

Urban Agriculture in China and Norway

Astri Eiterstraum
Department of Design
Norwegian University of Science and Technology

ABSTRACT

In the future, there will be a growing demand for sustainable and safe food to feed the increasing urban population. This article reviews how urban agriculture approaches can improve food security and create a better quality of life for people in cities, looking at Norway and China specifically. It uses the literature review as a method to give an overview of issues and benefits of urban agriculture initiatives, and mentions a few considerations and opportunity areas for designers and others interested in designing with and for urban farming. The article could be particularly interesting for those working with initiatives where individual food security is not the main driver for personal food growth.

KEYWORDS: Urban Agriculture, Design opportunities, China, Norway, TPD4505

1. INTRODUCTION

Most modern cities today consume resources far beyond their city borders. Food is transported from all over the world to feed the growing urban population. This is putting a massive stain on the environment in terms of land use for industrialized farms, carbon emissions from transportation, and production of packaging in order to keep produce fresh for the consumer (Deelstra and Girardet 2000, Chen 2012). The industrialization of farming has helped produce enough food for our increasing global population, but it has also made a majority of urban citizens lose touch with food production (Dixon, Donati et al. 2009). It is easy to discharge the environmental impact of agriculture when the relation to food is limited to pre-made meals and packaged goods in the supermarket. And with more people growing up in cities, the traditions and common knowledge related to farming might be available to only a selected few.

However, cities have great potential for growing produce. During the 2nd world war, food rations were restricted, and families in affected cities would use their available space

for livestock and food growth in order to maintain personal food security (Forsberg and Tollefsen 2014). In the United States, the government launched the Victory Gardens program, where an estimated 20 million civic gardens would support an increased food production to supply the troops (Hynes 1996). In poorer regions particularly, urban agriculture has a strong tradition as a strategy for survival, and you can still find people growing their own food due to concerns over poverty and food safety (Deelstra and Girardet 2000, Yi-Zhang and Zhan 2000, Dixon, Donati et al. 2009, Taylor and Lovell 2014). It can also act as a tool for empowerment and community building to reverse degradation of urban communities. In more affluent countries, you can find agriculture in forms of e.g. farmer's markets, food co-operatives and community gardens. These initiatives encourage consumers to be more connected to their food, and can entail positive social effects for both individuals and communities alike (Dixon, Donati et al. 2009).

How people organize around urban farming depends on culture and context. A rooftop farm in Shanghai will necessary not be the

same as a leisurely garden project found in Oslo. As urban farming can act as a social platform for communities, it has the potential of being a place where people connect to their cultural heritage. This could be through growing culturally appropriate crops, or as an important arena for feasts and celebrations (Dixon, Donati et al. 2009, Taylor and Lovell 2014). It can even be a platform for meeting new people with different backgrounds to exchange ideas and cultural practices.

2. METHOD

This article uses the literature review (Marrelli 2005) as a method to build an understanding of urban farming opportunities, challenges and benefits. It relates to an ongoing design project that aims to encourage urban farming in affluent cities. As a consequence, literature has been selected to first give a general overview of urban farming and then secondly how it relates to Norway and China specifically. Articles were collected from the online university libraries of NTNU and AHO, and all of them have been published in year 2000 or later. Although the concept of urban farming is far from new, the mix of genres selected gave a useful overview of both the historic roots and its implications today. Academic articles have been supplemented with more recent newspaper journals and ongoing development projects to relate to the project more specifically.

Similarly, project research illustrates or supports the literature where relevant. The research included interviews and participation in a seed exchange network conference in Norway, a trip to a student garden and a month long study trip to Hunan province in China. Additionally, there have been countless informal discussions and chats with friends, family and acquaintances about urban farming during this semester long project. Although irrelevant in an academic context, it has given interesting insight on the views on farming today.

3. DEFINITIONS OF URBAN FARMING

Urban farming can be defined as all farming activities done in close proximity to a city center. It can be in the form of industrialized vertical farms, local and small-scale growing systems in restaurants, community plots, rooftop gardens, and so on. In the future, a combination of these different urban farming approaches might be our best solution to ensure food security for the growing urban population.

While technical achievements can help us produce more of the food that we are already consuming, it has been criticized of having exclusionary effects and alienate people from traditional material and cultivation techniques (Specht, Siebert et al. 2014). Civic agriculture approaches, and especially those encouraging consumers to grow their own food, is said to be more inclusive, and it can even contribute to more environmentally sustainable eating habits. Studies have shown that community garden participants generally consume more servings of fresh fruits and vegetables, than their non-gardening counterparts (Alaimo, Packnett et al. 2008). These diets are often healthier, and can be a way to improve the general well-being of people involved in gardening (Dixon, Donati et al. 2009). Gardening can also act as an enabler for social interaction, thus preventing isolation and loneliness among urban citizens.

