Urbanization Issues Affecting Food System Sustainability

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This chapter identifies urbanization issues affecting food system sustainability. Since the nineteenth century and the onset of industrialization, cities have been both the product and motor of food systems, which are expanding worldwide despite the impression that they are nonsustainable. Since both the problems and resources are concentrated in cities, the latter are also a source of innovation, which can in turn help enhance the sustainability of food systems.

Cities, Sustainability and Food Systems: Definitions

Cities

To understand sustainability issues that cities may cause or could help solve, cities may be viewed through several features:

- First the city is a concentration of human beings, a space or habitat with a highly dense population, thus limiting areas for extensive agricultural production. Cities are essentially nurtured by external areas. This population concentration often gives rise to traffic problems given the density of goods needed by city dwellers. Originally a migration focal point, the city is also a space of coexistence and interaction between communities of different geographical and cultural origins (Lamizet 2007)—a source of both innovations and possible tensions.
- The city is also a concentration of resources—power, knowledge, wealth and biomass—contrasting with the scattered resources in rural areas. This generates power asymmetry between rural and urban environments. Some authors consider

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that cities develop through perpetual exploitation of rural areas (Salomon Cavin and Marchand 2010; Salomon Cavin and Mathieu 2014), while others point out that cities have been the drivers of agricultural development, offering outlets for higher value-added products (Tacoli 1998; Cour 2004).
- The city is a space of commercial and cultural exchange, with the urban market being a focal point of trade flows, particularly of agricultural goods. It hence represents a network hub whose ramifications can extend way beyond the outskirts of the urban area.

In addition to these three features that have been always been inherent to urban centres, we should mention two other traits that have been specific to cities since the nineteenth century:

- Urban growth has been a product of industrialization for nearly two centuries. This is understood here as involving the development of a mode of production using nonrenewable resources, particularly for energy, rather than the development of manufacturing companies (Krausmann and Haberl 2002). But this industrialization process is also concentrated in cities. Urbanization and industrialization thus seem to be closely linked, especially since issues related to these two phenomena are inseparable.
- The concentration of wealth and power has accelerated as a result of the major productivity gains achieved through industrialization. Industrial cities are spaces marked by high inequality between rich and poor populations living in close proximity, between small and large companies operating in the same markets, and between central governments where industrial, financial and political interests often overlap. The growing inequality is reflected in the marginalization of part of the population due to exclusion from the production system where mechanization is increasingly replacing human labour, thus constituting a reservoir of cheap manpower.

The evolution in the relationship the city has with its food system can be interpreted as a case of multifaceted distancing (Bricas et al. 2013):

- geographical distancing with remote relocation of supply areas because of urban expansion and facilitated by the decrease in fossil fuel based transportation costs;
- economic distancing with the multiplication of intermediaries between agricultural producers and consumers for food dissemination, processing, storage and distribution;
- cognitive distancing with a growing share of the population born in the city as it ages—a population that is unfamiliar with the rural community, with the virtual disappearance of contacts between city dwellers and farmers, and with knowledge of the agriculture and food spheres no longer being direct but instead mediated by science and information media;
- political distancing with citizens losing control of their food system—with their range of preferences being confined to choices between supply areas and products. Despite the development of consumerism, eaters feel deprived of power to orient the system, which is in the hands of a just few dominant stakeholders.

Food System

The food system represents a set of interrelated activities regarding the production, dissemination, processing and use of food, waste and the required resources. Food issues have long been overshadowed by production sufficiency concerns—a major focus of interest—but the food system concept is broader in scope, encompassing production and all that precedes and succeeds it (Malassis 1983; Rastoin and Ghersi 2010). This concept helps tackle issues specifically related to how agricultural products are used to feed populations (Sobal et al. 1998).

Still recently considered as resulting in consumption (from the Latin term *consumere),* i.e. destruction, the food system should now incorporate the fate of the waste produced. This waste has historically been used as fertilizer in agricultural production cycles until being replaced by petroleum-based nitrogen fertilizers and mined phosphate and potassium, with the result that waste is no longer a food system concern (Lewin 2009). We include waste as a food system component with the aim of minimizing waste quantities and recycling the intractable part, thus promoting sustainability.

Food

Food is considered here from a multifunctional standpoint (Fischler 1990; Poulain 2002). It is not solely aimed at meeting human needs (nutritional function), it also serves to create and maintain social interactions through the organization of the movement of products (market role) and the organization of meals (commensality role). It also provides pleasure and thus has an artistic aspect, as promoted by gastronomy (hedonic function). Food has an important identity function since it is incorporated in the body and thus helps build individual and collective identities. The biological function seems vital, but can no longer be considered a priority or fundamental once biological survival is no longer threatened. The relative importance of food functions is generally culture-dependent.

Sustainability

There is current no consensus on what pertains to sustainability in contemporary society issues. The sustainability concept was developed to cope with irreversible environmental situations resulting from changes in modes of production, especially via industrialization. Then a social dimension soon emerged, including problems of inequality, in addition to health concerns and even cultural aspects. Many problems are nowadays dealt with in the name of sustainability (Godard 1994).

On the basis of definitions proposed by FAO and Bioversity International (Burlingame and Dernini 2010), as well as IPES Food (2015), here we have adopted a definition that considers food systems are sustainable when they:

- protect the environment and biodiversity without depleting nonrenewable resources and biodiversity, and without polluting;
- provide universal access to sufficient, healthy, nutritional and culturally acceptable food;
- rely on an inclusive economic system that creates jobs for everyone while reducing power inequalities between businesses and within value chains so as to ensure a more equitable distribution of added value;
- encourage social cohesion and respect cultural diversity and dynamics;
- restore confidence in the system and enable citizens to participate in its development.

Based on this definition, what are the food system sustainability issues resulting from urbanization and industrialization?

Promoting Sustainable Agriculture to Feed Cities

Reclosing Fertilization Cycles and Reducing Pollution

Surplus food production is needed to feed nonfarming communities. In Mesopotanmia and Egypt in Ancient Times, and around the thirteenth century in the Khmer kingdom, cities were fed by agriculture that benefitted from fertilization via silt transfer from watersheds onto floodplains on both sides of the rivers. This is how Babylon (Van der Spek 2008), Alexandria (Viollet 2004) and Angkor (Evans et al. 2007) were able to grow. Note that this is how, for instance, Angkor managed to maintain a population of several hundreds of thousands of inhabitants, most of whom were involved in building temples.

That said, in 1800, only 3.4% of the world's population was urban, compared to about half in 2000! This soaring urbanization trend since the nineteenth century may be explained by changes in agricultural production methods that, in alternative ways, made it possible to generate surplus crops to feed a growing nonagricultural population. This trend generally occurred in two phases (Daviron 2016): first through an expansion of the cropping area and land colonization, and then by increased use of fossil coal as a fuel source. Coal enabled the development of transportation and provisioning via long-distance supply chains. Then the widespread use of petroleum prompted an increase in agricultural production by providing low-cost fuel to replace human and animal labour, with mechanization in turn leading to a marked increase in labour productivity. The use of petroleum also led to a decrease in material and energy extraction from forests, while also reducing areas devoted to producing animal feed—the main source of energy until then. These areas could subsequently be

converted for food production. With the use of fossil fuels, it was no longer necessary to ensure cycling of nitrogen, which is essential for plant growth. At the expense of high fuel consumption (generally natural gas), the Haber-Bosh process made it possible to transform atmospheric nitrogen into chemical nitrogen fertilizer. Moreover, the use of mined phosphate and potassium overcame the need for faeces recycling, as was previously practiced (Box 1 and chapter "History of Urban Food Policy in Europe, from the Ancient City to the Industrial City").

