

Policy and legal constraints on urban food production in the Perth region

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Abstract

Urban agriculture in Western Australia is regulated mainly by local government bodies, in combination with relevant legislature. This study proposes that inconsistencies in the existing council regulations, as well as overly strict regulations around some activities, act as barriers to the uptake of urban agriculture in the Perth metropolitan region.

Published regulations, policies, guidelines, and local laws around urban agriculture for eight councils in the Perth metropolitan region were subjected to comparative analysis to determine levels of consistency and potential areas for review and improvement. The regulations were then compared with the practical experience of a single case study from each council, as well as survey responses from residents, to determine the impact of existing regulations and policies on urban agriculture. Residents reported dissatisfaction with existing regulations and policies, and exhibited low levels of compliance with regulations. The scope of the study was unable to confirm if the regulations act as a barrier to the initiation of urban agriculture systems in the selected areas, but did determine that they were inconsistent across regions and not effective in supporting, limiting or managing urban agriculture activities.

Introduction

The human population is increasing rapidly, and becoming increasingly urbanised at the same time. Most predictions estimate that there will be somewhere between 8 and 15 billion people on Earth by the end of the 21st Century C.E. (Knight & Riggs, 2010), and the majority of those people will probably live in cities. Between 2003 and 2012, the percentage of the world population living in cities increased from 49% to 53% (Corbould, 2013), and is expected to increase to 75% in the near future (Medlen, 2013). In Australia, with its heavily urbanised population distribution, that percentage is already 90% (Wise, 2014). This trend is placing significant strains on environmental support systems in urban areas. Peter Newman, Professor of Sustainability at Curtin University, has expressed concern about the demand for basic resources such as energy, water and land in Australian cities (Medlen, 2013). Those basic resources include environmental services such as water and waste recycling, regulation of temperature, and of rainfall. They also include the provision of clean water and sufficient food. All of these resources are under pressure from increasing population and urbanisation, and maintaining them requires in-depth planning and management.

A supply of fresh, nutritious, high quality food is one of the services that cities are expected to provide for their residents. Like the provision of clean water and waste treatment services, urban food supply capacity is placed under pressure by the rapidly increasing urban population. As cities increase in size, they become more vulnerable to food insecurity due to larger numbers of people to provide food for, and longer transport and supply chains which are themselves subject to failure (Corbould, 2013). Both transport and basic supply of food are subject to increasing pressures. The land area required to produce enough food for the predicted population growth using current farming techniques has been compared to the country of Brazil (Nichols, 2014), meaning that global food production per unit of area must increase to meet predicted demand or other ways of producing food must be found. Globally, issues such as climate change and the associated peak climate events (storms, droughts, floods), increased energy prices, and financial speculation in food commodities have increased the volatility of food prices (Tornaghi, 2014). There is widespread concern among governments and regulators that food prices may rise dramatically, and that many places may see food shortages in the not too distant future (ibid.). To maintain food security, cities must have some mechanism or plan in place to overcome volatility in food prices and ensure food supplies for their residents.

Even if food supply chains do not fail, the costs involved may drive food prices to a point where food security becomes a significant problem for some people. Food security requires that all people have access to sufficient food, including those who are economically disadvantaged, and that the food itself is nutritious and safe to eat (Warren, Hawkesworth, & Knai, 2015). Although Australia is generally considered to be food secure (Wise, 2014), it is estimated that 2 million Australians each year are dependent on food relief due to economic pressures (Ismail, 2015). On a national survey in 2012, 16% of respondents indicated that they experienced concern that they would be unable to purchase food before their existing food supplies were consumed (Wise, 2014). Even if physical access to food can be guaranteed, economic access is not certain for all urban residents in Australia. As food security requires both physical and economic access to food, rising food prices will impact on the food security of urban areas.

One mechanism by which some of the concerns around food security in an urban context could be addressed is urban agriculture. This term encompasses any agricultural and many types of horticultural activity conducted in or around a metropolitan area. If we use the definition of agriculture proposed by Sumner, Mair, & Nelson (2010), that it is essentially a social-ecological system managed by people and focused on the extraction of products and services from the managed ecosystem, then Pearson, Pearson, & Pearson (2010) would be accurate in saying that the feature which distinguishes it from rural agriculture is that it is integrated into the urban ecological and economic context. It includes peri-urban, which is to say superficially rural and urban fringe (Houston, 2005), broadacre agriculture and market gardens, community gardens, land sharing, rooftop gardens and bee hives, home gardens, balcony and windowsill vegetable growing,

green walls planted with productive species, fruit trees planted along roadside reserves or in parks and public spaces, and many other initiatives (Tornaghi, 2014; Pearson, 2014). Urban agriculture may also include keeping livestock more often associated with a rural setting, ranging from chickens and ducks to goats, pigs, sheep and cattle, in an urban setting. The increasing demand for milk, eggs, and meat resulting from changes to consumer preferences (Udo et al., 2011), combined with volatile and increasing prices for these food items, is a motivating factor for people to keep livestock at home in their urban context. The products of urban agriculture may include any agricultural product: fruit and vegetables, honey, herbs, salad greens, eggs, milk, fibre, nuts, grain or legumes, oil, and meat. Due to urban space constraints, many urban agriculture initiatives are small and intensive, but they need not be. The only defining factor is their geographical proximity to urban, sub-urban, and peri-urban metropolitan areas.

Urban food production seems to be a logical response to concerns about urban food security, and is being embraced in many places. There is currently a strong grassroots movement towards urban food production in Australia (Merson et al., 2010), linked to an increased public awareness of food production systems and the potential for disruptions to food security. A 2014 study commissioned by The Australia Institute indicated that more than 50% of households in Australia were producing some of their own food at home, or intending to start doing so (Wise, 2014). This practice is well established and effective in developing nations such as Vietnam and Ghana (Corbould, 2013). However, there is little quantitative information available regarding how effective urban agriculture is in developed nations.