This article will look at the benefits, challenges, and opportunities for urban household gardeners producing edible plants. It specifically uses Norway and China as references. This refers to individual households growing food in a rented, shared or owned property, either indoors or in an outdoor plot. It can be as a way to secure self-sufficiency, as a leisure activity, or as part of a community effort.

4. GENERAL BENEFITS

Urban Farming is can be a strategy to create more environmentally, economically and

socially sustainable city ecosystems (Deelstra and Girardet 2000). It can be supported by government policies, and involves the collective efforts from individual households, community groups and corporations.

3.1 Environmental benefits

The environmental benefits of urban farming include reduced carbon emissions, city resilience and an improved urban microclimate. Growing food next to where it is consumed can drastically impact the transportation and handling phase of its total lifecycle. Not only would it reduce or eliminate emissions caused by transportation, it could also reduce unnecessary waste generated from harvest to consumption (Heather 2012). Increased awareness about farming processes amongst the general public can also impact the amount of food waste from consumers.

Utilizing rooftops and other vacant lots is beneficial to city microclimate and resilience against climate change related threats (Deelstra and Girardet 2000). A study from Philadelphia, USA (Heather 2012) argues that community- and rooftop gardens improves soil and air quality, reduce storm water runoff, and alleviates the urban heat effect. Outdoor growing also contributes to the overall biodiversity in the city. In some developed countries, you can even find cities that are richer in flora and fauna than their rural farmlands. For example, it is found that beehives in some cities produce more honey than those in the countryside (Deelstra and Girardet 2000, Forsberg and Tollefsen 2014).

3.2 Economic benefits

For lower-income families, urban gardening can positively contribute to the household economy by providing access to healthy food from their own gardens instead of buying it in a supermarket. It can even be an opportunity to sell some of their produce to others through formal or informal channels. In the past, these activities have mainly been done as a means of alleviating poverty, but in the future it might even appeal to higher-income user group if it is attractive enough. And with services like

Airbnb and Uber, selling self-produced food might be yet another integral part of the sharing economy, thus encouraging even more people to grow edible plants in their homes.

3.3 Social benefits

Several studies and reviews on urban agriculture have reported an improved quality of life for those involved in urban agriculture (Deelstra and Girardet 2000, Yi-Zhang and Zhangen 2000, Dixon, Donati et al. 2009, Cameron, Blanuša et al. 2012, Chen 2012, Taylor and Lovell 2014). Increased feeling of community togetherness is a strong factor for well-being amongst gardeners. Other contributing benefits are self-ownership and the therapeutic effect of working with plants (Pudup 2008).

A paper reviewing the effects of volunteering in a school kitchen garden program, for example, reported an increased feeling of belonging, self-worth and enjoyment amongst participants. It also saw a link to learning opportunities, as the volunteers gained confidence, capabilities and connections during the program (Townsend, Gibbs et al. 2014).

5. GENERAL CHALLENGES

Depending on the urban planning policies of a city, starting up your own gardening project can be challenging. With more people growing up in cities, knowledge about farming is no longer a given. Even for those with the know-how of farming, climate change and risk of contamination can pose serious threats for potential urban farmers (Deelstra and Girardet 2000, Dixon, Donati et al. 2009). Research run on household gardens in low-income families in Chicago shows that many gardeners are unaware of the risk that soil contamination can pose to themselves and the food they produce (Taylor and Lovell 2014). As excessive application of fertilizers and compost can pollute urban storm water runoff and groundwater (Witzling, Wander et al. 2011, Dewaelheyns, Elsen et al. 2013), it is particularly important that urban farmers have

access to knowledge about safe and sustainable farming practice.

Lack of space is another issue that needs to be dealt with, especially for those wanting to produce larger quantity of food. In Chinese cities particularly, space is scarce. One suggestion is to introduce technology that allows us to grow more effectively in smaller areas (Yi-Zhang and Zhanen 2000). This could be through vertical farming, where methods of hydroponics and controlled LED-lights are utilized to grow vegetables, herbs and micronutrients in large shelf-like-systems. Another approach is to combine civic space with productive land (Chen 2012). Shanghai is currently planning to build a whole neighborhood where urban living and farming practices is integrated with each other (Walsh 2017). As green spaces are connected with well-being and better air quality, using public areas for farming would benefit both farming and non-farming citizens, given that waste management and pollution issues are properly dealt with.