Box 1: Urban Metabolism and Territorial Ecology

Sabine Barles and Gilles Billen

Territorial metabolism—with all of the caution required when considering the analogy to organic metabolism—refers to how territories consume and transform energy and matter, as well as how they mobilize and transform biosphere resources. This concept emerged from the idea that territories are dependent on these resources and modify the biosphere at different scales depending on how they use them. Interactions between societies and nature can be systematically analysed from this perspective: How much energy does a territory need to carry out all of its activities? How much material, i.e. water, foods and finished products, etc.? What happens to these flows once they have entered the territory since they have been used and transformed? In what form are they eventually returned to the environment? What are the impacts? Territorial ecology aims to place territorial metabolism in a spatial and social setting—the material and energy flows involved are the result of political, economic, social and technical choices, to name but a few. They reflect typical biosphere processes as well as the functioning of societies and cannot be analysed without taking this functioning into account. These flows link territories to others that supply them or receive their excreta, so a given territory's environmental footprint can be quite far from its limits—this situation is highly prevalent in cities, especially regarding their food.

Cities emerge since they offer at least some of their inhabitants the possibility of developing activities other than just subsistence production, including trade. Cities are thus models of social and spatial specialization. The upshot is that they outsource at least part (and now most) of their metabolism (Barles 2015). This outsourcing first concerned food flows and flows associated with heating and food preparation (referred to as 'energy' from the nineteenth century onward), while building materials were often extracted in the immediate vicinity of cities to facilitate transport. Outsourcing reached its peak with the industrial revolutions and urban transition—most cities have become entirely dependent on external territories for their supplies of ever more numerous materials and products, and for the elimination of their growing volumes of waste. Cities' energy and material consumption have substantially increased, while their metabolism has been levelling off—the reliance

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Box 1: (continued)

on fossil fuel (coal, hydrocarbons) and industrial fertilizers (atmospheric nitrogen fixed via the Haber-Bosch process, phosphate and potassium extracted from mines), etc., enabled human societies to disregard major biogeochemical cycles and give up urban by-product recovery and recycling. The resulting environmental footprint is global, fragmented and deep-rooted.

Studies of material flows contributing to the urban food supply, especially in Paris which has been the focus of recent research (Abad 2002; Billen et al. 2011, 2014; Bognon 2014), have shown the extent to which these flows reflect the social relations and antagonistic trends that prevail in these cities. Until the early twentieth century, the Paris Basin (roughly the 200–250 km area around Paris) was the capital's main breadbasket hinterland, where the potential for producing agricultural surpluses was tailored to meeting the increased urban food demand induced by the considerable demographic growth rate. During the second half of the twentieth century, however, cropland specialization and disruption of the complementarity between crop and livestock farming, which was facilitated by the widespread application of industrial fertilizers, resulted in breakup of the supply area. The Paris Basin became devoted to export cereal crops and the *Grand Ouest* area to intensive livestock production based mainly on soybean imports from Latin America. The current Parisian paradox is that it relies on a quite locally circumscribed direct food market (within the limits of its specialization) whereas production is very globally oriented in the surrounding agricultural hinterland, with Paris now being just one of this hinterland's many market outlets. More than it might seem, the city has remained focused on its rural hinterland while the latter is very largely integrated in the globalization trend.

The future trajectory of the Parisian food system will depend on a tradeoff between two diametrically opposed trends, which correspond to two markedly different visions of the future of the city and agriculture. A centrifugal trend regarding the economic development of agriculture, agroindustries and supermarkets, which promotes the specialization and concentration of production and logistics tools in an increasingly globalized setting. In contrast, rising numbers of urban consumers, politically bolstered by local authorities, e.g. via the 2013 Master Plan for Ile-de-France Region, have created a centripetal trend with innovative forms of relocation of food links between the city and its historic hinterland.

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Box 1: (continued)

References

Abad R (2002) Le Grand Marché. L'approvisionnement alimentaire de Paris sous l'Ancien Régime. Fayard, Paris

Barles S (2015) The main characteristics of urban socio-ecological trajectories: Paris (France) from the 18th to the 20th Century. Ecol Econ 118: 177–185

Billen G, Barles S, Chatzimpiros P, Garnier J (2011) Grain, meat and vegetables to feed Paris: where did and do they come from? Localising Paris food supply areas from the eighteenth to the twenty-first century. Reg Environ Chang 12: 325–336

Billen G, Lasseletta L, Garnier J (2014) A biogeochemical view of the global agro-food system: Nitrogen flows associated with protein production, consumption and trade. Glob Food Sec 3: 209–219

Bognon S (2014) Les transformations de l'approvisionnement alimentaire dans la métropole parisienne. Trajectoire socio-écologique et construction de proximités. Thesis dissertation, Urbanism-Development, Université Paris 1

The now well known impacts of this industrialization of agricultural production are mixed. They are positive because this industrialization led to a sharp increase in food production, thus making it possible to feed a growing non-farmer population. On a global scale, one farm worker currently feeds around 5.5 people but, because of the still very high proportion of nonindustrialized agriculture in Asia and Africa, this ratio is over 1:140 in North America, according to FAOSTAT data.

The impacts are also negative because this production is achieved at the price of overconsumption of nonrenewable or slowly renewable resources: coal, oil and natural gas, mined phosphorus, as well as water due to the development of motorized irrigation. Fisheries resources have been exploited faster than their renewal capacity because of the motorization of fishing boats. In addition to this resource depletion, the environment is becoming saturated with pollutants: nitrogenous waste, GHGs, eutrophication and pesticides, leading to long-term environmental damage. Finally, agricultural specialization and intensive production strategies have contributed to the erosion of crop and livestock biodiversity, while also upsetting the biological balance (insects and microorganisms).

While it has been possible to feed fast growing cities so far, it seems that it will no longer be possible to continue to do so in the future if urbanization continues. Although industrial production methods could likely be streamlined to waste fewer resources and cause less pollution, they are still generally based on nonrenewable resource use, which is not sustainable in the long run. New production methods must be invented to be able to generate surpluses to feed cities but without using nonrenewable resources. Research on such alternative solutions has revealed that

cities have a high resource supply potential, especially with regard to soil fertilization.

Until the early twentieth century, Shanghai and even Paris recovered and recycled faeces and urine produced by their inhabitants to fertilize the lands that fed them. Thereafter, the use of petroleum—hence abandoning the closure of nitrogen and phosphorus cycles—has resulted in almost unlimited extension of food supply areas of cities. Because of the reduction in transportation costs, cities get their food supplies from increasingly remote production areas. Urban metabolism analyses (Girardet 1999; Barles 2007; Billen et al. 2012) (Box 1) have shown that cities are now gigantic pumps that concentrate materials such as nitrogen and phosphorus. Food supplies come from areas much further away than rural areas where sludge from sewage treatment plants is dumped. These resources, part of which are discharged into the sea or rivers, have potential for use as fertilizer, but they are generally just wasted—becoming sources of pollution, especially nitrogen pollution (Lacroix 1995).