One of the criticisms often leveled at urban agriculture and food gardening generally is the low yields often experienced by people engaging in it. However, agricultural production in the peri-urban areas of the mainland states of Australia is responsible for close to 25% of Australia's total gross value of agricultural produce (Houston, 2005). Peri-urban areas are defined as being within 100km of the central business district of a city (ibid.) and do not generally differ to any large extent from more central urban areas in climate, soil type, or other ecological factors affecting agricultural yield. Among academics and policy makers there is a consensus that urban agriculture is a plausible method for improving domestic food security (Ismail, 2015), indicating that there is no reason why yields from urban agriculture must be low. In Accra, Ghana's capital city, 90% of the fresh vegetables consumed are produced within the city (Corbould, 2013). In Hanoi 80% of fresh vegetables and 40% of the eggs consumed are produced within the city (ibid.). There is also evidence that engaging in urban food production is associated with increased dietary diversity in some contexts (Warren, Hawkesworth, & Knai, 2015). The short 'supply chain' of growing food for your own use, or for sale within the local area means that perishable, high value crops are especially appropriate for urban production (Nichols, 2014). We must conclude that urban agriculture has the potential to produce useful quantities of food if production systems are appropriately managed.

In terms of addressing food security, urban agriculture is of particular benefit to people under financial stress, including not only the urban poor but also single parents and the elderly. Although urban agriculture may be associated with recreation or landscape management, it is more generally practiced for food production or as an income earning exercise (van Leeuwen, Nijkamp, & de Noronha Vaz, 2010). The best case scenario for urban agriculture has it providing a stable source of nutrient rich food which might otherwise be economically unavailable to underprivileged people within the community. In addition to increased food availability and access, urban agriculture has the potential to provide an income generated through sales of produce (Warren, Hawkesworth, & Knai, 2015) if this is supported by local regulations. Both the direct production of food for personal or family use and the potential for increased income add to food security for people engaging in urban agriculture.

In addition to increasing food security, urban agriculture has a numerous associated social benefits. Access to green space, productive or unproductive, has been shown to have health benefits (Knight & Riggs, 2010), and many urban agriculture activities have the potential to increase social inclusion and civic participation. ABC Gardening Australia presenter, Costa Georgiadis, has been quoted talking about several instances of gardening, including back yard and verge gardens as well as community gardens, enabling community members who might not otherwise interact socially to engage with one another (Wise, 2014). This is not limited to community gardens and production in public spaces, as the advent of social media allows people to organise and engage in gardening clubs, workshops for skill sharing, and informational networks. All of these activities not only increase the physical and mental health of people involved, but also create and reinforce community identity and neighbourhood ownership. This is no less a part of sustainable urban living than ecological sustainability. Resilient cities must have the capacity to undergo changes while maintaining the same functions, general structure, and identity (Pearson, Pearson, & Pearson, 2010). Community engagement and community relationships are essential in maintaining that identity, as well as in sustaining effective food production systems, as Sumner, Mair, & Nelson (2010) showed in their case study of Fourfold Farm CSA in Canada. Engaging with our own food production systems is good for us, individually and as a community.

Urban agriculture can improve food security in one other way, related to shortening to food supply chains connecting us to what we eat. In 2015, we are interested not only in the freshness, quality, and availability of food items, but also in their provenance. In Europe, food scares such as the outbreaks of prion disease outbreaks, specifically BSE (Bovine Spongiform Encephalopathy), foot and mouth disease, and salmonella have led to an increased interest in local food production and associated direct marketing (Mason & Knowd, 2010). This trend towards locally produced food and clear provenance and traceability is global (van Leeuwen, Nijkamp, & de Noronha Vaz, 2010). It is

linked not only to food safety risks but also to an increase in awareness around the processes of food production (Ismail, 2015). The increasing interest in CSA (community-supported or community-shared agriculture) organisations shows an increased interest from the public in how their food is produced and in their connection to it (Sumner, Mair, & Nelson (2010). Shorter supply chains lower the risks around food availability and price volatility, but they also lower the risks around food safety and provide a better connection between consumers and producers.

That connection between food production and consumers, and the associated urban green spaces, have environmental benefits as well. There is evidence that urban food production leads to behavioural changes, such as reducing food waste and more sustainable purchasing habits, as well as a greater awareness of ecological issues and sustainability (Wise, 2014). Reducing the food waste sent to landfill may significantly reduce greenhouse gas emissions; in her 2014 report for The Australia Institute, Poppy Wise states that if 45% of the households in Australia which produce their own food reduced their food waste to half the average level for Australian households, that would have the potential to prevent as much as 2 million tonnes of greenhouse gas emissions (ibid.). Urban green space, including those used for productive urban agriculture activities moderate the impacts of human activities, by absorbing or neutralising pollutants, decreasing soil erosion, helping to regulate rainfall, moderating temperatures to decrease the urban 'heat island' effect, and providing ecological corridors for wildlife (van Leeuwen, Nijkamp, & de Noronha Vaz, 2010). This last factor should not be underemphasised. Maintaining green spaces in urban environments can provide corridors for threatened species to migrate as they come under pressure from climate change, preserving the viability of the species and avoiding extinctions of native wildlife (Medlen, 2013). Urban agriculture may allow urban residents to contribute to the preservation of threatened varieties of plant or animal, and to provide safe habitats and support to species such as honey bees which are at risk in the broader agricultural context (Warren, Hawkesworth, & Knai, 2015). These types of positive externalities create a self-perpetuating cycle, where urban green spaces provide benefits and useful products to the community and are therefore regarded as a positive complement to the built environment. The presence of urban green spaces and high quality landscapes may even increase property values (van Leeuwen, Nijkamp, & de Noronha Vaz, 2010), providing an increased motivation for engagement and support from residents. This increases the occurrence of sustainable practices in landscape architecture, which adds to the ecological benefits which the green spaces are able to provide to the community. What starts with a simple increase in the connection between food production and consumers can, if managed well, lead to vastly increased resilience in the urban landscape.