Another challenge is that of motivation. Waste management, maintenance and organization takes time and effort. Furthermore, urban farming might involve the management of smaller or larger groups of people. It is therefore crucial to spark the interest to initiate, and to keep the motivation over time. While maintaining food security is a common goal for those growing food in the global South, families and individuals in the North is generally more motivated by the health, social or political aspects of urban gardening (Veen, Derkzen et al. 2014).

6. CHINESE AND NORWEGIAN CONTEXT

Agriculture has strong roots in both China and Norway. And in both countries, the sector is undergoing rapid transformations. More people are moving into cities, and agriculture is becoming increasingly industrial to keep up with food demands. With this, urban farming initiatives are supported by both governments as means of providing food in an alternative, more sustainable way (Yi-Zhang and Zhanen 2000, Forsberg and Tollefsen 2014).

In the next sessions, some concrete differences will be reviewed.

5.1 China

Poverty and food safety is common catalyzers for urban farming initiatives in the global South (Deelstra and Girardet 2000, Yi-Zhang and Zhanen 2000). The latter is particularly relevant for China, where pollution and factory contamination is a serious threat to the country's food security (Yi-Zhang and Zhanen 2000). As more people move to larger cities, urban farming can be a way to ensure safe food in a time where major food scandals are putting people's health at risk (Foster 2011).

But it is not only contamination that can be damaging to public health. Obesity amongst children is another big issue in China, and in 2030 one in four children is expected to be obese (Connor 2017). Involving more people in growing their own vegetables can have a positive impact on diets by advocating healthier food options, and by making fresh produce easily available, thus avoiding obesity related health issues in the future (Dixon, Donati et al. 2009, Veen, Derkzen et al. 2014)

Urban farming can also strengthen social bonds amongst families and neighboring communities. Group mentality and social activities had long been important in China, with rural farmers traditionally living in small villages with close relation to their neighbors (own observation, China 2017). With more people moving into larger cities, social structures are bound to change, as people move from a rural to an urban context.

And with the government's plan to relocate 250 million people from farmlands to the cities (Johnson 2013), loneliness and isolation might turn into a serious problem if not taken seriously (Lemos 2012). In this context, urban farming can be a positive measure as an integration tool benefiting both relocated and existing residents. Rural residents can bring in valuable knowledge on traditional farming that benefit existing projects, and with that give a sense of meaning for those that have been

relocated to the city. More farmers in the city might also mean a higher likelihood for new urban farming initiatives, contributing to a more sustainable city. It can also create spaces where people meet and share rural traditions and knowledge through rituals and events, and possibly advocate a healthier and more sustainable diet for all citizens.

Food culture has always been important in China, but internet and take-away companies are making food consumption increasingly convenient, dramatically changing the social aspect of eating together. One Chinese student told (China 2017, female, 21) about family dinners where each family member spent the time with their mobile phones instead of talking, because it was easier to relax when they did not have to relate so much to each other. Getting take-away also means no time spent on cooking together as a family, and it also increases the distance to where food comes from. Chinese children can now learn about food growth in tourist farms outside the big cities, but if it is not integrated into daily life, food production might still remain distant.

5.2 Norway

In the Norwegian agricultural sector, smaller farming units are being replaced with larger ones. And with changing socioeconomic and political processes, the sector is becoming more vulnerable to climate change as it undermines climate adaptive capacity in the rural areas (Jørgensrud 2014).

However, in the cities there is a growing interest for learning about where the food comes from, and an increasing number of people are interested in producing food themselves (Forsberg and Tollefsen 2014). With urban agriculture being acknowledged as an important strategy for more sustainable cities, municipalities are keen on encouraging its citizens to initiate urban agriculture projects around the city, both for producing more locally and to advocate sustainable agriculture in general. In 2017, Oslo municipality (2017) handed out 2 million NOK to support initiatives for urban farming, including allotment gardens, beehives, and community farming projects.

Oslo has great potential for farming, with fertile land and strong agricultural roots. Today there are a few farms producing food, and some that are run as visitor farms for children. Citizens that want to grow their own food can do so in their own gardens, or sign up for an allotment in a community garden (Forsberg and Tollefsen 2014). There are a few organizations hosting seminars on how to grow your own food, and there is even a small, informal seed exchange network where people can share and receive plant seeds for free.

