

Planning food waste

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Abstract: Urban food strategies aim to connect the various food related public domains within a city region, such as spatial planning, environment and public health. Food strategies are slowly becoming part of the work of spatial planners and food system planning a legitimate field of planning research. However, the emphasis in planning research has been mainly on the production, processing and retail parts of the food chain, while research on both consumption of food and waste treatment is lacking. This research aims to identify how food waste is being addressed in urban food strategies and in what ways spatial planning can facilitate the handling of household food waste in city regions. The research involved two case studies in London (UK) and Toronto (Canada). From the research can be concluded that urban food strategies appear not have much influence on food waste management yet. However, facilitating urban agriculture showed to be an important part of both urban food strategies and this may indirectly facilitate composting and re-use of compost in urban agriculture. The possibilities for spatial planners to facilitate waste management in urban areas are limited, although some options were identified. These also require awareness raising, since not all planners at the local level are aware of the existence of a food strategy.

Key words: organic waste, food strategy, waste recycling, spatial planning, waste management

1. INTRODUCTION

Globally about one third of all the food produced for human consumption ends up as waste (1.3 billion tonnes). Food is wasted both in developing and developed countries, but the per-capita amounts of food waste are much higher in the developed world (Gustavsson et al. 2011). In the EU for example, it is estimated that each year approximately 90 million tonnes of food waste is generated. Most food waste is generated by households, who throw away 25% of the food they purchase by weight (European Commission 2010). Producing food contributes to the eutrophication of water bodies and depletion of soils (WRAP 2009). Food waste directed to landfills requires additional space and produces methane emissions contributing to climate change. The EU attempts to significantly decrease the amount of food waste going to landfills by policies such as the Landfill Directive 1999/31/EC. On both global (Gustavsson et al. 2011) and EU-level (European Commission 2010) the current knowledge on the food waste issue is insufficient and research is needed urgently.

Food waste indirectly increases the depletion of resources, such as water, fertilizers, pesticides, land, labour, fuel and energy (Lundqvist et al. 2008, WRAP 2009, UNEP 2011). Food waste also poses ethical problems and represents wasted capital. Therefore urgent measures regarding food waste should be of interest for society on global, regional and local scales. Many aforementioned aspects of the food waste problem can be ameliorated through the prevention of food waste. However, since food waste is such a significant problem it is also important to consider other measures. For example, resource depletion could be partly offset by recycling.

In response to these concerns, local level policies and projects in urban regions around the world have been initiated, including the development of so-called food strategies (Stierand 2012). These strategies aim to connect the various food related public domains within a city region, such as spatial planning, environment and public health (Sonnino 2009, Wiskerke 2009). Urban food strategies have been created, for example, in Toronto, New York, Seattle, London and Amsterdam (Morgan and Sonnino 2010). Food strategies are slowly becoming part of the work of spatial planners and food system planning a legitimate field of planning research. However, the emphasis in planning research has been mainly on the production,

processing and retail parts of the food chain, while research on both consumption of food and waste treatment is lacking (Broekhof and Van der Valk 2012).

This paper describes the results of a research that addresses the knowledge gap between spatial planning and recycling of food waste. The aim was to identify how food waste is being addressed in urban food strategies and in what ways spatial planning can facilitate the handling of household food waste in city regions. The research included two case studies, in the city regions of London (UK) and Toronto (Canada). A review of relevant scientific literature will be given in Chapter 2, which results in the analytical framework. Chapter 3 describes the methodology used to gather empirical data. Chapter 4 presents the results of the case studies, which are discussed in Chapter 5.

2. FOOD WASTE MANAGEMENT AND PLANNING

This chapter presents a review of scientific literature on concepts on food waste and food waste management (2.1), and the relationship between food waste and spatial planning, especially with urban food strategies and food systems planning (2.2). Based on this review, in section 2.3 the analytical framework will be derived.

