant, the Government needs to specifically consider the impacts of climate change and the future of food production. The Government's focus on economic prosperity, employment and community wellbeing in regional Australia will inevitably reduce the impact of any positive environmentally friendly farming alternatives practiced in urban environments. Accordingly, it may be expected that Government funding will instead be prioritised in regional farming research initiatives.

Therefore, where the Federal Government does not recognise the environmental significance of urban agricultural practice, lower Australian governments will need to regulate and encourage such practice. Unfortunately, a tension between economic development and environmental protection will typically preference profit or economic opportunity within our capitalist society. Commonly, where local government might legislate for urban agricultural practice, Australia's city councils appear reluctant to allocate vacant urban land to growing produce instead of using the land as profitable residential or commercial space [35, p. 13]. Also, issues of public safety and insurance liability mean that any council policy relating to community gardening is often heavily regulated or requires significant financial investment from residents [44]. A consideration of council laws, State building development code and State teaching curriculums provides that Australian local and State

governments have failed to truly encourage urban agricultural practice amongst the Australian community.

Firstly, a majority of city councils require residents to apply for a permit and pay an average yearly fee of approximately $170 to construct a garden bed, plant or interfere with vegetation on council land [10]. In some city councils, this fee is waived for 'edible' or community gardens, however, residents cannot utilise any gardening structures such as garden bed edging, planter boxes or non-organic materials including loose gravel and crushed brick [4]. Furthermore, particular city councils, such as the Sunshine Coast Council in Queensland, require residents to hold public liability insurance over any garden beds, should any injury occur due to or surrounding a resident's gardening venture [44]. Whilst it is reasonable for local councils to prioritise the safety and regulation of resident gardening ventures, the costs involved in applying for a permit, paying annual fees and maintaining insurance cover is likely to deter residents who would usually wish to engage in urban agricultural practices.

Secondly, consideration of State Sustainable Building Codes for new developments establishes that there is no requirement for the inclusion of green space, garden beds, irrigation or solar systems to be used for agricultural practices on new residential properties. For example, Queensland's Sustainable Buildings Guideline recommends the inclusion of outdoor living areas such as decks, verandas or balconies as these structures promote the Queensland outdoor lifestyle and encourage time spent outdoors without the use of artificial cooling [1, p. 17]. Also, the Guideline recommends solar energy systems as an environmentally friendly substitute to reduce a household's green house gas emissions [1, p. 22]. However, there is no mention of any land area or infrastructure, which would specifically assist in growing food or other non-edible plants at home. This is especially concerning in the development of high-density living where green space is already typically limited. It would be encouraging to see that Australian State governments have considered regulating the inclusion of valuable green space in new housing developments.

And lastly, consideration of State Primary School Curriculums suggests that the Australian State School system fails to adequately instill an appreciation for horticulture and/or urban agriculture in young children. For example, the New South Wales State School Curriculum, provided by the New South Wales Education Standards Authority, is said to encourage children to consider the process of growing plants and raising livestock, as well as the impact of significant development and drought [28]. However, no further information is provided to suggest whether students are taught about negative environmental impacts of industrial agricultural practices. It would be encouraging to see that Australian education standards instill an appreciation for healthy and locally grown fresh produce in Australia's youngest generation.

Fortunately, regardless of the above-mentioned financial or regulatory hindrances, a handful of urban agricultural ventures have persisted and flourish in Australia's capital cities. These ventures typically constitute 'city farms' founded by non-profit organisations and are tended to by volunteers or a limited staff. In order to continue operating, these city farms sell their produce within the community or rely upon intermittent funding grants [16].

In Sydney, Pocket City Farms operate with the purpose of filling neglected spaces with fresh, organic produce. The Pocket City pilot farm collects food scraps from local homes in a large composting unit to ensure that nutrients are returned to the soil and future-harvested crops. The farms generate income by selling produce at a farm gate stall every Saturday morning and encourage paid community and school tours [31].