Urban food production has been the subject of extensive research and attention in developing nations, but it has great potential in developed nations as well. While food insecurity has not been a significant concern in Australia to date, it is an existing issue for some segments of the community. The potential for viable levels of food production in an urban setting has been clearly

shown – estimates as of 2011 were that 20 m² open space converted from lawn to food production could result in yields of 800 to 1,100 kg of vegetables and fruit per year (Wise, 2014). While this level of production would be labour intensive, technology exists which could be used to reduce the labour component and produce viable yields on small plots of land (Corbould, 2013). Techniques such as vertical farming systems, aeroponics, and aquaponics have potential to increase water use efficiency and precision in crop timing (Nichols, 2014). However, due to issues of land access and setup costs for urban agriculture activities, there is a need for support from policy makers and local governments. Tornaghi (2014) rightly calls out the irony that the people who would benefit the most from engaging in urban agriculture, such as the urban poor, are also the people least able to access the space and materials to do so. Barriers to effective food production include access to and the high costs of inputs such as fertiliser, and the ability to appropriately dispose of wastes (Poulsen, McNab, Clayton, & Neff, 2015). Support from policy makers could take many forms, but it is essential in order to approach the potential benefits offered by urban agriculture.

In Australia one of the major barriers to effective urban agriculture is restrictions placed by the legal and policy. Urban agriculture in Australia is not illegal, as it is in many countries (Corbould, 2013; Warren, Hawkesworth, & Knai, 2015), but it is not effectively supported or encouraged in most areas. Part of this is due to the complexity of the issues, which touch on health and food safety, land use, waste management, and transportation, and the resulting number of stakeholders in any decision (Huang & Drescher, 2015). Part of it also appears to be due to a perception that local food production is undesirable in the urban context (Wise, 2014) and due to public health concerns around the spread of disease, attraction of pests, and issues such as noise and odours (Huang & Drescher, 2015). All of these issues can be effectively handled through regulation, however. There is ample evidence that green space and local food production create multiple benefits and any negative effects can be neutralised, but this evidence is often not presented effectively to policy makers and regulators (Pearson, 2010). Because of this, policies and land zoning regulations in many areas severely limit the urban agriculture activities which can be legally undertaken. Planning policies and zoning provisions may act as barriers even to municipally initiated urban agriculture activities (Huang & Drescher, 2015). As the increasing complexity and cost of food supply chains and the volatility of food prices make food security a more relevant issue for Australia, it will be important for researchers and policy makers to be aware of the benefits of urban agriculture. Effective support for urban agriculture could be of great benefit to urban residents and to the region.

Broadly, this study is intended to amalgamate information drawn from multiple sources in order to present it more effectively for public and local government consumption. The data, drawn from published regulations, legislature and council guidelines, as well as from case studies and observations in the selected local government areas, is expected to show significant inconsistencies in the policy and regulatory approach of the different local government bodies to

urban agriculture. The author anticipates that these inconsistencies, when presented clearly, will show a clear case for local government regulatory reform to support urban agriculture while maintaining ecological sustainability, thus enabling a more flexible and effective approach by residents to urban food production.

Methodology

Eight urban and suburban city council areas were selected to focus on from the thirty-two (Department of Regional Development [DRD] 2014) in Perth. The councils were selected to present as wide a range as possible of localities, socio-economic zones, and levels of urban development within the metropolitan area. Both large and small local government areas were selected, ranging from small, inner city, urban centres such as the City of Vincent and City of Fremantle to larger suburban and semi-rural areas such as the City of Joondalup and City of Cockburn.

Table 1 – Selected Local Government Councils

Council	Land Area (ha) *	Population *	SEIFA Percentile **
Canning	6,490	96,356	88
Cockburn	16,793.8	103,351	87
Fremantle	1,901	30,321	82
Joondalup	9,892.7	167,623	96
Kwinana	12,001.2	34,413	48
Stirling	10,472.6	223,317	86
Victoria Park	1,793.1	37,682	84
Vincent	1,137.7	36,692	93

* Data sourced from the Australian Bureau of Statistics Region Data Summary for Canning (Australian Bureau of Statistics [ABS] 2013a), Cockburn (ABS 2013b), Fremantle (ABS 2013c), Joondalup (ABS 2013e), Kwinana (ABS 2013f), Stirling (ABS 2013g), Victoria Park (ABS 2013g), and Vincent (ABS 2013h). Population statistics are as of the 2013 census; land area statistics are as measured in 2012.