2.1 Food waste and food waste management

The term 'food waste' is used to describe consumer behaviour-related wastage at the end of the food supply chain (Parfitt et al. 2010). Most of the food waste generated by households is disposed of via municipal waste collection. The rest is being thrown into the sewer, composted at home or fed to animals (WRAP 2009). Even if food waste is fed to animals, composted or used in biofuel production, it can still be considered waste, because it is not used for its original purpose, human consumption (Gustavsson et al. 2011). Much of the edible food ends up in the garbage bin because of inefficient consumer behaviour, although some food waste can be considered unavoidable, e.g. bones, tea bags or egg shells (WRAP 2009). By composting important nutrients can be recovered and re-used in food production (Kibblewhite 2007). Mature compost can be used in professional agriculture and horticulture, at home gardens or for land restoration and soft landscaping (DEFRA 2007). Composting can be organized centrally or done at home (European Commission 2011). Composting systems can be fully or partially open to air or completely enclosed (Gajalakshmi and Abbasi 2008). Depending on the type of facility, they can be located in business or industrial urban areas, rural or suburban contexts and fitted to different scales (ODPM 2004). Possible nuisance resulting from composting, such as odours, can be overcome with proper management and design of facilities (European Commission 2011). Currently, composting of food waste is not used to its full potential (Gajalakshmi and Abbasi 2008). Besides composting, food waste can also be treated with anaerobic digestion, where the organic matter is decomposed in a controlled environment without the presence of oxygen, producing e.g. biogas. Food waste can also be incinerated for direct energy recovery.

Food waste treatment can be classified in different ways. The waste management hierarchy (Fig. 1) is a concept that sets waste treatment and disposal methods in a hierarchical order of preference considering the environmental impacts (Environmental Assessment Institute 2005). In the European Union this hierarchy is legally binding (Council Directive 2008/98/EC). In the hierarchy, prevention is the first preferred option, followed by recycling and energy recovery. Disposal is the least preferred option (European Commission 2011).

Food waste management can be analysed from the concept of closing cycles. By realising a cyclical system, environmental impacts due to waste disposal and resource extraction can be diminished (Lloyd 2007). For example, food waste can be a useful resource for phosphorus. Together with water and energy, nutrients could become a core concept in sustainability (Lloyd 2007). The EU Landfill Directive 1999/31/EC strongly supported the re-use of food waste, reducing the disposal into landfills (Lillywhite 2007).

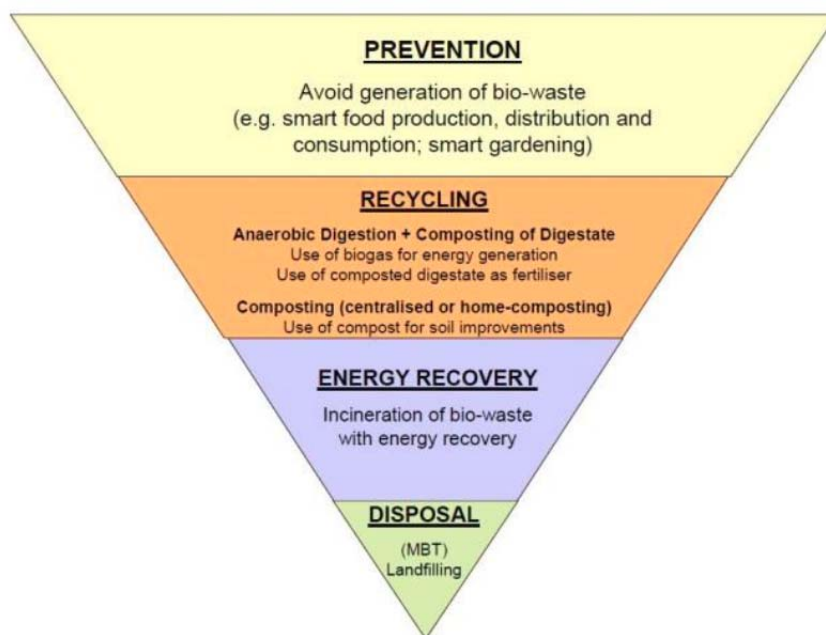


Fig. 1. Waste management hierarchy (European Commission 2011)