The reclosure of nitrogen, phosphorus and more generally biomass cycles is therefore a key urban food policy challenge. It highlights that cities can help promote new more sustainable modes of agricultural production. In the interstices of residential neighbourhoods, in periurban areas with high land constraints, so-called 'urban-farmers' practicing urban agriculture also invent new forms of production that are little or not at all reliant on chemical pesticides, while focusing on crop associations, saving water and making effective use of waste. The expertise that prevails in these nonconventional agricultural systems deserves to be studied and eventually developed.

This first issue highlights that urban food policies do not solely concern urban populations, but they can help shape agricultural production models to make them more sustainable.

Promoting Employment-Generating Agricultural and Agrifood Models

Industrialization—by markedly boosting labour productivity via mechanization—frees up the workforce in sectors affected by this process. In European countries, the transfer of labour from primary to secondary and tertiary sectors has been ongoing for almost two centuries. The rates of labour productivity growth and of freeing up the agricultural workforce have been relatively consistent with the pace of job creation in industrial and service sectors.

The situation is different in more recently industrialized countries. With urbanization, the emergence of the agrifood sector initially involves a surge of activity and job creation, especially for women. Subsequently, industrial mergers and foreign investment by large capital-intensive agroindustrial groups have the opposite effect. They compete with and rapidly eliminate thousands of micro-businesses and

SMEs (Malassis and Padilla 1986), with the risk of creating situations of high income inequality and mass unemployment (Weatherspoon and Reardon 2003; Cadilhon et al. 2006; Grain 2014). But recently industrialized countries are also in full demographic transition. It is estimated that in sub-Saharan Africa, given the extent of population growth, around 30,000 jobs per million inhabitants and per year should be created (Beaujeu et al. 2011). The agricultural, agrifood processing, distribution and catering sectors are emerging as the main potential sources of employment to meet this challenge (Losch et al. 2012; Farm 2016).

Through their potential to promote the development of relatively labour-intensive businesses—e.g. via commercial urbanism or job creation support—cities have the power to influence production models, especially in the agrifood sector.

Reducing Reliance on Remote Supplies and Reconnecting Cities to Their Hinterlands

Dependence on International Markets and Risks Associated with Market Volatility

Urbanization is considered by many observers as a key factor of international market food dependence (Pingali 2007; Wilkinson 2008; Porkka et al. 2013). Some authors consider that this dependence results from the domination of industrialized countries. Dumping of agricultural exports practiced by the United States and Europe until the 1990s, compounded by food aid, led to a competitive situation with regard to local production (Barrett and Maxwell 2007). These regular imports got city dwellers used to consuming foreign products even though they differed from those produced locally. For others, such as Abdou Touré (1981) and Victor Scardigli (1983), the economic and political dominance of Western countries prompts urban consumers to imitate their models. Although these theories of behavioural mimicry and extroversion have been criticized on the basis of empirical findings (Odeyé and Bricas 1985; Requier-Desjardins 1989, on food in Africa; Appadurai 1996, more generally), they implicitly underpin other theories on the 'westernization' of food (see studies of Popkin, Pingali, Usitalo, Goodland, etc.), the 'Coca-colonization' (Webster 1989) and 'McDonaldization' (Ritzer 2011) of diets.

Other authors such as Olivier Sudrie (1985) further explain import dependence as a strategic option for countries to cost-effectively secure food supplies for their potentially politically unstable urban population. This analysis is in line with the historical interpretation of Fernand Braudel (1979) concerning urbanization between the fifteenth and eighteenth centuries, while pointing out the difficulties that prevailed in building domestic markets: "A relatively flourishing external market usually preceded the laborious unification of the national market" (Braudel 1979: 332).

In other words, it has often been easier for countries to procure distant food supplies while building their national markets. More recently, in an economic liberalization setting, the period of low price stability that prevailed in international markets between the 1980s and the late 2000s prompted many countries to continue securing their supplies via imports.

The soaring international market prices and resulting urban riots that took place in 2008 and 2010 revealed the vulnerability of this food security option. International markets, which operate under a strongly finance-driven tight flow regime with low stocks, are now considered more volatile and riskier than before. In recent years, there has been a noticeable trend towards recapturing urban markets via local production supplies to reduce the dependence on imports. The challenge is not solely to reduce price volatility risks by diversifying supply sources. Indeed, reconnecting cities to their hinterlands is a further way to generate jobs and income in rural areas, thus avoiding rapid outmigration to cities.

Cities as Drivers of Agricultural Production

The focus on cereals in discussions regarding food dependency should not mask the fact that cities are already connected to their hinterlands. Various authors consider that urbanization has led to domestic market growth to the benefit of farmers. So-called food crops, initially considered essentially as being destined for on-farm consumption, became cash crops mainly to supply urban markets (see studies of Bricas, Chaleard, Moustier, Tacoli, etc.). In addition to being a driving force behind agricultural development, urbanization generates a range of intermediation activities with the rural community, promoting the diversification of income sources in rural areas and job creation in cities (Lopez and Muchnik 1997). A recent analysis of surveys of food consumption patterns in West Africa—a region that has experienced a sharp increase in food imports since the 1960s—revealed cities' high dependence on imported rice and wheat. Imports of these two cereals represent roughly two-thirds of the value of starch-based commodities consumed in cities. However these starchy products themselves account for only about a third of the economic value of urban household food consumption. The rest, i.e. animal products (one third), sauce products (legumes, vegetables, oil and condiments), fruit and sweet products (including drinks) (for the last third), are mostly produced locally (Bricas et al. 2016).

It is therefore not inevitable that food globalization will fuel urbanization, but the role of local production as an urban market driver is still a major policy issue that cities can help address. In this respect, some rely on infrastructure (e.g. farmers' markets or wholesale markets), on regulation or contracting, especially for public procurement (e.g. for collective catering), on local product promotional operations, or on investment in rural areas or financial support (e.g. to rural agroindustries), thus helping to boost the added value for farmers.

Rebalancing City/Rural Relationships

This connection nevertheless does not represent a balance of power between cities and rural areas (Lipton 1977). Cities—since they are hubs where trade flows converge—force competition between food production areas, thereby putting pressure on farmers. Urban markets dictate prices for local products that farmers consider unprofitable, as well as hard to meet product quality requirements. This pressure can lead to paradoxical situations whereby family farmers generate production surpluses to feed cities while experiencing food insecurity because of their low incomes. In this regard, farmers living far from cities are often obliged to rely on intermediaries to gain access to urban markets, which in turn further reduces their income (Tacoli 1998).

Rural poverty and widening gaps regarding living standards between cities and rural areas often trigger rural outmigration, in turn raising problems for urban authorities. The rebalancing of these city/rural interactions is a rising concern for cities and their inhabitants. This may prompt investment in rural areas to help maintain rural communities, which is a priority of some associations of formerly rural people who have taken up residence in cities (Ouattara 2005) and some municipalities (e.g. Hanoi, with rural development contracts in Vietnamese provinces, or Medellin, with support given to rural agroindustries to increase the added value for Colombian farmers). This rebalancing may also be in the form of contractual agreements between collective caterers and rural production areas to ensure supplies of quality products and better financial gains for farmers.

A movement is emerging that is opposed to the idea of rural areas being reduced to the role of nurturing cities and is striving to create new more balanced and sustainable city/rural relationships. That is the goal of the city-region food systems concept, which stresses the benefits of relocating agriculture to areas around the markets served, and with better balancing of relationships between these complementary worlds (Jennings et al. 2015; Dubbelling et al. 2015).