In Brisbane, Northey Street City Farm operates on four hectares with more than one thousand varieties of fruit trees, bushes, shrubs and ground-covering plants. The farm is heavily reliant upon community grants and the work of volunteers to remain viable [22, p. 113].

However, its founders continue on in the belief that permaculture can create an environmentally, socially and economically just world. Accordingly, operators encourage anyone in the community to volunteer or attend workshops about sustainable living taught specifically at the farm [27].

In Perth, Green World Revolution is another enterprise growing and selling produce from a 400m^2 site in the city centre. The enterprise provides paid work for unemployed Australians through the

Australian Work for the Dole Scheme. Workers tend to the gardens and bicycle deliver fresh produce grown on site to local restaurants and cafes. Green World Revolution also re-collects food packaging from restaurants for re-use in future produce deliveries [13].

However, the most impressive Australian venture operates in Melbourne with extensive support from the Yarra City Council. The Council developed the Community Growing Spaces Program as part of the Urban Agriculture in Yarra Strategy [49]. The program operates with the purpose of assisting the community to grow pop-up gardens, planter boxes or nature strip gardens on Council property [50]. Residents must simply attend a gardening workshop before the Council will provide the basic resources for residents to erect gardens in the community. It is understood that this program is so successful because the Council is connecting people to the land and cultivating a food culture. The program promotes the building of communities and the growing and sharing food with minimal environmental impact [50].

3. CONCLUSIONS

The community ventures described above are instrumental in reconnecting people within communities and establishing healthier relationships between these communities and the environment. When ventures inspire people to assist in gardening, erect their own gardens or live in better harmony with the environment, they promote recovery of the natural environment in cities and surrounding urban areas. Nutrient-rich soil, an improved microclimate and flora and fauna biodiversity will assist in returning cities to their more natural state [7, p. 47].

However, at present, only more substantial and persistent urban agricultural ventures survive. It is expected that if policymakers understood urban agriculture on a holistic level and did not focus on economic output and profit margins, there would be greater opportunity for smaller ventures to flourish too [29]. The Australian legal system can no longer rest on the foundations that evolved prior to the Anthropocene. This new geological era requires urgent legal intervention into the development and maintenance of urban environments to ensure the protection and recovery of natural habitat and biological diversity [20].

Australian governments at federal, state and local levels can play a key role in promoting small and medium-scale urban agriculture, which will assist in recovering the natural environment of Australia's cities [24, p. 48].

The development of urban agricultural ventures has the potential to assist climate restoration, soil fertility, biodiversity and overall environmental awareness in urban environments. It has been argued that the future of any urban agriculture policy will begin with an effort by the Government to celebrate local food networks. In turn, the Australian community should be inspired to engage in the practice of urban agriculture and these local food networks.

In overseas cities and countries where urban agriculture has been successfully implemented, there has always been a form of regulation or policy in place. Therefore, it is recommended that Australian local governments consider the development of an urban agricultural plan that recognises the interrelation of food, agriculture, health and the environment. An urban agricultural plan may be incorporated into city land-use planning allowing for the use of inner city green space for agricultural practices [7, p. 59]. The plan could be used to preserve agricultural land on the fringe of cities and promote better regulation of environment, social and financial factors balanced in any development assessment [42, p. 122]. Furthermore, Australian governments could promote legislation that imposes green space, solar and water facilities for urban agriculture on all new housing developments. In cases of redevelopment, legislation may also impose site remediation to ensure that soil is safe for future farming of produce [42, p. 122].

Lastly, it is recognised that the successful implementation of urban agriculture into cities is reliant upon community engagement and education. It would be beneficial for Australian governments to promote the establishment of backyard plots, community gardens or even city farms by providing funding and education required for growing fresh produce. Australian governments could also

develop an accreditation system for identifying and promoting produce grown and sold locally in communities [7, p. 54].

REFERENCES

[1] Australian Government. *Queensland Development Code Mandatory Part 4.1 – Sustainable buildings guideline.* Department of Local Government and Planning, Brisbane, 2011.

