

Land Use and Food Security in 2050: a Narrow Road

Agrimonde-Terra

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9. Urbanization, Rural Transformation and Future Urban-Rural Linkages

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Introduction

URBAN-RURAL RELATIONSHIPS AND URBANIZATION processes play a significant role in food value chains, food security and nutrition, and, indeed, in land-use changes, though this is still overlooked in spite of some studies (Tacoli, 1998; Marsden and Sonnino, 2012). Since the 2008 food crisis, debates on food security and agricultural issues have emphasized the significance of the spatial organization of food systems and the location of agriculture. In this chapter, we focus on socio-spatial relationships between urban and rural areas taking into account urbanization processes and the structural transformation of rural spaces. Urbanization processes are transforming social, economic and ecosystem interactions between urban and rural areas and play a central role in re-configuring food supply chains. Rapid land-use change results from the intensified connections of cities and rural hinterlands, of sites of production and consumption, at various scales (Friis and Nielsen, 2017). For example, evidence of the increasing distance between places where demand for food is found and those where it is produced can be seen in the growth of food miles (Paxton, 1994) and the international food trade (Kastner *et al.*, 2014). However, agriculture remains the primary activity in rural areas in developing countries, where it constitutes the main form of employment and rural areas continue to face specific issues with regard to poverty, food insecurity and undernutrition.

Rather than an overly dichotomous analysis, for example restricting urban dwellers to the role of consumers and rural populations to the role of food producers, the aim of this chapter is to explore the complex and intricate issues of urban-rural interactions based on a method combining two approaches. The first, summarized in Section 2, is a

40. The authors thank all the participants of the two sessions of the workshop on rural-urban relationships (Box 9.1). They also thank the contributors to the four regional case studies that helped us to finalize our rural-urban relationship hypotheses for 2050: Jonathan Rigg and Alberto Salamanca for their study on North Thailand, Ophélie Robineau for a study on Bobo-Dioulasso (Burkina Faso), Daniela Toccaçeli for a study on Tuscany (Italy) and Bayuni Shantiko for a study on Java and Sumatra (Indonesia). For a presentation of those case studies, see the report of the workshop in Mora *et al.* (2014).

comprehensive scientific review scanning separately the current trends in urbanization and rural transformation processes. The second, presented in Section 3, is the result of a foresight workshop based on a specific expert group (Box 9.1). Based on the underpinning empirical observations, possible disruptions, weak signals and scientific controversies, the workshop resulted in the building of hypotheses about urban-rural relationships in 2050. Through these hypotheses, we underline the diverse significance of urban-rural assemblages for land use and food and nutrition security.

Significance and changes in urban-rural relationships

I The process of urbanization

The pace, nature and drivers of urbanization are discussed in the scientific literature. The shift from a mainly rural to a mainly urban population, through the increase in permanent rural-to-urban migration and natural growth in the urban population, underpins the global rise of an 'urban era'. However, the analytical dichotomy between urban and rural areas, and also the mechanisms at play, are increasingly subject to debate (Brenner and Schmid, 2013). It seems that the more urbanization increases, the more the ways of describing urban forms and urbanization processes are called into question; the apparent uniqueness of the urbanization phenomenon conceals a diversity of processes and relationships with rural areas.

Urbanization trends

Measuring the urban phenomenon remains a challenge, as there is no unified definition of what constitutes urban. An 'urban area' is a vague concept, and the designation of urban or rural settlements is often linked to administrative functions. Depending on the country, the minimum size for an urban area ranges from a threshold of more than 2,000 inhabitants (as in France, Kenya and Gabon) to a threshold of 5,000 (Madagascar, Ghana and Mali), 10,000 (Greece and Ivory Coast) and even 20,000 inhabitants in the case of Nigeria (Moriconi-Ebrard *et al.*, 2010). This criterion is frequently combined with other criteria concerning activities, with a strong presence of agricultural activities being discriminatory for the definition of 'urban'. The definition of an urban population has consequences on the definition of the rural population, since the most regular feature of 'rural' is characterized by that which is not 'city'.