However, although urban farming has become more popular over the years, it is far from mainstream. Growing your own food takes time and dedication, and with relatively low food prices, it is easy to find cheap vegetables in the store instead of growing it at home. Civic agriculture initiatives like farmers markets and community supported agriculture can connect producer and consumer to some degree, but research shows that people that are actively engaged in growing the food themselves are more likely to maintain a sustainable diet over time (Veen, Derkzen et al. 2014). For families, this means that it has to be prioritized in an otherwise busy lifestyle.

The loss of common knowledge on farming might be another challenge to overcome. In the 19th century, household gardens were a sign of status in Norway, but with the 20th century industrialization, connections to food steadily declined (Forsberg and Tollefsen 2014). What plants to grow, when to grow it, and how to grow it is no longer common knowledge, and the learning barriers might be a threshold for beginners.

The social network for exchanging knowledge has also changed. While growing plants used to be something “everyone” knew how to do, knowledge today is more scattered. However, internet can be a source for finding necessary information, and to connect with other people interested in urban farming. School kitchen gardening programs are another opportunity to learn basic skills, and can be a great way to lower the threshold for growing food at home, and increase awareness about food (Forsberg

and Tollefsen 2014, Haglund 2014, Townsend, Gibbs et al. 2014).

7. DESIGN OPPORTUNITIES

Designers possess an array of tools and methods for understanding and involving users and stakeholders in creating products and services within a specific topic.

For urban agriculture, these products and services could communicate information about urban farming in an engaging way, or it could make it easier to learn how to grow for the first time. Designers could also make systems and products to be used in planning and maintaining a garden, from seasonal planting calendars to high-tech equipment to monitor and help growing plants in challenging climate conditions and limited space. Designers could even be part in planning processes as mediators between users and city planners.

Below are a few considerations and opportunities for designers and others interested in encouraging more farming initiatives in cities.

7.1 Mainstream interest

Many urban farming projects are located in hidden spaces, often as a result from marginalization processes by the government. (Galt, Gray et al. 2014). With city planners seeing the potential of urban agriculture, these projects might be allowed more public space in the future, like the Sunqiao project currently being constructed in Shanghai (Walsh 2017).

Lowering the knowledge barriers could also help urban farming move from niche to mainstream. This could be through educational programs in schools and kindergartens, or by working with existing urban farming networks and city planners on potential service offerings.

7.2 Food variety

With grocery stores providing an extremely convenient alternative to growing our own food, urban farming needs to add extra value

for those affluent enough to buy all of their food in supermarkets and restaurants. For foodies and people interested in the historical and cultural aspects of farming, seed variety might be key. Depending on climate and physical materials and tools, urban farmers have the potential to grow a large variety of food that cannot be found in the grocery store.

A variety of fresh and healthy vegetables might also be attractive as staying healthy and eating well is increasingly important in both Norway and China.

7.3 Designing for community

Most studies on urban agriculture has reported on the benefits of social belonging within the community. With big cities increasing the risk of isolation and loneliness, these communities could increase the quality of life for those with a limited social network.

Communities could also be a great place to learn and to be inspired by others. Oslo has several groups arranging courses and meetups within the urban and semi-urban farming community. The internet also contains a vast amount of DIY guides with people posting their experience, achievements, and concrete instructions on YouTube and in social media channels. There are even apps and websites dedicated to helping people start their own garden project.

8. CONCLUSION

Urban community- and household gardens today are places where food can be grown to secure self-sufficiency, as a leisure activity, or as a social arena where people work together towards a common goal.

They contribute to cities by improving microclimate and reducing food waste and transportation. It also has a positive effect on general wellbeing as a promotor of healthy eating habits, and a place for people to socialize. Given the benefits of urban farming, cities would benefit from more urban farming initiatives in its public and private spaces.

Future efforts should be directed towards making it attractive for a greater variety of people, mediating knowledge about farming and its benefits, and combining it with other activities such as cooking to facilitate common leisure time for families and smaller communities.

Designers could contribute to this by suggesting context-specific services in collaboration with the public sector or other collaborators, and/or by creating tools and products to inspire and facilitate food growth. An example would be a guide to help people get started, or a campaign implemented in elementary schools to get children more acquainted with the skills and knowledge needed to grow food at home. It could also be something to help beginners connect more easily with skilled people, building on the foundations of the existing DIY community.

Regardless of design direction, encouraging people to grow their own food is challenging. Urban farming networks will generally have established a set of existing practices and norms within the community, and people might value different aspects of farming. Designers and others wishing to design for urban farming therefore needs to understand the context and values of the people they are designing for. As urban citizens are becoming increasingly distant to traditional farming practices, there is a need to make it both visible in the public space, and to relate it directly to the existing everyday life of people.