[2] Bouvier J. Why urban agriculture can be controversial: exploring the cultural association of urban agriculture with backwardness, race, gender and poverty. *University of Detroit Mercy Law Review,* **91** (3) (2014), 205–211.

[3] Verge garden guidelines. *Brisbane City Council,* 2017 Available at: https://www.brisbane.qld.gov.au/environment-waste/natural-environment/plants-trees-gardens/verge-gardens?utm_source=corphome&utm_medium=promo&utm_campaign=promo_corphome_footpath_gardens

[4] Brisbin J. Urban agriculture in Australia: local food, global communities. *Australian Community Foods*, (2002), 1–8. Available at: https://www.ruaf.org/sites/default/files/econf4_submittedpapers_brisbin.pdf

[5] Burton P. (Eds.) *Urban food security, urban resilience and climate change.* National Climate Change Adaptation Research Facility, Gold Coast, 2013.

[6] Crawford H. Celebrating urban agriculture in Australia. *Sustain: The Australian Food Network*, December, 2016. Available at: http://www.circlesoffood.org/2016/12/05/celebrating-urban-agriculture-australia/

[7] Tjeerd D., Girardet H. Urban agriculture and sustainable cities. In: Bakker N. (Eds) *Growing Cities, Growing Food: Urban Agriculture on the Policy Agenda*, (2000), 43–65.

[8] *Australia. Department of Agriculture, Fisheries and Forestry. National Food Plan: our food future.* Department of Agriculture, Fisheries and Forestry, Canberra, 2013.

[9] *Australia. Department of Agriculture, Fisheries and Forestry. Towards a national food plan for Australia: a summary of the green paper.* Department of Agriculture, Fisheries and Forestry, Canberra, 2012.

[10] Department of Industry, Innovation and Science. Permit to Plant or Interfere with Vegetation on a Nature Strip or Council Land, Victoria (2017). Australian Government. Available at: https://ablis.business.gov.au/service/vic/permit-to-plant-or-interfere-with-vegetation-on-a-nature-strip-or-council-land/38711

[11] Dossor R. The national food plan: food policy or something else? *Parliament of Australia*, (17 July 2013). Available at: https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/FlagPost/2013/July/The_National_Food_Plan_food_policy_or_something_else

[12] Gammon J. Can urban farming take off in Australia? *Sourceable News (online*), 15 July 2016. Available at: https://sourceable.net/hypothetically-speaking-lets-explore-the-potential-of-urban-farming/

[13] Farm. *Green World Revolution*, (2018). Available at: http://gwr.org.au/farm/

[14] Han S. H. (Eds.) The effects of organic manure and chemical fertilizer on the growth and nutrient concentrations of yellow poplar (Liriodendron tulipifera Lin.) in a nursery system. *Forest Science and Technology,* **12** (3) (2016), p. 137–143. doi: 10.1080/21580103.2015.1135827

[15] Hand J., Gregory A. The Detroit Frontier: Urban Agriculture in a Legal Vacuum. *Chicago-Kent Law Review,* **92** (2) (2017), 497–527. Available at: https://scholarship.kentlaw.iit.edu/cklawreview/vol92/iss2/6

[16] Hardman M. Urban farms won't feed our cities, but they're still a great idea – here's why. *The Conversation*, (26 October 2016). Available at: https://theconversation.com/urban-farms-wont-feed-our-cities-but-theyre-still-a-great-idea-heres-why-66107

[17] Future Cities: Planning for our growing population. *Infrastructure Australia*, (February 2018). Available at: http://infrastructureaustralia.gov.au/policy-publications/publications/future-cities.aspx

[18] Haweya I. Localising food production: urban agriculture in Australia. *Strategic Analysis Paper*, (28 May 2015). Available at: http://futuredirections.org.au/wp-content/uploads/2015/05/Localising_Food_Production _-_Urban_Agriculture.pdf