Facilitating the Movement of Goods and Access to Food

Reducing Last-Kilometre Transportation Costs

Daily feeding of large population concentrations raises substantial logistics problems. Transportation, storage and distribution result in high flows of goods in constrained spaces (Gaigné et al. 2011). Most initial urban markets are built at the city core. The market is a place of exchange which gives life to the city and many other activities develop in the vicinity of these markets. As the city expands this central market model is generally replicated in the new neighbourhoods, until the point when such expansion of the urban area and building density starts to hamper the flow of wholesale goods. Many cities are then forced to geographically separate

wholesale and retail functions, with wholesale infrastructure being set up at the outskirts of cities to decongest the city of supply trucks (Densley and Sanchez-Monjo 1999). Moreover, sanitary constraints, including the management of livestock being transported into cities, also contributes to the reorganization of flows. Centralized slaughterhouses are generally built at the city gateways, which avoids livestock entering the neighbourhoods and enables centralized animal health control (Fitzgerald 2010).

This logistics restructuring generally began taking place during the twentieth century and is still ongoing without any real energy constraints. The environmental impact of the different logistics models, particularly the issue of transportation energy costs, has become problematic with the relatively recent threat of soaring petroleum prices. However, few studies to date have focused on this issue (Masson and Petiot 2012). In Great Britain, Alison Smith et al. (2005) calculated that household car food shopping trips—mainly to supermarkets located on the outskirts of cities—represented 47.5% of the overall food transport distance covered in 2002 and 13% of CO_2 emissions and 40% of total social costs due to food transport. At a time when new potential logistics models are emerging, along with the development of e-commerce and new delivery modes (click & drive, drone), the last-kilometre organization issue has become important from an environmental standpoint. Sally Cairns (2005) thus showed that home food delivery, rather than household food shopping trips, could reduce the overall food transport distance covered by 70% (Box 2). Reconfiguring urban food logistics is also a social issue (Morana and Gonzalez-Feliu 2011). The food supply mode also impacts consumers' relationship with food. Depending on whether or not there is human contact in the commercial exchange, this mode more or less leads to commodity standardization, while also having an impact on the diversity of the supply.

Preventing the Emergence of Food Deserts

The development of supermarkets can generate competition with local shops and even eliminate them. This often results in a dearth of grocery stores in some city neighbourhoods, which means that only households with medium-distance means of transport will have access to healthy and nutritionally suitable food (Beaulac et al. 2009). Taking the nutritional impacts of these so-called 'food deserts' into account has thus become a strategic priority in commercial planning policies in some cities in the Global North.

This fight to prevent the development of food deserts nevertheless does not always involve preserving small shops in which products may be sold at relatively high prices. In some cities, such as Medellin in Colombia, a municipal policy to ensure that the poorest people will have access to quality food has led to the building of central purchasing units in popular neighbourhoods of the city, where only small shops previously prevailed (Correa Pelàez 2016).

Box 2: Who Generates Urban Conurbation Food Supply Flows?[1]

Jean-Louis Routhier

Under the conventional pattern that prevailed until the early 1960s, households mainly shopped on foot at local stores that were provisioned by truck. However, it is now possible, thanks to the widespread adoption of car transport, for consumers to fetch supplies at stores located far from their homes. The pattern has thus evolved in favour of the development of supermarket food shopping by car. Supermarkets in turn have a role as urban distribution warehouses, providing an alternative to operators who provision local shops. The supply is therefore split between shops and households.

Provisioning Food Shops

In the light of the findings of the ETMV 'goods in cities' survey conducted in Ile-de-France region in 2011, if we just focus on the store supply chain, it emerges that out of the 4,250,000 goods deliveries or pick-ups that take place weekly, 850,000 (19%) concern foodstuffs. In detail, these movements are split into three parts:

- a large third upstream share related to industrial and small-scale production (11%), wholesalers (20%) and warehouses (6%);
- around 45% related to catering for cafés, hotels and restaurants (31%), and corporate catering (13%);
- finally, retailers represent barely 20%, headed by small traditional food businesses (groceries, bakeries, butcheries and markets; 13%), followed by supermarkets (only 5%; but obviously in batches of several tonnes and delivered by heavy trucks!).

Light vehicles are mostly used to carry out these operations (54%), compared to 39% trucks of more than 3.5 t and 7% semi-trailers.

The weight and packaging of deliveries of course differ from one end of the chain to the other. On average, the mean tonnage per delivery to warehouses, industries and hypermarkets ranges from 4 to 7 t, while for supermarkets and wholesalers it is 2.5 t, and 1 t for small supermarkets. Finally, cafés, groceries and markets receive batches of around 500 kg. For home deliveries of foodstuffs, the mean weight ranges from 50 to 90 kg, whereas when individuals themselves transport their purchases, the foodstuff weight ranges from a few kilogrammes when they are walking to 20 kg on average when they are in their private cars.

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[1] I would like to thank Florence Toilier, Marc Serouge and Mathieu Gardrat for their invaluable help in generating several of the results summarized here.

Box 2: (continued)

Consumer Shopping Trips

The EGT 'general transport' survey conducted in Ile-de-France in 2010 revealed that residents of this region make 34 million shopping trips a week, 33% of which take place on the weekend. Overall, 42% are by car, 50% walking, 8% by public transport or soft modes. With a corrected car occupancy rate of 1.29 passengers, there are 11 million purchase pick-ups a week in private cars. Foodstuffs should be separated from the purchases in order to be able to compare these findings with the figures in the previous paragraph, but this is currently hard to accomplish because daily mobility surveys generally do not specify the type of goods purchased. Moreover, since it is not possible to specifically focus on food purchases, we compare household shopping trips overall and movements of goods generated by the business supply chain (consumer goods producers, wholesalers and retailers). This results in 1,700,000 goods deliveries and pick-ups a week, which is about sixfold fewer than private car shopping trips.

The most relevant measure for assessing the sustainability of urban food flows is, however, not the number of trips. It is better to focus on road occupancy by motor vehicle traffic to account for the scarcity of road space that typifies the urban space. The ETMV and EGT surveys make it possible to estimate this road occupancy linked to supplying businesses and households.

80 million km are travelled weekly by Ile-de-France residents during shopping trips, 70% of which is to supermarkets. Compared to the 41 million km-PCE[2] generated by the retail supply chain in 1 week, the road occupation for shopping trips is twofold greater than that of vehicles involved in the business supply chain.

These few figures clearly show that urban food supply issues are very closely related to consumer mobility practices for shopping.

Are 'New Practices' Exemplary?

In this domain, as elsewhere, there is marked diversification in food supply modes in the cities: Markets, local shops, supermarkets, as well as the many cafés and restaurants. The practices are also diversified, ranging from 'click & drives' to 'relay point' (pick-up and drop-off location) and home deliveries, as well as neighbourhood AMAPs (consumer associations providing bulk

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[2] PCE: passenger car equivalent: a weighting factor used to take the vehicle road footprint into account (a light commercial vehicle [LCV] = 1.5 PC; a straight truck = 2 PC; a heavy articulated truck = 2.5 PC). Calculations performed using the FRETURB© model.

Box 2: (continued)

delivery of produce) and even harvesting of produce in market gardens by nature-loving urban households. The supply pattern is therefore further evolving and becoming more complex.