The concept of integrated sustainable waste management provides a more holistic concept of looking at food waste management. This concept addresses the integration of the waste management system with other systems, such as agriculture. This more integrated approach provides a better means to close the nutrient cycle, for example by including the environmental costs associated with manufacturing and transport of nutrients from elsewhere (Anschütz and Van de Klundert 2001).

Industrial ecology is another approach which encourages the use of waste as a resource, promoting the re-use of waste in industries. Industrial ecology involves concepts such as industrial symbiosis and eco-industrial parks that focus at the effective exchange of waste among industries (den Hond 2000).

2.2 Food waste and spatial planning

In 2000 Pothukuchi and Kaufman argued that the food system was poorly addressed in planning research. Food was largely ignored over issues such as housing, pollution, health or crime in the public agenda of the 20th Century. One of the reasons for this lack of interest in food systems is that planning problems are often divided into either urban or rural problems. Food is usually considered to be a solely rural issue. In other words, planners tend to see food in terms of production only, while forgetting the other parts of the food chain such as processing, retailing and consumption. Another reason is that the industrialisation of food production has increased the physical distance between producers and consumers, which has ensured the flow of food into the cities despite the clearing of farmland due to urban development (Pothukuchi and Kaufman 2000). Recent years show an emergence of new research and education in food systems planning (Hammer 2004, Sonnino 2009, Viljoen and Wiskerke 2012). Morgan (2009, p. 343) states that “food planning in its broadest sense is arguably one of the most important social movements of the early twenty-first century in the global north”. However, several parts of the food chain, such as food waste, have not been addressed in planning literature yet (Broekhof and Van der Valk 2012).

Recent years also show increasing concerns about food in society. Food prices and food insecurity are increasing, effects of climate change create uncertainty and an increasing amount of people need to be fed in the future. Confidence and fairness in the food chain have become issues of concern for some consumers, while constant supply of food is not the only requirement any longer. In response to these concerns, local food system policies and projects have emerged all over the world, especially in North America and the UK (Stierand 2012). Their goal is to connect the various food related public domains within the city, such as spatial planning, environment and public health (Sonnino 2009). Stierand (2012) distinguishes two concepts: food strategies and food policy councils. Food strategies set goals and

guidelines regarding the future development of the urban food system. Urban food strategies address different kinds of opportunities and problems, such as health issues and retail development, depending on context dependent characteristics. Projects related to urban food strategies vary in scale level, ranging from city-wide to neighbourhood level (Stierand 2012). Food policy councils act as counsellors on food issues for political and administrative bodies. During the last ten years more than 35 food policy councils were established in North-America. Food policy councils can be found in local, regional and national governments (Roberts 2010). Food policy councils can have four functions: discussion forums for food issues, developing coordination between the sectors of the food system, evaluating and influencing policy and launching support programs and services aimed at local needs. An ideal food policy council consists of participants from all parts of the food system: production, consumption, processing, distribution and waste recycling. In reality though, waste management representatives are often non-present (Harper et al. 2009).

2.3 Analytical framework

The literature review on waste management concepts provided a list of aspects to be analysed in the case studies. These aspects were structured using a so called layered perspective. See Fig. 2. Three different scale levels for analysis were distinguished: meso, macro and micro. Changes in the macro and meso scales will have spatial consequences on the micro scale, but changes can also start at the micro scale and influence higher scale levels if local innovations in different places link up with each other (Hartman et al 2011). Urban food strategies are initiated at the city level, but individual projects can focus on smaller scale levels. Therefore, in this study the macro scale is considered to be the city level, meso scale the district level and micro scale the neighbourhood or household level. Each scale level is further analysed using three different angles: material, organizational and institutional. Material aspects in this case are the physical elements of waste management (e.g. infrastructure). Organisational aspects are the actors and their organisations: planners, food policy councils, waste managers and people involved in bottom-up initiatives. Institutional aspects are the values, norms, customs and rules surrounding waste: waste policies and food waste management goals. Emphasis in this study is put on the formal rules, because researching values and attitudes could be a comprehensive study in itself.