[19] Lin B.B., Philpott S.M., Jha S. The future of urban agriculture and bio-diversity ecosystem services: Challenges and next steps. *Basic and Applied Ecology,* **16** (3) (2015), 189–201. doi: 10.1016/j.baae.2015.01.005
[20] Lyle P., Choi J.H., Foth M. *HCI for City Farms: Design Challenges and Opportunities*. In: Kotzé P., Marsden G. (Eds.) Human-Computer Interaction – INTERACT 2013. Lecture Notes in Computer Science, 8120. Springer, Heidelberg, 2013, 109–116. doi: 10.1007/978-3-642-40498-6_7
[21] Mosha A.C. Review – Cities and agriculture. *Commonwealth Journal of Local Governance,* **19** (2016), 174–175.
[22] Mosha A.C. Urban agriculture in Botswana. *Commonwealth Journal of Local Governance,* **18** (2015), 48–67.
[23] Luc J.A., Mougeot Ph.D. *Urban Agriculture: Definition, Presence, Potentials and Risks, and Policy Challenges.* German Foundation for International Development (DSE), Feldafing, 2000.
[24] Norris P. Seeking balance: the promise and reality of biodiversity offsetting. *Environmental and Planning Law Journal*, **31** (2014), 137–147.
[25] About. *Northey Street City Farm.* Available at: https://www.nscf.org.au/about/
[26] Agriculture K-6 resources. *NSW Education Standards Authority*. Available at: http://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/technologies/teaching-agriculture
[27] Olivier D.W. Urban farming produces more than food: social networks are a key spinoff. *The Conversation,* (10.02.2017). Available at: https://theconversation.com/urban-farming-produces-more-than-food-social-networks-are-a-key-spinoff-71568
[28] Peters K.A., Creating a Sustainable Urban Agriculture Revolution. *Journal of Environmental Law and Litigation*, **25** (2010), 203–248.
[29] The Camperdown farm. *Pocket City Farms*, (2015). Available at: http://www.pocketcityfarms.com.au/our-farm/
[30] Preston J., Scott J. Meeting the climate challenge in local government decision-making with the use of sustainable climate change adaptation modeling. *Decentralization and Local Governance. Climate Change,* (2012).
[31] Preston J.Br. Adapting to the impacts of climate change: The limits and opportunities of law in conserving biodiversity. *Environmental and Planning Law Journal,* **30** (5) (2013), 375–389.
[32] Rawlinson C. Council gardener at centre of "urban agriculture" debate in Melbourne's inner north. *ABC News (online),* 13 May 2015. Available at: http://www.abc.net.au/news/2015-05-13/urban-agriculture-debate-flares-in-melbournes-north/6466632
[33] Rheinberger B. Seeds of regeneration: urban agriculture in shrinking cities. *University of New South Wales Law Journal Student Series,* **18-01** (2018). Available at: http://www.austlii.edu.au/au/ journals/ UNSWLawJlStuS/2018/1.html
[34] Richardson B.J. Restoring layered geographies: ecology, society and time. *Griffith Law Review 1,* **26** (2) 2017, 154–177. doi: 10.1080/10383441.2017.1348437
[35] Richtr J., Potteiger M. Farming as a Tool of urban rebirth? Urban agriculture in Detroit 2015: A case study. In: Cinà G., Dansero E. 7th International Aesop Sustainable Food Planning Conference "Localizing urban food strategies. Farming cities and performing rurality", Turin, Italy, October 7–9, 2015, Politecnico di Torino, Turin, 2015, 463–477.
[36] Roser M., Ritchie H. Yields and land use in agriculture. *Our World in Data,* 2018. Available at: https://ourworldindata.org/yields-and-land-use-in-agriculture
[37] Schuijers L. Environmental decision-making in the Anthropocene: Challenges for ecologically sustainable development and the case for systems thinking. *Environmental and Planning Law Journal,* **34** (3) (2017), 179–197.
[38] Sherry C. Book review – Urban agriculture Europe. *Property Law Review,* **6** (3) (2017), 224–228.
[39] Smit J., Nasr J. Urban agriculture for sustainable cities: using wastes and idle land and water bodies as resources. *Environment and Urbanization,* **4** (2) (1992)**,** 141–152. doi: 10.1177/095624789200400214
[40] Spencer L. Farming the city. Urban agriculture, planning law and food consumption choices. *Alternative Law Journal*, **39** (2) (2014), 120–124. doi: 10.1177/1037969X1403900211
[41] Steffen W. et al. Planetary boundaries: Guiding human development on a changing planet. *Science,* **347** (6223) (2015). doi: 10.1126/science.1259855