** Socio-Economic Index for Area, Ranking Within Australia, Percentile (ABS 2013i).

As an initial data source, the published regulations, guidelines, and local laws were invaluable. The local health laws of the selected councils were analysed and compared to provide a baseline of allowable urban agriculture activities across these regions. Notably, none of the councils included in this study had policies regarding vegetable gardens, fruit trees, fishponds or aquaponics systems, or verge gardens; all the published policies related to poultry, bees and livestock. The local laws and policies did cover waste disposal, and public health issues such as practices intended to avoid spreading infectious diseases or attracting pests. For most of the councils, a single Local Health Law covered all urban agriculture activities (The City of Canning Health Local Laws 1997; City of Cockburn Health Amendment Local Law 2012; The City of Fremantle Health Local Laws 1997; City of Joondalup Animals Local Law 1999; The Town of Victoria Park Health Local Law 2003; The City of Vincent Health Local Law 2004). However, the Town of Kwinana

separated these regulations out so that separate local health laws were available regarding bee-keeping (Town of Kwinana Bee Keeping Local Law 2002), piggeries (Town of Kwinana Piggeries By-laws 1983), and the keeping of equines and large animals (Town of Kwinana Health [Keeping of Horses and Equine Premises] Local Laws 1997), with a by-law regarding the keeping of pigeons (Town of Kwinana By-Law No 29B Relating to the Keeping of Pigeons 1996). The City of Stirling has a separate local health law (City of Stirling Health Local Law 2009) and local law regarding bee-keeping (City of Stirling Bee Keeping Local Law 2008). Some of the councils also published guidelines to clarify their local laws for residents (City of Cockburn, n.d.; City of Cockburn, 2002; City of Cockburn 2010; City of Cockburn, 2015; City of Fremantle, 2015; City of Vincent, 2005; City of Vincent, 2011). All of these documents were freely available online. The contents of these documents were summarised for tabular comparison.

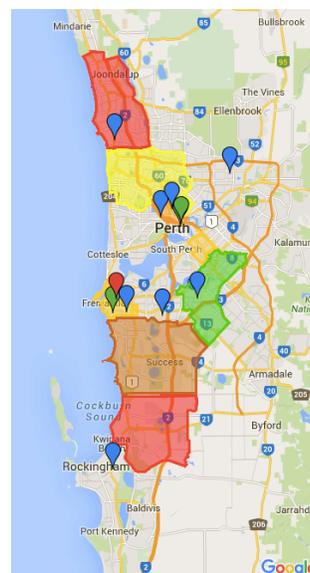
A case study was then identified from each of the selected local government areas, using social media to contact existing gardening and permaculture groups in Perth. Interviews were conducted with a representative from each case study to determine:

- the participant's understanding of their local council's regulations,
- an overview of the participant's interactions with their local council,
- the participant's level of compliance with council regulations, and
- the reasons for compliance or non-compliance.

These interviews also served as an opportunity to observe what types of urban agriculture activities were being carried out in each of the selected council areas, and what value residents placed on these activities and their outputs. Each interview consisted of a standard set of qualitative questions, as well as a tour of the garden or farm. Case study interviews were conducted between 2015-09-24 and 2015-10-03, and were in all cases conducted at the participant's residence or the location in which the urban agriculture activities were being undertaken.

In addition, the interview questions were presented to a self-selected group of respondents from the previously contacted gardening and permaculture social media groups in the form of an online survey. Survey responses and interview responses were amalgamated where possible to provide a better overview of urban agriculture activities within each local government area. Due to the timeframe of the study, response levels were low; however, as the data gathered was qualitative in nature rather than quantitative, these low response levels were not regarded as detracting from the quality of the resulting data.

Based on the elements which participants included in their gardens or urban farm systems, a map was produced summarising the regulations



around those elements for the included councils. As a number of participants asked about verge gardens, this information was included in the summary. Each council area was outlined and coloured on a Google maps layer, and a descriptive text block added giving the following data points:

- verge gardens: existing council policy or no existing policy;
- vegetable gardens: encouraged, discouraged, or disallowed;
- maximum number of poultry allowed;
- minimum setback distance of poultry from any dwelling;
- maximum number of bee hives allowed;
- goats or sheep allowed: yes or no;
- rabbits or guinea pigs allowed: yes or no; and
- fish or aquaponics systems allowed: yes or no.

Significant urban agriculture centres in Perth, including teaching or demonstration sites and community gardens, have also been marked on the map. This map has been made publicly available online, and can be found at the following URL:

<https://www.google.com/maps/d/edit?mid=zEOe3TJXnUkw.kNY06igigB1o>

Results

Analysis of the local health laws and regulations of the included councils showed considerable variation. For example, the minimum distances required between poultry or pigeons and dwellings or houses varied from 5 to 15m. For larger animals such as goats or cattle, the setback varied from 6 to 18 m in areas where large animals are permitted. Setback distances required between poultry or livestock and public spaces, workplaces, boundaries and roads also varied widely, and not all of these things were specified in the regulations of each council.

Table 2 – Variations by Council in Poultry & Pigeon Keeping Regulations

Council	Minimum Setback Distance to:				
	a dwelling	a property boundary	a public street	a public building or public space	a place where food is handled
Canning	5 m	<i>not specified</i>	15 m	15 m	15 m
Cockburn	9 m	1.2 m	18 m	9 m	12 m
Fremantle	7 m **	1 m	18 m	7 m **	7 m **
Joondalup	9 m	1 m	9 m	9 m *	9 m *
Kwinana	9 m	<i>not specified</i>	18 m *	9 m *	9 m *
Stirling	10 m	1 m	10 m	10 m	10 m
Victoria Park	15 m	1.2 m	18 m	15 m	15 m
Vincent	15 m	<i>not specified</i>	18 m	15 m	15 m

* The City of Kwinana's local health laws (Town of Kwinana By-Law No 29B Relating to the Keeping of Pigeons 1996) and the City of Joondalup's local health laws (City of Joondalup Animals Local Law 1999) do not specify minimum setback distances for poultry in these categories, but do specify setback requirements for pigeons. It is assumed that similar setback requirements would apply to poultry.