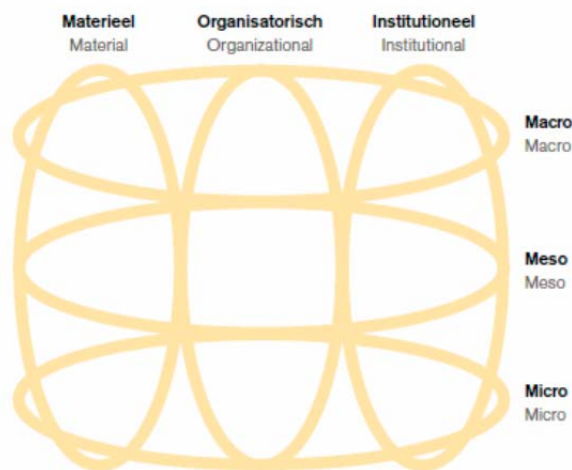


Fig. 2. A layered perspective (Hartman et al. 2011, p. 39)

3. METHODOLOGY

Two case study areas were chosen to assess how food waste is being addressed in urban food strategies: Toronto, Canada and London, UK. These cities were selected because both have an urban food strategy and food waste is recycled at least to some extent through composting and anaerobic digestion. The research design involved a combination of document study and semi-structured interviews using Skype

and email. The document study included a review of legislation and policies, waste management related websites, and other available documents on food strategies and food waste management. The interviews were held with selected experts and representatives from the field of spatial planning and waste management or involved in the local food policy council. See Table 1. The interviews were executed between April and June 2013. The interviews were recorded and transcribed.

Table 1. *Interviewees in London and Toronto.*

Interviewee	Area	Position	Technique
1	Toronto	Toronto Solid Waste Management Division	Email
2	Toronto	Toronto City Planning Division, Subdivision Environmental Planning	Skype
3	Toronto	Toronto Food Policy Council	Skype
4	London	London Waste and Recycling Board	Skype
5	London	Redbridge Borough planning	Email
6	London	Barking and Dagenham Borough planning	Email

4. RESULTS

The results of the case studies are presented in the following paragraphs. The material, organisational and institutional aspects are described for each scale level, starting from the highest macro level (the city) down to the micro-level (neighbourhood/household).

4.1 Toronto

At the macro and meso-level, Toronto has had a Green Bin program since 2002. It is a separate collection of food waste covering 510.000 single-family households and 1.005 apartment buildings (Sferrazza 2013). Almost half of the population live in multi-residential dwellings and only a small proportion of them are source-separating their food waste (Interviewee 3). Some of the food waste is being processed in an anaerobic digestion facility within the city, which is currently being expanded, while the rest travels outside the city. See also Fig. 3. The Green Bin program is currently being expanded too, to cover more multi-residential buildings (Interviewee 3). Mature compost from the city's food waste is mostly sold to horticultural markets (Interviewee 1).

The Ontario provincial policy statement of 2005 states that present and future requirements need to be taken into account for providing waste management systems, which should facilitate and encourage the 3R's: reduce, reuse and recycle. Major facilities, such as waste management systems should be designed in a way that nuisances are avoided and risks for public health and safety are minimized (Ontario Ministry of Municipal Affairs and Housing 2012). This is restated in the Toronto Official Plan. Food is being mentioned, for example, in a topic on encouraging community and rooftop gardens (City of Toronto 2010a). Spatial planners are not involved in planning the composting program and the food waste processing plants are allocated by the Solid Waste Management division at the waste transfer stations, which have been zoned for this activity (Interviewee 1).

