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Nicolas Bricas is an agricultural engineer by training, specializing in development economics and the socio-anthropology of food. After 6 years of commitment to research action with NGOs to promote local food production in sub-Saharan Africa, he joined Cirad in 1989, where he was in charge of research programmes on food changes in the world. Since 2008 he has been a member of the French multi-stakeholder task force on food security (GISA), where he has done research on global food security governance. He was co-facilitator of a joint CIRAD/INRA think tank on research issues in sustainable food systems (DuAline). More recently, he has led a group looking into urban food policies and the sustainability of urban food systems in the framework of the Surfood programme. Since 2016, he has been Director of the Unesco Chair on World Food Systems.

What are the stakes for city food systems?

Nicolas Bricas
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More than half of the world's population now lives in cities. Of course, not all countries use the same definition of a "city", and the concentrated population thresholds that define it may vary from 2,000 to 20,000 inhabitants! But what always typifies a city is the proportion of its non-agricultural population. City dwellers are very dependent on country dwellers for their food supply, and the city's self-sufficiency in food is limited, at best, to vegetables and perhaps poultry. United Nations projections are that city dwellers will account for 63% of the world population in 25 years. Will the world be able to feed itself as it does today if industrialized countries' urban food model becomes the norm? Probably not. Nevertheless, it seems to be in cities that some solutions for tomorrow are being found.

The challenge of agricultural production models to feed the cities

The rapid growth of cities in the nineteenth and twentieth centuries was made possible by agriculture's success in producing enough to feed a growing number of people not involved in agriculture. On average, worldwide, one farmer now feeds 5.5 persons. But that ratio is 4.2 in Asia and 142 in North America!

That growth has been driven by industrialization—in other words, a production system that draws on non-renewable resources. Mechanization and increased labour productivity were made possible by the use of coal and oil, which also helped to free agriculture of its ancestral function of producing energy and materials. Construction needs less wood and so fewer forests, while farm work and transport needs fewer animals.

Agriculture is now mainly devoted to animal and vegetable food production. The dire predictions of Malthus[1] have been confounded through the use of petroleum (to produce chemical nitrogen) and phosphorus and potassium as fertilizer, and through massive water consumption: since the nineteenth century, food production has grown faster than the population. So abundant has it become, indeed, that livestock as well as humans have been better fed, allowing meat and dairy products to be cheaply produced. In our newly affluent societies, less value has been assigned to food, leading to unconscionable waste: nearly 30 percent of global food production according to FAO figures.

If that trend continues, two outcomes are possible. First, we forge ahead regardless: with a 70 to 100% increase in food production by 2050, depending which author we read, to cope with population growth and changing consumption patterns, taken as a given, that generate more and more animal products and waste. That option ignores an unresolved issue: the origin of fertilizers and energy resources. Indeed, so great an increase can only be sustained if deforestation and mineral resource depletion continue unabated. Alternatively, consumption patterns may change, as consumption of animal products is realigned with production capacity so that non-renewable resources are no longer recklessly squandered. That would mean living within our means, in an agroecological feedback loop of energy, water and fertilizer cycles. And of course, considerably reducing waste, not by repurposing unsold food products but by reducing them to the minimum economically acceptable level. That scenario, which has been explored in such forward-looking analyses as Agrimonde (Paillard *et al*., 2010) and Afterres 2050 (Solagro, 2015), seems the only one with any long-term viability, but it would require a sea change in food systems. The challenge is not just to deal with the exhaustion of mineral resources, but also to reduce pollution. The industrial food system generates high nitrogen loads, plastics pollution from packaging, and great amounts of greenhouse gases (GHGs). The international organization GRAIN claims that about half of worldwide GHG emissions come from the food system.

1. Malthus, a British economist (1766–1834), observing that population grows exponentially while resources grow linearly, predicted disaster.

Cities can help devise new systems. Urban metabolism analyses (Barles, 2002) show that since industrialization, cities have acted as gigantic pumps, concentrating materials. Their supply chains are longer and longer, moving nitrogen, phosphorus, etc. in the form of food from the countryside—sometimes halfway round the world—to the cities. But they do less and less recycling of the waste, which turns into sludge in wastewater treatment plants. Often it is dumped outside the city, when it does not go directly into the rivers or the sea. One symptom of the problem: the "supply chain" so important in the agri-food economy has been understood not to include the issue of waste, as consumption has—over-hastily—been deemed to be its end link. While chemical nitrogen resources from petroleum or mined phosphates are becoming scarcer, there is a growing realization that cities constitute vast deposits of fertilizer, which sustainable agriculture can certainly not do without.