[42] Vegetation on council-controlled land. *Sunshine Coast Council*, (9 May 2018). Available at: https://www.sunshinecoast.qld.gov.au/Pay-and-Apply/Tree-and-Vegetation-Clearing/Vegetation-on-Council-Controlled-Land
[43] Taylor R. Fractal patterns in nature and art are aesthetically pleasing and stress reducing. *The Conversation*, (31 March 2017). Available at: https://theconversation.com/fractal-patterns-in-nature-and-art-are-aesthetically-pleasing-and-stress-reducing-73255
[44] Telesetsky A., Cliquet A., Akhtar-Khavari A. *Ecological Restoration in International Environmental Law*. Routledge, London, 2016.
[45] Case studies. *Urban agriculture Australia*. Available at: http://www.urbanagriculture.org.au/about/case-studies/
[46] What is urban agriculture? *Urban Agriculture Forum*. Available at: http://www.uaf.org.au/about-urban-agriculture/#
[47] Wilson V. How the growth of monoculture crops is destroying our planet and still leaving us hungry. *One Green Planet*, (17 October 2014). Available at: http://www.onegreenplanet.org/animalsandnature/monoculture-crops-environment/
[48] Woodsworth A. Urban agriculture and sustainable cities. *City Farmer*, (5 March 2001). Available at: http://www.cityfarmer.org/alexandraUA.html
[49] Growing Food in Yarra. *City of Yarra*. Available at: https://www.yarracity.vic.gov.au/services/living-sustainably/grow-your-own-food
[50] Yarra City Council. *Urban Agriculture Strategy 2014–2018*. Available at: https://www.yoursayyarra.com.au/35898/documents/77623

Address: Jamie Matthews, Afshin Akhtar-Khavari, Queensland University of Technology, 2, George Str., Brisbane, QLD 4000, Australia.
E-mail: afshin.akhtarkhavari@qut.edu.au, jamie.hynds@hotmail.com
Received: 17.04.2018; **revised:** 18.06.2018.

Метьюз Джеймі, Ахтар-Кхварі Афшін. Відновлення навколишнього природного середовища через ведення сільського господарства у містах. *Журнал Прикарпатського університету імені Василя Стефаника*, **5** (2) (2018), 45–54.

У роботі аналізується практика правового регулювання забезпечення та ведення сільського господарства у містах в умовах зростання вартості землі та збільшення щільності населення. Визначено, що навколишнє середовище у містах залежить від регіональних умов та сільськогосподарської практики, на яких базується регулювання продовольчої безпеки в умовах постійного зростання населення. Найчастіше міське сільське господарство практикується країнами третього світу як першочерговий спосіб запобігання голоду та недоїдання або як засіб запобігання бідності в періоди економічного спаду. У даній статті стверджується, що практика міського сільського господарства сприяє життєво важливому відновленню довкілля, необхідному у межах даного антропоцену. Оскільки діяльність людини продовжує впливати на функціонування екосистеми у планетарному масштабі, антропогенне відновлення екосистеми є одним із пріоритетів заходів охорони навколишнього середовища та індикатором ефективності існуючих стратегій захисту та збереження навколишнього середовища.

Ключові слова: міське середовище, міське сільське господарство, антропоцен.