



Urban agriculture and related water supply: Explorations and discussion



Magnus Moglia*

CSIRO Land and Water, 37 Graham Road, Highett, VIC 3190, Australia

A B S T R A C T

Keywords:

Urban and peri-urban agriculture (UPA)
Urban water
Water recycling
Nutrient recycling

This article provides a review of the opportunities and challenges of urban agriculture. Secondly, it is explored whether it may be feasible for the urban water sector to facilitate greater uptake of urban agriculture and this is done by exploring a hypothetical case. Urban agriculture is an opportunity for many cities, with some cities sourcing more than half of the fresh produce from within the city boundaries. The literature describes numerous benefits of urban agriculture; some which are difficult to measure such as women's empowerment, increasing social cohesion, and others that can be more easily measured such as job creation, or reductions in greenhouse gas emissions. However, the potential for this depends on the local context, and local restrictions. It may be possible that the urban water sector can help facilitate greater uptake of urban agriculture in synergistic relationships. The case for this statement however hinges on a number of assumptions, and estimates that are laid out in this article. Further research is suggested to explore the validity of such assumptions and estimates in various contexts.

© 2014 Elsevier Ltd. All rights reserved.

Introduction

People in cities need food and especially in most modern cities this is primarily provided through a complex and increasingly global supply chain. Food comes from far away and nearby, connecting suppliers and customers across the globe. Local climate variability has been devastating in many locations in our history (Fagan, 2008) but throughout history urban agriculture has increased the resilience of cities to deal with such shocks (Barthel & Isendahl, 2013). Global supply chains have reduced the reliance on local food supplies which in turn has reduced the vulnerability to local climatic variability. Despite this, the Food and Agriculture Organisations of the United Nations note that approximately 12.5% of the world's population, or 868 million people at the time of the estimation, are under-nourished in terms of energy intake and approximately 2 billion people suffer from micro-nutrient deficiencies (FAO, 2013). Rural areas tend to have higher prevalence of malnutrition when compared to cities, but a proportion of urban populations are still under-nourished (FAO, 2013). The rate of malnutrition is zero or close to zero in some of the wealthiest nations like Australia or Sweden, but significantly higher in some of the poorer nations with the prevalence of stunting among children as a result of malnutrition nearly one in every three children in

Vietnam and nearly one in every two children in India (FAO, 2013). It is also expected, on the basis of population projections, that there is a need to raise food production by nearly 50% in the next 50 years to maintain the present per capita supply (Jury & Vaux, 2007). It is also worth noting that the population of cities represent more than half of the global demand for food (Lerner & Eakin, 2011).

Increased food production in cities has emerged as an important strategy for meeting the expected increase in the global demand for food and promotes food security (Barthel, Parker, & Ernstson, 2013; Orsini, Kahane, Nono-Womdim, & Gianquinto, 2013; Raftery & Miner, 2011). However, each city is unique, and the feasibility of urban and peri-urban agriculture (UPA) depends on a range of local factors. This paper provides a brief review of urban agriculture, and its drivers and barriers. Subsequently, the case for a synergistic relationship is explored between the urban water and UPA sectors.

Drivers of UPA

There are a range of reasons for why UPA is taken up in cities across the world. Choguill (1995) summarised three key drivers for uptake of urban agriculture in the world: ability, necessity and opportunity. There is often ability of urban dwellers to engage in agricultural practices because many new arrivals into cities are farmers. There is often the necessity amongst urban dwellers to engage in urban farming because economic opportunities in cities are sometimes scarce. In some cities there is also opportunity to engage in urban farming because of redundancy in planning leaves

* Tel.: +61 3 92526025.

E-mail address: magnus.moglia@csiro.au.

unused land available for agriculture. The reasons however vary, and some of these key drivers are described below.

Food shortage

We know that the world of today is highly complex and uncertain, and our reliance on global food supply chains create vulnerabilities. In response to experiences of food shortages, some cities have moved towards greater self-reliance in food, such as in the case of Lusaka, Zambia (Simatele, Binns, & Simatele, 2012), Havana, Cuba (Koont, 2008) and Freetown, Sierra Leone (Lynch, Maconachie, Binns, Tengbe, & Bangura, 2013). Simatele et al. (2012) report that in a situation with deteriorating national and local economies many urban communities in sub-Saharan Africa are resorting to UPA in order to reduce food insecurity and also to generate some income. In Havana, a city of approximately 2 million people, limitations on food imports and access to fossil fuels led to a transition towards UPA so that it now supplies 90% of the city's demand for fresh produce (Koont, 2008). In Lubumbashi in the Democratic Republic of Congo, the collapse of a local mining company created large-scale unemployment, and UPA was an important adaptation strategy for coping with urgent food shortages (Tambwe, Rudolph, & Greenstein, 2011). Islam and Siwar (2012) noted that in Malaysia, UPA has significant potential for providing food for poorer city dwellers.