The Toronto Food Policy Council, established in 1990, operates as a subcommittee to the City of Toronto Board of Health (Toronto Food Policy Council 2000). Their urban food strategy stems from concerns about the affordability of healthy food, obesity, viability of local rural communities and greenhouse gas emissions from the food system. Food waste is only briefly mentioned, in a topic on encouraging home composting and improving waste diversion strategies (Toronto Public Health 2010). Food waste is not being addressed in the current Urban Food Strategy, because it surfaced as an issue of concern only after the most recent strategy was established (Interviewee 3).



Fig. 3. Waste facilities inside Toronto city.

At the micro level, home composting is encouraged through the possibility of ordering cheap backyard composters from the city, but the lack of space and the cold weather make backyard composting challenging (Interviewee 3). For both private and public new developments there are a set of performance measures, the Toronto Green Standard, to ensure sustainability in site and building designs. The measures include collection and storage areas for waste and recyclables (City of Toronto 2010b). Not many possibilities were identified to facilitate the re-use of compost in agriculture: there is not much agriculture within the city (Interviewee 2). The Toronto Food Policy Council is interested in medium size composting around old apartment buildings which have available land around them. It is envisioned that such land could be used for community gardens and on-site composting, which would enable a full cycle of nutrients, at the same time raising awareness of food issues among people. It is a concept which has not yet achieved Ontario government approval. The solid waste management department of the city is focused on large-scale solutions rather than micro solutions (Interviewee 3).

4.2 London

At the macro-level, there is no collective waste management system in London. There are 33 separate waste collection authorities, representing each of the London boroughs (Interviewee 4). 23 Boroughs currently have a separate food waste collection scheme (Sustain 2012). See also Fig. 4. About half of the housing stock are flats (GLA 2011c) and the consequent lack of space is problematic for recycling (GLA 2011b). London has four in-vessel and four open-windrow composting facilities (LWARB 2010), but some food waste is transported outside London. About 9% of the organic waste is composted (GLA 2011b). It has been estimated that 57 new composting and 25 anaerobic digestion facilities are needed in the future (GLA 2008). The first anaerobic digestion plant is currently being constructed in a Sustainable Industries Park, which is envisioned to house a concentration of environmental industries and technologies working in a closed loop system by making use of each other's waste. Some of the compost made from the city's food waste is used in agriculture and community gardens, but it is unclear to what extent.



Fig. 4. London boroughs that collect food waste (Sustain 2011).

The UK national planning policy statement (PPS 10) includes a section on sustainable waste management. According to PPS 10, planning has a role in sustainable waste management through developing growth and regeneration strategies and ensuring prudent use of resources, as well as providing adequate opportunities for new waste management facilities. A waste management strategy has to be included in the regional spatial strategy (RSS) (ODPM 2005). In line with the PPS 10, the London Plan (the RSS) recognises self-sufficiency in waste management (100% by 2031) and close proximity between waste source and disposal as key planning objectives. Zero biodegradable waste should be sent to landfills by 2031 and waste processing should create positive environmental and economic impacts. The most urgent focus is on household waste (GLA 2011a). The London Plan supports the regional municipal waste management strategy, which sets goals for providing residents with infrastructure and incentives to recycle and compost as much as possible, to reduce carbon footprint from municipal waste and minimise environmental impacts and to make use of the economic value of waste (GLA 2011b). Spatial planners have limited involvement in food waste management at the city level, although they do have to regard the waste strategy (Interviewee 5).

The London food board, established in 2004, supervises the development and implementation of the London food strategy. The current food strategy is focused on food security and food growing (Reynolds

2009). The strategy splits the food chain into eight stages, the last one being disposal. The strategy aims to reduce the disposal of food waste by 2016, through actions like exploring household kitchen waste collection schemes covering the entire London area, expanding household composting schemes and encouraging community composting. The municipal waste strategy and the London Plan are crucial to achieve the food strategy objectives (London Development Agency 2006).