** The City of Fremantle's local laws specify a 9 m setback for pigeons, rather than 7 m for all other poultry (The City of Fremantle Health Local Laws 1997)

Table 3 – Variations by Council in Livestock* Keeping Regulations

Council	Minimum Setback Distance to:				
	<i>the owner's dwelling</i>	<i>accommodation for trainers or employees</i>	<i>any other dwelling or building</i>	<i>a property boundary</i>	<i>a public street</i>
Canning	10 m	10 m	10 m	<i>not specified</i>	<i>not specified</i>
Cockburn	livestock are not permitted on residential lots				
Fremantle	6 m	15 m	15 m	<i>not specified</i>	<i>not specified</i>
Joondalup	10 m	10 m	10 m	<i>not specified</i>	<i>not specified</i>
Kwinana	18 m	18 m	10 m	1.2 m	24 m
Stirling	livestock are not permitted on residential lots				
Victoria Park	15 m	15 m	15 m	<i>not specified</i>	<i>not specified</i>
Vincent	<i>not specified</i>	<i>not specified</i>	<i>not specified</i>	<i>not specified</i>	<i>not specified</i>

* Livestock are defined in this context as including any large animals, such as horses, goats, cattle, sheep, alpacas, camels, deer, etc., but excluding ratites. Small animals such as rabbits and guinea pigs are also excluded from this definition.

There appeared to be no clear pattern governing the setback distances regulated. The Cities of Fremantle, Vincent, and Victoria Park were the smallest in terms of land area, with similar areas of between 1 and 2 hectares of total land area (see Table 1), and yet the City of Fremantle has much smaller setback distances required than the City of Vincent or the City of Victoria Park. The next smallest setback distances were specified by the City of Joondalup, which is almost four times the size of the City of Fremantle, and far more rural in character. It is also worth noting that the local laws of the City of Swan (City of Swan Health Local Law 2002), which was not included in this study due to a lack of potential case study participants, do not specify setback distances at all. The City of Swan instead advises the resident to consider both the distance to buildings on neighbouring lots and the prevailing wind when determining where to keep poultry or livestock (City of Swan, 2015a; 2015b; 2015c) in order to avoid creating a nuisance to neighbours. No pattern could be determined on the basis of area, location, or on the relative recency of amendments to the regulations.

From the responses to the case study interviews and survey questions, it was apparent that there is a low level of compliance with the regulations and policies across all the included council areas. Multiple participants commented that it is impossible to carry on effective urban food production and comply with all of the regulations. Even those participants who were fully compliant indicated that they placed more weight on their neighbours' opinions than on the council regulations and

local health laws. The only participants who were happy with the council regulations were those who did not keep any animals or poultry, and a number of them were unsure if they were compliant with council regulations or not.

Most participating residents were unaware of or confused about the council regulations which applied to them. Of the 30 case studies and survey respondents, 24 had not read the full local health laws, and eight had not read any of the regulations or local laws for their council. The main reasons given were:

- the regulations and policies were difficult to find, or confusing;
- the respondent was not aware that there were any regulations or local laws around urban food production; or
- reading the regulations would have been so discouraging that it would have prevented the respondent from attempting to initiate an urban food production system.

Many of the respondents who had read only some of the relevant regulations indicated that they only read them when a neighbour complained, or when they needed specific information. Only four respondents were entirely comfortable that they understood their council's regulations thoroughly and were fully compliant.

There were many commonalities in the elements included in the gardens or urban farm systems of the case study participants and survey respondents, although a few unusual items were also reported. All of the participants had vegetable and/or herb gardens, and 80% also had productive fruit trees. These elements were the most significant in terms of food production, with 30% of participants reporting that they produced 50% or more of the fresh fruit and vegetables that their families consumed per week. Poultry were also common, with 70% of respondents either keeping or planning to obtain in the very near future either chickens, ducks, or both. Fewer of the respondents kept fish (16.67%), honey bees (10%), or composting worms (20%). A small number of participants also kept larger animals, such as sheep (3.3%, 1 participant) and goats (13.3%); there was also one pet pig reported. Goats were kept primarily for milk, while the sheep was kept for meat. In addition, 13.3% of participants either kept or were planning to keep rabbits or guinea pigs (cavies) as meat animals. Poultry were kept primarily for eggs, but some respondents reported that they kept their poultry for meat as well. Fruit trees, vegetable gardens, and chickens or ducks were by far the most common elements reported. Less common elements were, however, included in the production systems of a large portion of participants.

Discussion & Recommendations

As expected, the published local laws, policies and regulations were inconsistent across the included councils. Inconsistencies did not appear to follow any clear pattern, even though the format of the local laws and policy documents was consistent. The local laws appear to have been

drafted based purely on the individual interpretations of the councils as to what they believed likely to cause a nuisance, rather than on any practical considerations mandated by location, level of urbanisation, or the desires of residents. It is possible, although it was beyond the scope of this study to determine, that the councils with fewer or more relaxed constraints were those in which residents had engaged with the council to update the regulations. There is evidence suggesting that public advocacy is one of the most significant factors supporting the inclusion of supportive urban agriculture policies in regulations and planning documents (Huang & Drescher, 2015). The inconsistencies in the existing regulations show clear scope for a review and update of those documents. Improved consistency in the regulations across different local government areas would empower more residents to engage in food production, and would allow for the development and implementation of city-wide sustainable management plans.

While the Local Government Act (1995) allows local government bodies to create local laws which apply within their district boundaries, these local laws may not be inconsistent with any Act or written legislation (Local Government Act 1995, Sect 3.7). As such, any points covered by the Health Act (1911), Animal Welfare Act (2002), or any other legislation do not need to be addressed by local laws. Removing the elements of the local laws which duplicate existing legislation would improve the consistency of those local laws considerably. As the local health laws of many of the councils included in this study were last updated before the legislation of the Animal Welfare Act (2002), this would be a logical update to recommend as it would reduce administrative requirements for the councilors and council employees. Improving the efficiency of local government regulations by removing points duplicated by currently existing Acts would be a good first step towards resolving the issues with the regulations as they stand.