Preliminary calculations based on a survey conducted in late 2015 in metropolitan Lyon (France) showed that each household generates about 20 equipment acts of purchase a year that are 'disconnected' with shopping trips, i.e. receipt of goods by the buyer does not take place at the same time as the act of purchase: Home or relay point delivery following a phone or online purchase, etc. if this figure is transposed to conventional shopping trips in the Ile-de-France area, it would represent around 6% of the total shopping trips by individuals and 18% of their car shopping trips. Of these 20 disconnected annual purchases, only four involved food shopping and three online meal orders. This emerging and fast-growing phenomenon has yet to structurally modify flows and road occupancy. These new practices are likely to add to, or partly or totally supplant, conventional shopping trips. Ongoing research should make it possible to assess the impacts of these new behavioural and operational trends on the city.

This text is based on data processed by the *Laboratoire aménagement économie transports* (LAET) research unit (Lyon) based on findings from the following reference sources.

References

'Deferred Household Purchases' survey, 2015, Metropolitan Lyon – ADEME
EGT 2010 survey, Ile-de-France region, DRIEA, IAU, STIF
FRETURB© model applied to Ile-de-France, DRIEA-LET
TMV 2011 surveys, Ile-de-France Region, ADEME, DRI of the French Ministry of Transport

Promoting More Sustainable Urban Food Styles

To Cope with Food Style Changes Related to Urbanization…

The growing remoteness of agricultural production areas that supply cities leads to the development of processing activities to reduce the volume and weight of food to be transported, while extending their shelf life: drying, shelling and extraction of the useful fractions (oil, sugar, juice, etc.). The agrifood sector is also developing to provide urban dwellers already processed foods that are more convenient to use and increasingly diversified (Colonna et al. 2011). Human concentration also leads to the development of distribution and catering activities in cities. These activities,

which are initially carried out on a small scale, have become industrialized with the gradual increase in consumer purchasing power, thus providing income for an increasing number of services incorporated in food commodities, i.e. products that are precooked, have a long shelf life or are divided into individual portions. These processed commodities are promoted by agrifood companies, sometimes with a lot of publicity (Kearney 2010; Monteiro and Cannon 2012; Stuckler and Nestle 2012).

The higher purchasing power of urban dwellers generally results in an increase in the consumption of animal products, i.e. meat in many countries and dairy products in places such as India.

…the Environmental Cost of Diets Has to be Reduced

From an environmental viewpoint, this dietary shift towards more industrially processed products is reflected—as for agricultural production—by high nonrenewable or slowly renewable resource consumption and pollution. The extent of the agrifood sector's contribution to environmental degradation is hard to calculate due to the absence of data differentiating the food contribution from industrial, transportation and other factors. The NGO Grain (2011) attempted this calculation on a global scale and concluded that the food processing sector, including refrigeration and packaging, accounts for 13–15% of total GHG emissions, with transport only representing 5–6%, distribution 1–2%, and agricultural organic and food waste decomposition 3–4%. Overall, the agrifood sector represents 15–20% of total GHG emissions, compared to 11–15% for agricultural production alone and 15–18% for land-use changes, mainly related to deforestation, 70–90% of which is caused by farmland expansion. When considering environmental impacts other than GHG emissions (acidification, ecotoxicity, eutrophication, etc.), the contribution of the food sector seems to be lower. Food and beverage products contribute 20–30% to the overall environmental impact (Tukker and Jansen 2006).

Packaging pollution is also a noteworthy issue. The proliferation of individual packaging, ranging from simple polyethylene bags to more elaborate packages combining plastics, aluminium and cardboard, is a major source of pollution and concern in cities where such packaging occurs in dense concentrations (Marsh and Bugusu 2007). This has prompted some cities (e.g. Dacca, San Francisco, Kinshasa and Dakar) to regulate the use of certain packaging, thus forcing companies to seek alternative solutions.

From a biodiversity standpoint, the standardization of products and the growing need for uniform quality raw materials because of technological processing constraints leads to erosion in the diversity of raw material varieties used (McKinney 2006). Hence the number of varieties that may be used by the agrifood industry is declining. Nevertheless, a very diverse range of processed products could be obtained via raw material fractionation (Soler et al. 2011). Through their preferred logistics models, cities have the levers needed to help preserve biodiversity. The development of central purchasing centres serving supermarket chains results a

reduction in the number of items marketed due to volume bulking. In comparison, the wholesale market model promotes the marketing of a wider variety of products as it provides a better linkage between smallholder farmers and niche markets (De Raymond 2010).

The industrialization of food products and the increased consumption of animal products decreases the energy efficiency of food. A growing amount of energy is required for animal production, food processing, packaging and marketing to be able to guarantee a daily intake of 2000–2500 kcal per person (Pimentel and Pimentel 2007). The worldwide adoption of the so-called Western consumption model is turning out to be unbearable for global resources, while also generating high levels of pollution. The impacts of this trend, however, are not solely environmental in scope.

Jointly Combating Obesity and Micronutrient Malnutrition

Changes in diet related to urbanization also have nutritional impacts. In rural areas, food insecurity has long been linked (and continues to be in some regions) to food supply insufficiency because of the low or highly variable production conditions, high postharvest losses or limited market access due to remoteness. Difficulties in eating properly in urban areas are primarily related to economic poverty rather than to the available food supply. In developing countries that have undergone rapid urbanization, many urban inhabitants live below the poverty line as they do not have a sufficiently lucrative job to meet their baseline needs. According to World Bank poverty statistics, this situation prevailed in 50% of the urban population in Mexico in 2014, 36% in Côte d'Ivoire in 2015, 25% in Colombia in 2014 and 21% in India in 2009. These people do not have enough purchasing power to gain access to foods of good nutritional and health quality, and they are very vulnerable to price hikes.

Middle classes are also emerging in cities of the Global South despite the extent of urban poverty. The average living standards of urban households are everywhere higher than those of rural households (Ginneken 1976). These cities are thus the main locus of the so-called double nutritional burden, i.e. the coexistence of undernutrition and overnutrition (Boutayeb 2006). Undernutrition due to insufficient calorie or protein intake is not as prevalent as it is in rural areas. This condition is especially the result of micronutrient deficiency (iron, vitamin A, zinc, etc.) which causes stunted growth. But one specific feature of cities is the considerable increase in diseases related to overconsumption of fat, sweet and salty products, combined with reduced physical activity, especially amongst the emerging middle class: overweight and obesity, often associated with diabetes, cardiovascular diseases and certain cancers (Popkin 1999; Maire and Delpeuch 2004; Goryakin and Suhrcke 2014).

After long having favoured options to boost awareness and educate populations, policies are now more oriented towards actions that will enhance consumers' knowledge and attitudes as well as their environment (Cohen and Ilieva 2015). The food supply is no longer seen as being an independent response to a demand but

rather as a means to shape it (Lahlou 2005). Consumers' behaviours are not solely shaped by their knowledge and wishes, the facilities and incentives of their environment or foodscape also create behavioural habits. This major shift in perspective highlights the role that urban policy could potentially have, e.g. by the way collective catering is organized, as a means of learning about food habits, or by commercial urbanism, e.g. spaces left for gardens, markets, restaurants, waste management organization, etc.

Enhancing the Health Quality of Food Consumed by Poor Communities

In poor city neighbourhoods, work schedule and traveling hour constraints as well as the lack of space in precarious habitats (Satterthwaite et al. 2010) often leads to a reliance on popular restaurants and street food. These small-scale activities generate job opportunities but are carried out with limited resources, i.e. scant access to drinking water or quality raw materials, unsanitary environments, lack of food storage facilities, etc. (Henson 2003; Broutin and Bricas 2006). Moreover, anonymity and low institutional quality control capabilities promote unfair commercial exchange behaviour. The informal food sector—although providing essential services to feed populations with limited purchasing power—is thus often considered as a generator of consumer health risks (Ekanem 1998; Winarno and Allain 1991).