At the meso-level, waste managers have to make decisions in a complex environment through a cost-benefit analysis. The food strategy in itself has no power, so it is hard for it to cut through to the waste management level (Interviewee 4). Also, not all planners on the borough level are aware of the food strategy (Interviewees 5 and 6).

At the level of local spatial plans, existing composting facilities can be safeguarded (Interviewee 5) and appropriate new locations for future waste management needs can be chosen (Interviewee 6). Waste management from planning perspective is quite underdeveloped on the borough level, because of the borough's history of exporting waste elsewhere. Planners tend to be focused on large facilities (Interviewee 4). It is hard to acquire sites for waste infrastructure, because there are competing pressures for housing development and land prices are high (Interviewees 4 and 5). Allocating waste facilities in neighbourhoods can also suffer from the NIMBY-effect (GLA 2008).

At the micro-level, at least 22 boroughs try to encourage home-composting, for example by providing backyard or community composting bins at a discount price. The involvement of spatial planners at the micro-level is limited. Local plan policies ensure adequate provision for external bin storage in new developments, especially in multi-occupancy areas (Interviewees 5 and 6). In theory, planners could require for example food growing spaces in new developments, but planners are restrained in their actions because of political, social and economic factors (Sustain 2011). There is some community composting going on in the city but not a lot. It would be difficult to strategically plan for it because by definition it is community based and therefore authorities tend to plan towards centralised composting. Encouraging home-composting tends to get ignored (Interviewee 4).

5. DISCUSSION AND CONCLUSION

The objective of the research was to identify how food waste is being addressed in urban food strategies and in what ways spatial planning can facilitate the handling of household food waste in city regions. The two case studies show that food waste is not being addressed systematically in both cases. The Toronto urban food strategy does not focus on food waste at all, and although the London urban food strategy identifies food waste as an issue of concern, the municipal waste management strategies and the regional plan are more dominant when it comes to food waste issues. Given the fact that London and Toronto are among the front-runners in urban food strategies, it can be concluded that food strategies appear not have much influence on food waste management yet.

The waste management concepts discussed in this paper were to some extent visible in the food waste management in both case study areas. The waste management hierarchy is embedded in the European regulations and therefore clearly visible in the waste management goals set in London. In Toronto a similar 3R's (reuse, reduce and recycle) system was being followed. Waste management documents and plans of both cities clearly communicated that waste should be managed as a resource. In reality, closing the loop between disposal and the use of compost in agriculture remains limited. Some of the compost is being used for agriculture, but the extent is unclear and much of the compost is applied for horticultural purposes instead. Both cases showed that it is difficult to facilitate the use of compost in agriculture within the city, because the space available for agriculture in the urban area is limited. Principles of industrial ecology were currently being realised in London, with the new anaerobic digestion plant in an eco-park. Self-sufficiency in waste management is a goal of both cities, yet the large distances within the cities also mean that even if the waste can be managed within the city, it may have to travel around vast distances.

Facilitating urban agriculture is an important part of both urban food strategies and this may indirectly facilitate composting and re-use of compost in urban agriculture. However, a clear link between waste management and urban agriculture is still missing. Furthermore, waste managers tend to be more focused on large scale solutions instead of small scale developments such as urban agriculture.

The possibilities for spatial planners to facilitate composting and anaerobic digestion in urban areas are limited, although some options were identified. In the macro and meso scales (city and district), strategic sites with good transport connections can be identified and existing sites safeguarded. On the micro scale, good design of waste management facilities and recycling areas of buildings is important. Spatial planners can facilitate community composting by ensuring that space for such facilities exists in new developments and to allow the use of existing green and open spaces for purposes of community composting. However, this also requires awareness raising, since not all planners at the local level are aware of the existence of a food strategy.

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