For example, most of the local councils included in this study incorporate specific requirements around shelters or stables for animals in their local health laws. The intent of these requirements appear to be: (a) to prevent nuisances and health impacts to the owner, surrounding residents and neighbours, and the public; and (b) to ensure minimum standards for animal welfare. However, the Animal Welfare Act (2002) specifies that cruelty to an animal is an offence punishable by a fine of up to \$50,000 and possibly a jail term of up to 5 years. It further defines cruelty as including confining or restraining an animal in a way which is likely to cause harm, failing to provide appropriate food and fresh water, and failing to provide appropriate shelter (Animal Welfare Act 2002, Sect 19). As such, the local health laws regarding the provision and construction of shelters and enclosures for animals do not need to go into specifics intended to ensure the welfare of the animals. This aspect of animal husbandry, urban or not, is already covered by the Animal Welfare Act (2002). These regulations were some of the most problematic for case study participants, who cited items such as the required concrete floor to a poultry enclosure as being environmentally unsound, more difficult to keep clean and sanitary than a sand or deep litter floor, and a negative environment for the chickens. Many people who keep urban livestock today, at least in the context

of affluent, developed nations such as Australia, consider their animals more as pets or even companions rather than traditional rural livestock (Huang & Drescher, 2015). As such, their welfare is not merely a matter of legal requirements but also of personal interest. The specific requirements around stables, shelters and poultry enclosures could be removed from the local health laws, and replaced by a single, RSPCA approved guideline applicable in all council areas on how to appropriately house different animals.

This solution would also satisfy the Health Act (1911), especially if the sections of the local health laws regarding the spread of infectious diseases, and the control of pests and rodents, were retained. The Health Act (1911) specifies that any animal “so kept as to be a nuisance or injurious or dangerous to health” constitutes a nuisance (Health Act 1911, Sect 182.2). Where a nuisance is identified, the local government is empowered to determine a solution to abate the nuisance, and to require the owner and occupier jointly to act to abate the nuisance (Health Act 1911, Sect 184). This means that the various local health laws and regulations governing to minimum distance which poultry can approach a house, for example, or the construction of the floor of a stable, are no more than interpretations of what is or is not a nuisance or health hazard. The Health Act (1911) does not specify how animals should be kept, any more than it specifies how vegetables should be grown.

It is also recommended that councils reconsider the regulations relating zoning to urban agriculture activities. Concerns around public health and environmental health have led to strict regulations regarding allowable activities in residential zones in many council areas, but the low compliance rate in these council areas shows that the regulations are not effectively addressing the needs and desires of residents. The City of Swan has had much more open-ended regulations for the last 13 years (City of Swan Health Local Law 2002) and has not reported any significant public health issues in that time. A more useful approach might be, as Mason & Knowd (2010) suggested for the Sydney metropolitan area, a land suitability map showing areas which are suitable for various forms of urban agriculture, from market gardens and commercial mushroom cultivation through to community gardens. Huang and Drescher (2015) advise local government bodies to create inventories of potential under-utilised or vacant land which could be used for community initiatives such as community gardens.

One of the other issues raised by many case study participants was the lack of clear policies around verge gardens and public spaces. In a similar manner to the proposed cross-council guidelines around shelters for animals, a review and update of the relevant regulations, policies and local laws would provide an opportunity to form policies and publish guidelines for creating verge gardens or neighbourhood gardens. These guidelines could then be used by residents to generate their own plans for urban food production, and by neighbourhood groups to create shared community green spaces. Published guidelines would clarify the activities of residents, and allow

municipal planners to create or encourage the creation of ecological corridors via parks, verges and road reserves. For example, guidelines might specify that an equal area of native plants must be planted if residents wish to put in productive garden spaces on their verges, or that every productive verge garden must also include a native tree to allow habitat for threatened native bird species. This is only possible, however, where the policy framework in place supports these activities as well as supporting local biodiversity and ecological conservation.

Conclusion

Sustainable management of urban food production systems is essential if local government bodies wish to access the potential social and food security benefits of urban agriculture. It is the contention of this paper that there is scope for local governments in Perth to review and update their regulations and local laws regarding urban agriculture. Improved consistency in these regulations across different local government areas would empower more residents to engage in food production, and would allow for the development and implementation of city-wide sustainable management plans.

True sustainability requires that we address shortcomings and failings in the planning and design of the urban environment rather than simply continuing with traditional approaches. It is clear that the existing planning policies and regulations do not fit the needs of the community, and that traditional approaches to urban planning do not cater for the future potential of increased food insecurity. In Europe, there is a belief that agriculture has the capacity to adapt to urbanisation (Mason & Knowd, 2010). Planning and policy support for urban agriculture initiatives would allow Perth to adapt, to incorporate urban food production into the fabric of residential areas. Such an approach has clear benefits to the community and the natural environment. We have the opportunity to adapt now, to build on the increasing public awareness of the importance of agriculture and food production and create a more resilient urban system.