9. REFERENCES

- (2017). "Tilskudd til urbant landbruk." from <https://www.oslo.kommune.no/politikk-og-administrasjon/tilskudd-legater-og-stipend/tilskudd-til-urbant-landbruk/> - [gref](#).
- Alaimo, K., et al. (2008). "Fruit and vegetable intake among urban community gardeners." Journal of nutrition education and behavior **40**(2): 94-101.
- Cameron, R. W., et al. (2012). "The domestic garden—its contribution to urban green infrastructure." Urban Forestry & Urban Greening **11**(2): 129-137.
- Chen, S. (2012). "Civic agriculture: towards a local food web for sustainable urban development." APCBEE Procedia **1**: 169-176.
- Connor, N. (2017). One in four Chinese children expected to be overweight by 2030 amid obesity epidemic. The Telegraph.
- Deelstra, T. and H. Girardet (2000). "Urban agriculture and sustainable cities." Bakker N., Dubbeling M., Gündel S., Sabel-Koshella U., de Zeeuw H. Growing cities, growing food. Urban agriculture on the policy agenda. Feldafing, Germany: Zentralstelle für Ernährung und Landwirtschaft (ZEL): 43-66.
- Dewaelheyns, V., et al. (2013). "Garden management and soil fertility in Flemish domestic gardens." Landscape and urban planning **116**: 25-35.
- Dixon, J. M., et al. (2009). "Functional foods and urban agriculture: two responses to climate change-related food insecurity." New South Wales Public Health Bulletin **20**(2): 14-18.
- Forsberg, E. and K. Tollefsen (2014). Urbant landbruk—bærekraftig, synlig og verdsatt, Fyl.
- Foster, P. (2011). Top 10 Chinese Food Scandals. The Telegraph.
- Galt, R. E., et al. (2014). Subversive and interstitial food spaces: transforming selves, societies, and society—environment relations through urban agriculture and foraging, Taylor & Francis.
- Haglund, A. (2014). Skolehagen som en arena for å lære om mat, kosthold, og bærekraftighet? Institutt for helse, ernæring og ledelse, HiOA.
- Heather, K. L. (2012). "The environmental benefits of urban agriculture on unused, impermeable and semi-permeable spaces in major cities with a focus on Philadelphia, PA."
- Hynes, H. P. (1996). A patch of Eden: America's inner city gardeners, Chelsea Green Pub.
- Johnson, I. (2013). China's Great Uprooting: Moving 250 Million Into Cities. The New York Times.
- Jørgensrud, Å. S. (2014). Farm household vulnerability and adaptive capacity to the double exposure of climate change and structural change: A case study of a farming community in Western Norway, Norwegian University of Life Sciences, Ås.
- Lemos, G. (2012). Viewpoint: Fear and loneliness in China. BBC.
- Marrelli, A. F. (2005). "The performance technologist's toolbox: Literature reviews." Performance Improvement **44**(7): 40-44.
- Pudup, M. B. (2008). "It takes a garden: Cultivating citizen-subjects in organized garden projects." Geoforum **39**(3): 1228-1240.
- Specht, K., et al. (2014). "Urban agriculture of the future: an overview of sustainability aspects of food production in and on buildings." Agriculture and Human Values **31**(1): 33-51.
- Taylor, J. R. and S. T. Lovell (2014). "Urban home food gardens in the Global North: research traditions and future directions." Agriculture and Human Values **31**(2): 285-305.
- Townsend, M., et al. (2014). "Volunteering in a School Kitchen Garden Program: Cooking Up Confidence, Capabilities, and Connections!" VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations **25**(1): 225-247.
- Veen, E. J., et al. (2014). "Shopping Versus Growing: Food Acquisition Habits of Dutch Urban Gardeners." Food and Foodways **22**(4): 268-299.
- Walsh, N. P. (2017). Sasaki Unveils Design for Sunqiao, a 100-Hectare Urban Farming District in Shanghai. Archdaily.

Witzling, L., et al. (2011). "Testing and educating on urban soil lead: A case of Chicago community gardens." Journal of Agriculture, Food Systems, and Community Development **1**(2): 167-185.

Yi-Zhang, C. and Z. Zhan (2000). "Shanghai: trends towards specialised and capital-intensive urban agriculture." Growing cities, growing food, urban agriculture on the policy agenda: 467-476.