Food insecurity in these environments also involves difficult access to healthy food. More generally, market segmentation takes place with a supply of strict quality controlled products targeting relatively rich consumers, alongside the development of a supply targeted to populations with low purchasing power. This supply comes mainly from informal microenterprises and itinerant trade, but also from more specific sectors in which unsold products from formal markets are recycled for popular markets.

The development of market stalls to improve the health conditions, the creation of equipped areas devoted to popular restaurants and the training of craftspeople, are different ways that some cities implement to enhance the health quality of food.

Reducing Inequality and Power Asymmetry

In addition to the essential rebalancing of power between small and large enterprises and between cities and rural areas, reducing inequality within the urban population is a major social and political challenge.

The concentration of poor people in cities who have no access to the abundant available supply, while living alongside rich and super rich populations, can generate a powder keg of social instability in crisis situations, as shown by the urban riots

that took place in 2008 and 2011 triggered by the rising energy and food prices. Many of these clashes resulted in the destruction of public infrastructure, violence and the fall of governments. They revealed the importance of food price stabilization (HLPE 2011), as well as the employment issue.

Beyond this political risk, geographic, economic, cognitive and political distancing can create a credibility gap between consumers and their food system, further accentuated by power asymmetries.

This distancing results in a feeling amongst consumers that they are losing control of the system—a decline that is spurred by the acceleration of modernity (Rosa 2010)—thus lowering the risk acceptability (Slovic 1987). Personal confidence in food quality is less dependent on each person's sensory and cognitive cues and relies more on third parties (intermediaries, labels, prices, brand reputation and State seals of approval) (Cheyns and Bricas 2003). This process is not self-evident and may give rise to worry and suspicion, especially when these third parties prove to be fallible (mad cow crisis, contaminated blood crisis and Chernobyl cloud crisis) or are suspected of protecting their own economic interests before the health of consumers.

The growing anxiety amongst food consumers is further accentuated by the individualization of their eating habits (Fischler and Masson 2008). What was once 'self-evident', a routine embedded in a universe of rules and conventions, has become a question of individual choice. In the abundant and diverse supply, food consumers must now make choices between nutritional, taste, environmental, practical and price attributes, etc., but without having any solid benchmarks in the face of controversies and uncertainties about food quality. The increase in everyone's freedom of choice has led to a paradox (Schwartz 2004), i.e. it generates anxiety and a feeling of not being able to properly orient one's diet (Poulain 2002; Poulain and Corbeau 2002). Finally, consumer over-responsibility tends to clear suppliers of their responsibility to shape consumption patterns, in turn accentuating consumer anxiety (Figuié and Bricas 2011).

The search for new proximities may be viewed as a reaction to this distancing and individualization, while reassuring food consumers. Many urban food policies, especially in the most industrialized countries, are focused on relocating supplies and building more inclusive governance. Local supplies, short food supply chains, direct marketing, territorial food systems, local food policy councils, etc., are amongst potential ways to reassure food consumers, while giving them the feeling that they are recovering some control over their diets.

Living Together

The city is a space where populations of various cultural origins and contrasting social backgrounds coexist. For some, it is a place of deculturation and anomy, generating social tension or even violence exacerbated by economic precarity and growing inequality (Hérault and Adesanmi 1997). In the food domain, the city has

often been considered as a place where people lose their 'traditional' bearings that serve to structure food habits (Fischler 1979; Mestdag 2005), and as a privileged place for the extension of global culture (Westernization). In response, these phenomena may lead to demands for respect of the specific food habits of some cultural or religious groups—a sign of hyperculturation (Barber 2010; Jourdan and Riley 2013).

Other authors consider instead that the city is a space for integration and development of a unique culture. Urban identity is formed especially via cooking, i.e. through gastronomy and chefs associated with the city or, more often, by the development of popular kitchens associated with small-scale catering (Bricas and Odéyé 1985). In Africa, Dakar-style fish and rice (*thiébou diène*) (Sankale et al. 1980), Abidjan-style cassava semolina (*garba d'attiéké*) (Konaté 2005) and Ouagadougou-style cornmeal and greens (*baabenda*) are typical urban dishes that contribute to urban cultural integration and identity building.

In one way or another, changes in food styles associated with urbanization are major sociocultural issues, including food heritage changes in a setting of strong external influences, and living together in a setting of growing social tension (Tibère 2009).

Here again cities can, through their food policies, help inhabitants live better together. Cooking and gastronomy are eminent cultural and identity enhancing activities and can contribute to generating inclusive identities, understanding and appreciating other cultures, for instance via collective catering.

Conclusion

Literature on sustainable urban food systems often tends to be focused on the relationship of cities with agriculture, particularly on the food supply issue. These studies are part of a movement seeking new geographical (promotion of local commodities), economic (short supply chains), cognitive (learning about agriculture through community gardening) and political (food governance) proximity. The city region food systems (CRFS) concept promoted by several international organizations and NGOs also reflects this movement. Other studies with the same rationale of bringing urban and rural areas closer together are also focused on the possible closure of cycles of materials that tend to build up in cities and which could be effectively used in agriculture.

These studies place less emphasis on the internal organization of the food system within cities, on the effects of forms of urbanization or on city dwellers' behaviour. However, the non-sustainability of urban food systems is also a result of urban lifestyles, spatial configurations and consumption practices. In this sense, all food system sustainability issues related to urbanization cannot simply be solved by reconnecting cities to their rural environment.

Cities have long had resources that impact food. They manage land and can thus maintain agricultural activities within or around the city. They manage the space

and thus shape the foodscapes and dictate the location of shops and market places. They organize their supply logistics through wholesale market management, with a direct impact on the type of agriculture that these modes of management promote. They often manage collective catering, particularly for children and youth—a multifunctional tool for food and nutritional security, education and social integration. They encourage the development of economic activities, especially in the agrifood sector, by developing spaces devoted to the creation or establishment of businesses, while taking advantage of taxation conditions and organizational services. They manage waste, which in turn is a resource that may be useful in agriculture.

These many levers, which generally concern distinct sectors, are now being reconsidered from a more integrative standpoint. It is no longer a question of guaranteeing a constant supply, of ensuring universal access to quality food or of reducing congestion in cities. Increasingly, these levers are now used to help invent new and more sustainable food systems.