References

- Knight, L., & Riggs, W. (2010). Nourishing urbanism: a case for a new urban paradigm. *International Journal of Agricultural Sustainability*, 8(1), 116-126. doi:10.3763/ijas.2009.0478
- Corbould, C. (2013). *Feeding the Cities: Is Urban Agriculture the Future of Food Security?*. Retrieved from Future Directions International Pty Ltd.: <http://www.futuredirections.org.au/publications/food-and-water-crises/1406-feeding-the-cities-is-urban-agriculture-the-future-of-food-security.html>.
- Medlen, P. (2013). Smart thinking needed as Perth and its issues expand. Retrieved from <http://www.abc.net.au/news/2013-05-13/the-city-is-expanding-as-do-its-problems/4685632>.
- Wise, P. (2014). *Grow Your Own*. Retrieved from <http://www.tai.org.au/content/grow-your-own>.
- Nichols, M. (2014). Vertical farming and urban agriculture. *Practical Hydroponics & Greenhouses*, 149, 14 - 17.
- Tornaghi, C. (2014). Critical geography of urban agriculture. *Progress in Human Geography*, 38(4), 551-567. doi: 10.1177/0309132513512542
- Warren, E., Hawkesworth, S., & Knai, C. (2015). Investigating the association between urban agriculture and food security, dietary diversity, and nutritional status: A systematic literature review. *Food Policy*, 53, 54-66. doi:10.1016/j.foodpol.2015.03.004
- Ismail, H. (2015). *Localising Food Production: Urban Agriculture in Australia* Retrieved from Future Directions International Pty Ltd.: <http://www.futuredirections.org.au/publications/food-and-water-crises/2287-localising-food-production-urban-agriculture-in-australia.html>.
- Merson, J., Attwater, R., Ampt, P., Wildman, H., & Chapple, R. (2010). The challenges to urban agriculture in the Sydney basin and lower Blue Mountains region of Australia. *International Journal of Agricultural Sustainability*, 8(1), 72-85. doi: 10.3763/ijas.2009.0464
- Sumner, J., Mair, H., & Nelson, E. (2010). Putting the culture back into agriculture: civic engagement, community and the celebration of local food. *International Journal of Agricultural Sustainability*, 8(1), 54-61. doi:10.3763/ijas.2009.0454
- Pearson, L. J., Pearson, L., & Pearson, C. J. (2010). Sustainable urban agriculture: stocktake and opportunities. *International Journal of Agricultural Sustainability*, 8(1), 7-19. doi:10.3763/ijas.2009.0468
- Houston, P. (2005). Re-valuing the Fringe- Some Findings on the Value of Agricultural Production in Australia's Peri-Urban Regions. *Geographical Research*, 43(2), 209 - 223.
- Pearson, C. J. (2010). Guest editorial: Challenging, multidimensional agriculture in cities. *International Journal of Agricultural Sustainability*, 8(1), 3-4. doi:10.3763/ijas.2009.c5008
- Udo, H. M. J., Aklilu, H. A., Phong, L. T., Bosma, R. H., Budisatria, I. G. S., Patil, B. R., . . . Bebe, B. O. (2011). Impact of intensification of different types of livestock production in smallholder crop-livestock systems. *Livestock Science*, 139(1-2), 22-29. doi: 10.1016/j.livsci.2011.03.020
- Mason, D., & Knowd, I. (2010). The emergence of urban agriculture: Sydney, Australia. *International Journal of Agricultural Sustainability*, 8(1), 62-71. doi:10.3763/ijas.2009.0474

van Leeuwen, E., Nijkamp, P., & de Noronha Vaz, T. (2010). The multifunctional use of urban greenspace. *International Journal of Agricultural Sustainability*, 8(1), 20-25. doi: 10.3763/ijas.2009.0466

Poulsen, M. N., McNab, P. R., Clayton, M. L., & Neff, R. A. (2015). A systematic review of urban agriculture and food security impacts in low-income countries. *Food Policy*, 55, 131-146. doi:10.1016/j.foodpol.2015.07.002

Huang, D., & Drescher, M. (2015). Urban crops and livestock: The experiences, challenges, and opportunities of planning for urban agriculture in two Canadian provinces. *Land Use Policy*, 43, 1-14. doi:10.1016/j.landusepol.2014.10.011

Department of Regional Development [DRD]. (2014). Metropolitan Perth LGA Boundaries. Retrieved from http://www.drd.wa.gov.au/Publications/Documents/Metropolitan_Perth_LGA_boundaries.pdf.

Australian Bureau of Statistics (2013a). 'Canning (C) (LGA), Region Data Summary'. Retrieved from http://stat.abs.gov.au/itt/r.jsp?RegionSummary®ion=51330&dataset=ABS_REGIONAL_LGA&geoconcept=REGION&maplayerid=LGA2013&measure=MEASURE&datasetASGS=ABS_REGIONAL_ASGS&datasetLGA=ABS_REGIONAL_LGA®ionLGA=REGION®ionASGS=REGION.

Australian Bureau of Statistics (2013b). 'Cockburn (C) (LGA), Region Data Summary'. Retrieved from http://stat.abs.gov.au/itt/r.jsp?RegionSummary®ion=51820&dataset=ABS_REGIONAL_LGA&geoconcept=REGION&maplayerid=LGA2013&measure=MEASURE&datasetASGS=ABS_REGIONAL_ASGS&datasetLGA=ABS_REGIONAL_LGA®ionLGA=REGION®ionASGS=REGION.

Australian Bureau of Statistics (2013c). 'Fremantle (C) (LGA), Region Data Summary'. Retrieved from http://stat.abs.gov.au/itt/r.jsp?RegionSummary®ion=53430&dataset=ABS_REGIONAL_LGA&geoconcept=REGION&maplayerid=LGA2013&measure=MEASURE&datasetASGS=ABS_REGIONAL_ASGS&datasetLGA=ABS_REGIONAL_LGA®ionLGA=REGION®ionASGS=REGION.

Australian Bureau of Statistics (2013d). 'Joondalup (C) (LGA), Region Data Summary'. Retrieved from http://stat.abs.gov.au/itt/r.jsp?RegionSummary®ion=54170&dataset=ABS_REGIONAL_LGA&geoconcept=REGION&maplayerid=LGA2013&measure=MEASURE&datasetASGS=ABS_REGIONAL_ASGS&datasetLGA=ABS_REGIONAL_LGA®ionLGA=REGION®ionASGS=REGION.