Social factors

UPA has also been justified on the basis of what appears to be very human desires and social needs. McClintock (2010) provided a theoretical basis for why UPA delivers major social benefits, focussing on its ability to overcome what is referred to as the ecological, social and individual rifts. The ecological rift is the separation between city and country, and thus between humans and nature, creating a desire to “getting in touch with nature”. The social rift is the removal or displacement of people from rural lands, primarily on the basis of commodification of land and labour, creating the desire for jobs or subsistence activities in urban areas. The individual rift is the separation of large numbers of individuals from the food supply chain. By influencing social processes, UPA has a number of secondary impacts. Some reported benefits related to the transformative nature of the experience, and how engaging in UPA allows individuals to develop strong civic virtues (Levkoe, 2006). It has also been argued that UPA can support women's empowerment (Slater, 2001; Van Veenhuizen, 2011). May and Rogerson (1995) note the social benefits of UPA to poor households in South Africa. Others have focussed on the capacity of UPA for building community and increasing social cohesion (Larjosto & Raivio, 2012; Levkoe, 2006; Slater, 2001). An example of UPA that seems to relate to social factors as drivers exists in Canberra, Australia, where food producing community gardens has provided a range of social benefits to the local community (Turner, Henryks, & Pearson, 2011). In another case in Istanbul, Turkey, UPA has been implemented as part of a strategy for sustainable development, and contributed specifically to support marginalised groups such as urban poor women and migrants, as well as generating benefits in terms of urban landscape and environment (Akin, 2011).

Food awareness and nutrition

UPA is commonly seen as part of the movement of increased food awareness. For example, it has been found that a driver for UPA has been the desire of urban populations to control the ethical and “organic” quality of the food that they consume (Hara, Tsuchiya, Matsuda, Yamamoto, & Sampei, 2012; Shi, Cheng, Lei, Wen, & Merrifield, 2011; Turner et al., 2011). In Berlin, Germany,

Zubir, Razali, Norhisham, and Rahman (2011) noted the short supply of organic food producers, and can see the considerable potential for UPA to tap into this market. In China, a growing urban middle class have increased the demand for “green and sustainable food”, and therefore much of Chinese sustainable agriculture is located in urban and peri-urban areas (Shi et al., 2011). A similar trend is present in Japan, with the “local production for local consumption” movement (Hara et al., 2012). It has also been found that UPA is a strategy for addressing deficiencies in micro-nutrients amongst urban dwellers by increasing the access to fresh vegetables and fruits (Díaz, de las Cagigas, & Rodríguez, 2003).

Environmental factors

An environmental benefit of UPA relates to the reduced transport distance between supply and demand (Zhao, Liu, & Zhang, 2011; Zubir et al., 2011). In fact, based on this reduction in the need for transport, Cerón-Palma and colleagues have reported based on implementation of UPA and additional green spaces, of around 33% reduction in global warming potential for studied households in Merida, Mexico (Cerón-Palma et al., 2013). However, in a study in the U.K. it was found that land used on an urban fringe for food production could potentially reduce greenhouse gas emissions by up to 34 t CO₂-e ha⁻¹ a⁻¹ (Kulak, Graves, & Chatterton, 2013). It has also been argued that UPA can help with improving the condition of urban lands and reversing degradation of urban lands; including the opportunity for “brownfield rehabilitation” (Howorth, Convery, & O'Keefe, 2001; Miner & Raftery, 2012). Smit and Nasr (1992) also discussed the possibilities of UPA contributing to an appropriate way of planning cities urban environmental sustainability, emphasising the opportunities for recycling wastewater as well as solid organic waste. Another stated benefit, as argued by Nhapi (2004), is that recycling of nutrients such as Phosphorous and Nitrogen near the place of use, as is possible with UPA, makes recycling more commercially viable, and this presents opportunities for reduced Phosphorous depletion on a global basis. The full need and potential for Phosphorous and Nitrogen recovery however needs to be assessed in the local context.

Economic factors

Economic factors are not mentioned as frequently in the literature on UPA, but some argue for its potential to generate jobs (Dixon et al., 2007; McClintock, 2010; Van Veenhuizen, 2011), and for its potential to create subsistence opportunities (Islam & Siwar, 2012; Maxwell, Levin, & Csete, 1998). The importance of this factor for a given city will depend on the state of the labour market, and whether other jobs are available. It has also been argued that UPA provides opportunities for effective use of resources, such as utilising vacant land in “shrinking cities” (LaCroix, 2010). For these reasons, for example in Detroit, Michigan, there are large-scale plans for UPA that capitalises on vacant lots across the city (Millington, 2013).

Constraints on UPA

Food producers face practical challenges relating to ensuring land, nutrients and water (Hubbard & Onumah, 2001). UPA activities also need to be commercially viable, unless purely for private purposes and they need to be carried out in a way that considers disturbance to neighbours (Pearson, Pearson, & Pearson, 2010).

Access to land

In the context of Australia, Pearson et al. (2010) argue that the primary challenge in terms of supporting UPA is to protect and

Download English Version:

<https://daneshyari.com/en/article/1047982>

Download Persian Version:

<https://daneshyari.com/article/1047982>

[Daneshyari.com](https://daneshyari.com)