References

Appadurai A (1996) Modernity at large: cultural dimensions of globalization. University of Minnesota Press, Minneapolis

Barber BR (2010) Jihad vs McWorld. Random House, New York

Barles S (2007) Feeding the city: food consumption and flow of nitrogen, Paris, 1801–1914. Sci Total Environ 375(1):48–58

Barrett CB, Maxwell D (2007) Food aid after fifty years: recasting its role. Routledge, London, 314 p

Beaujeu R, Kolie M, Sempéré JF, Uhder C (2011) Transition démographique et emploi en Afrique subsaharienne. Comment remettre l'emploi au cœur des politiques de développement, À savoir, vol 5. Ministère des affaires étrangères et européennes, AFD, Coll, Paris, p 213

Beaulac J, Kristjansson E, Cummins S (2009) A systematic review of food deserts, 1966–2007. Prev Chronic Dis 6(3):A105

Billen G, Garnier J, Barles S (2012) History of the urban environmental imprint: introduction to a multidisciplinary approach to the long-term relationships between Western cities and their hinterland. Reg Environ Chang 12(2):249–253

Boutayeb A (2006) The double burden of communicable and non-communicable diseases in developing countries. Trans R Soc Trop Med Hyg 100(3):191–199

Braudel F (1979) Civilisation matérielle, économie et capitalisme, XV^{e}–XVIII^{e} siècle. Tome 3: le temps du monde. Armand Colin, Paris

Bricas N, Odéyé M (1985) À propos de l'évolution des styles alimentaires à Dakar. In: Bricas N, Courade G, Coussy J, Hugon P, Muchnik J (eds) Nourrir les villes en Afrique sub-saharienne, Coll. Villes et entreprises. L'Harmattan, Paris, pp 179–195

Bricas N, Lamine C, Casabianca F (2013) Agricultures et alimentations : des relations à repenser ? Nat Sci Sociétés 21(1):66–70

Bricas N, Tchamda C, Mouton F (eds) (2016) L'Afrique à la conquête de son marché alimentaire intérieur. Enseignements de dix ans d'enquêtes auprès des ménages d'Afrique de l'Ouest, du Cameroun et du Tchad, Coll. Études de l'AFD, Cirad, Afristat. AFD, Paris, p 130

Broutin C, Bricas N (2006) Agroalimentaire et lutte contre la pauvreté en Afrique subsaharienne; le rôle des micro et petites entreprises. Éd. du Gret, Paris, 128 p

Burlingame B, Dernini S (Eds) (2010) Sustainable diets and biodiversity. Directions and solutions for policy, research and action. In: Proceedings of the international scientific symposium biodi-

versity and sustainable diets united against hunger, FAO Headquarters, Rome, 3–5 November 2010, p 309
Cadilhon JJ, Fearne AP, Figuie M, Giac Tam PT, Moustier P, Poole ND (2006) The economic impact of supermarket growth in Vietnamese food supply chains. Int J Environ Cult Econ Soc Sustain 2(7):1–12
Cairns S (2005) Delivering supermarket shopping: more or less traffic? Transp Rev 25(1):51–84
Cheyns E, Bricas N (2003) La construction sociale de la qualité des produits alimentaires ; le cas du soumbala, des céréales et des viandes sur le marché de Ouagadougou au Burkina. Montpellier, Cirad, Série Alimentation, Savoir-faire et Innovations en agroalimentaire en Afrique de l'Ouest, p 82
Cohen N, Ilieva RT (2015) Transitioning the food system: a strategic practice management approach for cities. Environ Innov Soc Trans 17:199–217
Colonna P, Fournier S, Touzard JM (2011) Systèmes alimentaires. In: Esnouf C, Russel M, Bricas N (eds) Pour une alimentation durable. Réflexion stratégique DuALIne. Quæ, Paris, pp 59–84
Correa PF (2016) Alianza por el buen vivir. Fortalecimiento de Sistemas Agroalimentarios. 43rd Committee on world food security, forum on urbanization, rural transformation and implications for food security and nutrition, Rome, 20 October 2016
Cour JM (2004) Peuplement, urbanisation et transformation de l'agriculture : un cadre d'analyse démo-économique et spatial. Cah Agric 13(1):158–165
Daviron B (2016) Agriculture et économie : du solaire au minier… et retour ? Agron Environ Soc 6(1):23–34
De Raymond AB (2010) Dispositifs d'intermédiation marchande et politique des marchés. La modernisation du marché des fruits et légumes en France, 1950–1980. Sociologie du travail 52(1):1–20
Densley B, Sanchez-Monjo E (1999) Wholesale market management. A manual. FAO Agric Serv Bull 140, 96 p
Dubbeling M, Renting H, Hoekstra F, Wiskerke JSC, Carey J (2015) City region food systems. Urban Agriculture Magazine, p 29
Ekanem EO (1998) The street food trade in Africa: safety and socio-environmental issues. Food Control 9(4):211–215
Evans D, Pottier C, Fletcher R, Hensley S, Tapley I, Milne A, Barbetti M (2007) A comprehensive archaeological map of the world's largest preindustrial settlement complex at Angkor, Cambodia. Proc Natl Acad Sci 104(36):14277–14282
Farm (2016) Emploi en Afrique: et si l'agroalimentaire était une solution ? International conference, 8 December 2016. http://www.fondation-farm.org/spip.php?page=article&id_article=992
Figuié M, Bricas N (2011) Réinvestir la régulation publique. Le risque d'une sur-responsabilisation des consommateurs. Problèmes politiques et sociaux 982:99–100
Fischler C (1979) Gastro-nomie et gastro-anomie. Communications 31(1):189–210
Fischler C (1990) L'homnivore. Le goût, la cuisine et le corps. Odile Jacob, Paris
Fischler C, Masson E (2008) Manger : Français, Européens et Américains face à l'alimentation. Odile Jacob, Paris
Fitzgerald AJ (2010) A social history of the slaughterhouse: from inception to contemporary implications. Hum Ecol Rev 17(1):58–69
Gaigné C, Capt D, Faguer E, Frappier L, Hilal M, Hovelaque V, Le Cotty T, Parrot L, Schmitt B, Soulard C (2011) Urbanisation et durabilité des systèmes alimentaires. In: Esnouf C, Russel M, Bricas N (eds) Pour une alimentation durable. Réflexion stratégique DuALIne. Quæ, Paris, pp 123–142
Ginneken WV (1976) Rural and urban income inequalities in Indonesia, Mexico, Pakistan, Tanzania, and Tunisia. International Labour Office, Geneva, 67 p
Girardet H (1999) Sustainable cities: a contradiction in terms? In: Satterthwaite D (ed) The Earthscan reader in sustainable cities. Earthcan, London, pp 413–425
Godard O (1994) Le développement durable. Paysage intellectuel. Nat Sci Sociétés 2(4):309–322