Australian Bureau of Statistics (2013e). 'Kwinana (C) (LGA), Region Data Summary'. Retrieved from http://stat.abs.gov.au/itt/r.jsp?RegionSummary®ion=54830&dataset=ABS_REGIONAL_LGA&geoconcept=REGION&maplayerid=LGA2013&measure=MEASURE&datasetASGS=ABS_REGIONAL_ASGS&datasetLGA=ABS_REGIONAL_LGA®ionLGA=REGION®ionASGS=REGION.

Australian Bureau of Statistics (2013f). 'Stirling (C) (LGA), Region Data Summary'. Retrieved from http://stat.abs.gov.au/itt/r.jsp?RegionSummary®ion=57910&dataset=ABS_REGIONAL_LGA&geoconcept=REGION&maplayerid=LGA2013&measure=MEASURE&datasetASGS=ABS_REGIONAL_ASGS&datasetLGA=ABS_REGIONAL_LGA®ionLGA=REGION®ionASGS=REGION.

Australian Bureau of Statistics (2013g). 'Victoria Park (T) (LGA), Region Data Summary'. Retrieved 2015-10-05, from http://stat.abs.gov.au/itt/r.jsp?RegionSummary®ion=58510&dataset=ABS_REGIONAL_LGA&geoconcept=REGION&maplayerid=LGA2013&measure=MEASURE&datasetASGS=ABS_REGIONAL_ASGS&datasetLGA=ABS_REGIONAL_LGA®ionLGA=REGION®ionASGS=REGION.

Australian Bureau of Statistics (2013h). 'Vincent (C) (LGA), Region Data Summary'. Retrieved from http://stat.abs.gov.au/itt/r.jsp?RegionSummary®ion=58570&dataset=ABS_REGIONAL_LGA&geoconcept=REGION&maplayerid=LGA2013&measure=MEASURE&datasetASGS=ABS_REGIONAL_ASGS&datasetLGA=ABS_REGIONAL_LGA®ionLGA=REGION®ionASGS=REGION.

Australian Bureau of Statistics (2013i). *Local Government Area, Indexes, SEIFA 2011*. data cube: Excel spreadsheet, cat. no. 2033.0.55.001. Retrieved from: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2033.0.55.0012011>.

The City of Canning Health Local-laws 1997, (1998).

City of Cockburn Health Amendment Local Law 2012, (2012).

The City of Fremantle Health Local Laws 1997, (1997).

City of Joondalup Animals Local Law 1999, (1999).

The Town of Victoria Park Health Local Law 2003, (2003).

The City of Vincent Health Local Law 2004, (2004).

Town of Kwinana Bee Keeping Local Law 2002, (2002).

Town of Kwinana Piggeries By-laws, (1983).

Town of Kwinana Health (Keeping of Horses and Equine Premises) Local Laws 1997, (1997).

Town of Kwinana By-Law No 29B Relating to the Keeping of Pigeons, (1996).

City of Stirling Health Local Law 2009, (2009).

City of Stirling Bee Keeping Local Law 2008, (2008).

City of Cockburn. (n.d.). *Planning Information Sheet: The Keeping of Horses & Other Animals in the Resource Zone*. Retrieved from http://www.cockburn.wa.gov.au/templates/template48/frame2.asp?url=/Council_Services/City_Development/Planning_Documents/1591-keeping_of_horses.pdf&EventID=1591&TemplateID=48.

City of Cockburn. (2002). *APD42: THE KEEPING OF HORSES AND OTHER ANIMALS IN THE RESOURCE ZONE*. Retrieved from http://www.cockburn.wa.gov.au/documents/councildoc/policies/policy_statements/planningdevelop_serv/apd42.pdf.

City of Cockburn. (2010). *Keeping Bees & Swarming Bees*. Retrieved from http://www.cockburn.wa.gov.au/documents/CouncilServices/Health/Keeping_of_Bees_2010.pdf.

City of Cockburn. (2015). *Guidelines for keeping poultry in a residential area*. Retrieved from http://www.cockburn.wa.gov.au/documents/CouncilServices/Health/poultry_residential_area.pdf.

City of Fremantle. (2015). Animals. Retrieved from <http://www.fremantle.wa.gov.au/residents/health-and-wellbeing/animals>.

City of Vincent. (2005). *Bee Keeping*. Retrieved from www.vincent.wa.gov.au/files/085f6b68-3927-4844-92c6-9ed300a6f0ef/Bees_Guide_2005_-_Done.pdf.

City of Vincent. (2011). *Guidelines for Keeping Poultry and Pigeons*. Retrieved from www.vincent.wa.gov.au/files/958add5f-9ce8-4c5d-a043-a42500b5466d/Poultry_Guideline.pdf.

City of Swan Health Local Law 2002, (2002).

City of Swan. (2015a, 2015-09-16). Am I allowed to keep a rooster? Retrieved on 2015-09-28, from http://www.swan.wa.gov.au/Residents/Animals/Poultry/Am_I_allowed_to_keep_a_rooster.

City of Swan. (2015b, 2015-02-17). Are there any regulations? Retrieved on 2015-09-28, from http://www.swan.wa.gov.au/Residents/Sustainable_Living/Be_Waste_Wise/Reduce_waste/Keeping_chickens/Are_there_any_regulations.

City of Swan. (2015c, 2015-04-13). Do I need a licence to keep poultry? Retrieved on 2015-09-28, from http://www.swan.wa.gov.au/Residents/Sustainable_Living/Be_Waste_Wise/Reduce_waste/Keeping_chickens/Do_I_need_a_licence_to_keep_poultry.

Local Government Act 1995, (1995).

Health Act 1911, (1911).

Animal Welfare Act 2002, (2002).