The challenge of food-related jobs

Feeding a city means not only producing more than the agricultural population consumes, but stabilizing the products for storage, processing them for more convenient use, and distributing them to a concentrated population. All of these activities of the agri-food sector represent millions of jobs. In countries with rapid population growth, as in Africa, it is estimated that twenty or thirty thousand jobs per million inhabitants need to be created each year. Where urbanization is recent, living conditions in the cities are so different from the countryside that young people flock to the city. That situation raises serious issues for the food system. It may generate both farm-related rural activities (supply of inputs and services to agriculture, crop processing, storage, transport, marketing) and urban activities (processing, distribution, catering). If, however, highly labour-intensive food systems are the goal, they must resist the pressures of industrialization and business concentration and manage the severe capacity mismatch between small businesses and huge international corporations.

Promotion of such job creation is now one way to combat food insecurity, which, though linked to shortfalls in food production in some

rural areas, is increasingly correlated with growing inequalities. The people who go hungry are those who lack access to the means of food production and sufficient purchasing power to feed themselves properly. From that standpoint, agri-food activities are, in particular for women in the numerous countries where they manage most such activities, a very important income source and a way to increase their capacities, as suggested by Sen (Broutin and Bricas, 2006). By reduction of inequalities is meant, in particular, the reduction of those between the cities and the countryside, for while food insecurity is mainly a rural and indeed peasant phenomenon, one reason for that is that cities have the power to impose prices that afford their suppliers too little profit. Hence, there is a need for urban-rural solidarity and new relationships, which may be based on urban investments in rural areas, forms of contractualization whereby farmers can take advantage of the opportunities afforded by the cities rather than turn to international markets. Wholesale markets managed by cities are very important in that connection in that they give small producers market access.

New nutritional challenges

In developing countries, urbanization is changing the face of food insecurity. Protein-energy undernutrition is falling, but new nutritional pathologies are emerging. Obesity and associated diabetes, cardiovascular disease and some cancers are by no means any longer restricted to affluent industrial societies; they have become a major public health problem. The incidence of such pathologies is alarming in all cities in Latin America, Asia, the Pacific and even Africa. Having greater purchasing power, city dwellers are able to consume products high in fat, sugar and salt. More calories are consumed even as there is less need for them because of lifestyles involving less physical activity and more sedentary work activities. Such overnutrition does not prevent deficiencies in micronutrients (in particular iron, zinc, vitamin A and iodine) that are essential for physical and intellectual growth. Food insecurity also takes the form of diseases caused by unwholesome food: diarrhoea, a principal cause of infant malnutrition, food poisoning, and acute or chronic foodborne illness in developing countries. In their cities' poor neighbourhoods, food

processing, catering and food distribution are heavily dominated by micro-businesses. Public authorities often take scant interest in such businesses, and given the environment in which they operate, with little access to resources (drinking water, healthy locations, training, credit, technical advice, etc.), they tend to peddle unwholesome food that is also low in nutritional quality (street food that is often overly fatty, sweet or salty). These new realities are a real challenge for food policies. They call into question the old policies, which promoted an increase in caloric availability, whereas what is needed nowadays is a way to manage both pathologies, of excess and deficiency, while increasing the wholesomeness and nutritional quality of food.

The challenge of distancing

The changes in the food system can be interpreted as a distancing process. Geographic distancing: as cities expand and agricultural specialization grows, food must be fetched from farther and farther afield. Economic distancing: between the producer and the consumer, intermediaries proliferate. As supply chains lengthen, there is a change in the way confidence in food quality is acquired: at first based on interpersonal trade relationships, it is now built through contracts, standards, reputations or prices. When the intermediaries in question are faceless financialized enterprises or laboratories that deal in chemistry or genomics, building such confidence is a huge challenge—all the more so in that the distancing is also cognitive. Fewer and fewer city dwellers have lived, or have relatives who have lived, on a farm. Out of ignorance, idealization, or demonization of agriculture and the contemporary agri-food industry, misunderstandings and conflict are becoming more frequent. The distancing is also political. Consumers feel they have lost all control or direction of the system. Despite the development of political consumerism that engages in boycotts or "buycotts", they increasingly feel powerless to influence the system.

One factor that helps explain local urban governments' mobilization with respect to food issues is the prospect of regaining some control over the food system. That is nothing new. Cities manage land in order to reserve green space or even agricultural plots in the heart of built-up areas or on the outskirts. They organize food supply and

distribution and manage sales outlets: wholesale or retail markets and supermarkets. In many countries they manage catering, and in particular school catering. Finally, they manage organic and inorganic waste. What is new is their willingness to rethink how these urban levers are applied to the new food challenges, especially as regards those raised by the countless civic and entrepreneurial initiatives that are undertaken more and more often in cities with the goal of producing, selling or eating differently.

The things invented by citizens or certain businesses in their search for alternatives, plus the things cities invent in terms of new and more participatory ways of devising policy, can catalyse new food systems that are more sustainable in social, economic, environmental and political terms. However, changes in dominant systems will not happen with only the levers available to cities. Governance must be local and global. Today, food systems are shaped by national and international policies and the practices of major industrial groups, which must also adopt new strategies, particularly under pressure from networked cities. On 15 October 2015, some one hundred world cities signed a Pact to that effect in Milan. Together, they are determined to make their voices heard at higher levels, where decisions are made that affect them. ★

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