Goryakin Y, Suhrcke M (2014) Economic development, urbanization, technological change and overweight: what do we learn from 244 demographic and health surveys? Econ Hum Biol 14:109–127
Grain (2011) Food and climate change. The forgotten link. Grain, Barcelona, 5 p
Grain (2014) Food sovereignty for sale: supermarkets are undermining people's control over food and farming in Asia. Grain, Barcelona, 19 p
Henson S (2003) The economics of food safety in developing countries. ESA Working Paper 19(3): 19–30
Hérault G, Adesanmi P (Eds) (1997) Jeunes, culture de la rue et violence urbaine en Afrique. In: Actes du symposium international d'Abidjan. Ibadan, IFRA, 5–7 mai 1997, p 419
HLPE (2011) Price volatility and food security. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome, CFS, p 79
IPES Food (2015) The new science of sustainable food systems. Overcoming barriers to food system reform. IPES Food, Brussels, 21 p
Jennings S, Cottee J, Curtis T, Miller S (2015) Food in an urbanized world. The role of City region food systems in resilience and sustainable development. International Sustainability Unit, London, 92 p
Jourdan C, Riley KC (2013) Présentation: La glocalisation alimentaire. Anthropol Soc 37(2):9–25
Kearney J (2010) Food consumption trends and drivers. Philos Trans R Soc London B: Biol Sci 365(1554):2793–2807
Konaté Y (2005) Abidjan : malentendu, poésies et lieux propres. Outre-Terre 11(2):319–328
Krausmann F, Haberl H (2002) The process of industrialization from the perspective of energetic metabolism: socioeconomic energy flows in Austria 1830–1995. Ecol Econ 41(2):177–201
Lacroix A (1995) Des solutions agronomiques à la pollution azotée. Cah Agric 4(5):333–342
Lahlou S (2005) Peut-on changer les comportements alimentaires? Cahiers de nutrition et de diététique 40(2):91–96
Lamizet B (2007) La polyphonie urbaine : essai de définition. Communication et organisation 32:14–25
Lewin RA (2009) Merde: excursions in scientific, cultural, and socio-historical coprology. Random House, New York
Lipton M (1977) Why poor people stay poor: urban bias in world development. Econ J 87(347):611–613
Lopez E, Muchnik J (1997) Petites entreprises et grands enjeux. L'Harmattan, Paris
Losch B, Fréguin-Gresh S, White ET (2012) Structural transformation and rural change revisited: challenges for late developing countries in a globalizing world. World Bank Publications, Washington, DC
Maire B, Delpeuch F (2004) La transition nutritionnelle, l'alimentation et les villes dans les pays en développement. Cah Agric 13(1):23–30
Malassis L (1983) Filières et systèmes agro-alimentaires. Économies et sociétés 17:911–921
Malassis L, Padilla M (1986) Économie agro-alimentaire, Tome 3 L'économie mondiale. Cujas, Paris, p 449
Marsh K, Bugusu B (2007) Food packaging – roles, materials, and environmental issues. J Food Sci 72(3):R39–R55
Masson S, Petiot R (2012) Attractivité territoriale, infrastructures logistiques et développement durable. Cahiers Scientifiques du Transport 61:63–90
McKinney ML (2006) Urbanization as a major cause of biotic homogenization. Biol Conserv 127(3):247–260
Mestdag I (2005) Disappearance of the traditional meal: temporal, social and spatial destructuration. Appetite 45(1):62–74
Monteiro CA, Cannon G (2012) The impact of transnational 'big food' companies on the South: a view from Brazil. PLoS Med 9(7):e1001252
Morana J, Gonzalez-Feliu J (2011) Le transport urbain vert de marchandises : leçons tirées de l'expérience de la ville de Padoue en Italie. Gestion 36(2):18–26

Odeyé M, Bricas N (1985) À propos de l'évolution des styles alimentaires à Dakar. In: Bricas N, Courade G, Coussy J, Hugon P, Muchnik J (eds) Nourrir les villes en Afrique sub-saharienne, Coll. Villes et entreprises. L'Harmattan, Paris, pp 179–195
Ouattara I (2005) Les villes et les campagnes ivoiriennes : quels nouveaux liens? In: Coll JL, Guibbert JJ (eds) L'aménagement au défi de la décentralisation en Afrique de l'Ouest, Coll. Villes et Territoires. Presses Universitaires du Mirail, Toulouse, pp 149–162
Pimentel D, Pimentel MH (eds) (2007) Food, energy, and society, 3rd edn. CRC Press, Boca Raton, p 380
Pingali P (2007) Westernization of Asian diets and the transformation of food systems: implications for research and policy. Food Policy 32(3):281–298
Popkin BM (1999) Urbanization, lifestyle changes and the nutrition transition. World Dev 27(11):1905–1916
Porkka M, Kummu M, Siebert S, Varis O (2013) From food insufficiency towards trade dependency: a historical analysis of global food availability. PLoS One 8(12):e82714
Poulain JP (2002) Sociologies de l'alimentation : les mangeurs et l'espace social alimentaire. PUF, Paris
Poulain JP, Corbeau JP (2002) Penser l'alimentation. Entre imaginaire et rationalité. Privat, Toulouse
Rastoin JL, Ghersi G (2010) Le système alimentaire mondial : concepts et méthodes, analyses et dynamiques. Éditions Quæ, Paris
Requier-Desjardins D (1989) L'alimentation en Afrique : manger ce qu'on peut produire. L'exemple de la consommation alimentaire en Côte d'Ivoire. Karthala, Paris, 169 p
Ritzer G (2011) The McDonaldization of society. Pine Forge Press, Los Angeles
Rosa H (2010) Accélération : une critique sociale du temps. La Découverte, Paris, 474 p
Salomon CJ, Marchand B (eds) (2010) Antiurbain. Origines et conséquences de l'urbaphobie. PPUR, Lausanne, 329 p
Salomon CJ, Mathieu N (2014) Interroger une représentation collective : la ville mal-aimée. In: Martouzet D (ed) Ville aimable. PUFR, Tours, pp 125–154
Sankale M, Wone I, Morosov T, Moroso S, De Lauture H (1980) La place du « ceebu-jën » dans l'alimentation des populations suburbaines de Dakar. Présence Africaine, 1980/1(113):9–44. https://doi.org/10.3917/presa.113.0009
Satterthwaite D, McGranahan G, Tacoli C (2010) Urbanization and its implications for food and farming. Philos Trans R Soc B: Biol Sci 365(1554):2809–2820
Scardigli V (1983) La consommation, culture du quotidien. PUF, Paris, p 35
Schwartz B (2004) The paradox of choice: why less is more. Ecco, New York
Slovic P (1987) Perception of risk. Science 236(4799):280–285
Smith A, Watkiss P, Tweddle G, McKinnon A, Browne M, Hunt A, Treleven C, Nash C, Cross S (2005) The validity of food miles as an indicator of sustainable development – final report produced for Defra. UK Defra, Report ED50254, p 117
Sobal J, Khan LK, Bisogni C (1998) A conceptual model of the food and nutrition system. Soc Sci Med 47(7):853–863
Soler LG, Requillart V, Trystram G (2011) Organisation industrielle et durabilité. In: Esnouf C, Russel M, Bricas N (eds) Pour une alimentation durable. Réflexion stratégique DuALIne. Quæ, Paris, pp 109–142
Stuckler D, Nestle M (2012) Big food, food systems, and global health. PLoS Med 9(6):e1001242
Sudrie O (1985) Dépendance alimentaire et urbanisation, une relation controversée. Revue Tiers Monde 26(104):861–878
Tacoli C (1998) Rural-urban interactions: a guide to the literature. Environ Urban 10:147–166
Tibère L (2009) L'alimentation dans le « vivre ensemble » multiculturel : l'exemple de La Réunion. L'Harmattan, Paris
Touré A (1981) La civilisation quotidienne en Côte d'Ivoire. Procès d'occidentalisation. Karthala, Paris, 279 p

Tukker A, Jansen B (2006) Environmental impacts of products: a detailed review of studies. J Ind Ecol 10(3):159–182
Van der Spek RJ (2008) Feeding Hellenistic Seleucia on the Tigris and Babylon. In: Alston R, Van Niif OM (eds) Feeding the ancient city. Peeters, Leuven, pp 33–45
Viollet PL (2004) L'hydraulique dans les civilisations anciennes : 5 000 ans d'histoire. Presses des Ponts, Paris
Weatherspoon DD, Reardon T (2003) The rise of supermarkets in Africa: implications for agrifood systems and the rural poor. Dev Pol Rev 21(3):333–355
Webster D (1989) Coca-colonisation and national cultures. Over Here 9(2):64–75
Wilkinson J (2008) The food processing industry, globalization and developing countries. In: McCullough EB, Pingali PL, Stamoulis KG (eds) The transformation of agri-food systems: globalization, supply chains and smallholder farmers. FAO, Agricultural Development Economics Div, Rome, pp 87–108
Winarno FG, Allain A (1991) Street foods in developing countries: lessons from Asia. Food Nutr Agric 1:11–18