The most common indicator used for measuring urbanization is the urbanization level, which is "the increasing share of a nation's population living in urban areas" (Satterthwaite *et al.*, 2010). An increase in urbanization level results from several outcomes: net migration from rural to urban areas, high fertility rates and high natural urban growth in urban areas (Jedwab *et al.*, 2015), expansion of urban boundaries or the formation of new urban centres based on *in situ* growth of rural villages (McGranahan and Satterthwaite, 2014).

Box 9.1. Members of the expert group on rural-urban relationships and contributors to rural-urban relationship hypotheses in 2050.

Members of the expert group on rural-urban relationships

Name	Institution	Discipline
Christine Aubry	INRA, UMR SADAPT, Paris, France	Agronomics
Nicolas Bricas	CIRAD, UMR Moisa, Montpellier, France	Socio-economics
Jean-Marie Cour	Consultant, retired expert	Engineer
Julien Custot	FAO, Rome, Italy	Agronomics
Carl Gaigné	INRA, UMR SMART-LERECO, Rennes, France	Economic Geography
Hélène Guéat	University of Toulouse, UMR Dynamiques Rurales, Toulouse, France	Geography
Bruno Losch	CIRAD, UMR ARTDev, Montpellier, France	Economics
François Moriconi-Ebrard	CNRS, UMR Espace, Avignon, France	Geography
Paule Moustier	CIRAD, UMR Moisa, Montpellier, France	Economics
Claude Napoléone	INRA, UMR Ecodéveloppement, Avignon, France	Economics
Martine Padilla	CIHEAM, Montpellier, France	Economics
Jonathan Rigg	Durham University, National University of Singapore, Singapore	Geography of Development
Adrian Rodriguez	CEPAL, Economic Commission for Latin America and the Caribbean (ECLAC), Santiago, Chile	Economics
Roberta Sonnino	School of City and Regional Planning, Glamorgan Building, Cardiff University, Cardiff, UK	Geography and planning
Christophe Soulard	INRA, UMR Innovation, Toulouse, France	Geography
Akiko Suwa-Eisenmann	INRA, UMR PjSE, Paris, France	Economics
Cecilia Tacoli	International Institute for Environment and Development (IIED), London, UK	Acting Head, Human Settlements Group; Team Leader, Rural-urban
Daniela Toccaceli	Centro Interuniversitario Europeo di Studi Rurali GAIA, Dipartimento di Scienze Economiche, University of Florence, Florence, Italy	Territorial economics
Erik Westholm	Swedish University of Agricultural Sciences, Dep. Urban and Rural Development, Högskolan Dalarna, Sweden	Social and economic geography

Contributors to rural-urban relationship assumptions in 2050

Name	Institution	Case study
Jonathan Rigg	Faculty of Arts and Social Sciences, National University of Singapore, Singapore	Thailand
Alberto Salamanca	Stockholm Environment Institute, Asia Centre, Bangkok, Thailand	Thailand
Daniela Toccaceli	University of Florence, Florence, Italy	Tuscany (Italy)
Ophélie Robineau	CIRAD, UMR Innovation, Toulouse, France	Bobo-Dioulasso (Burkina Faso)
Bayuni Shantiko	Center for International Forestry Research, Bogor, Indonesia	Java and Sumatra (Indonesia)

The difficulty of identifying what is urban or rural is demonstrated by the case of India. In India, the urbanization level, as defined by the Census of India, remains at 28%, one of the lowest in the world, arguing for a high potential for urban growth in the future. However, in 2001, the number of 'villages' having more than 10,000 inhabitants in India surpassed the number of official 'towns' and 'urban areas' with more than 10,000 inhabitants. In other countries, these 'villages' would be considered small towns and included in the 'urban' category. The authors conclude that the urbanization level is underestimated in India and that the "statistical approach of the urbanization does not allow to take in account the dramatic increase of thousands of small-sized urban localities" (Denis and Marius-Gnanou, 2011).

An urban transition

Based on the thresholds used in each country, the United Nations has estimated that over the past 60 years, the process of urbanization has been very rapid with the global urbanization level evolving from 30% in 1950 (meaning that 70% of the global population lived in rural areas) to 50% in 2007. This date underlines a shift in the world's population, which has become mainly urban. In the latest urbanization prospects, published by the United Nations Population Division for 2014, the global urbanization level (the share of urbanites in the total population) was 54% (UN, 2015). The urbanization level was low in Asia and Africa, as these regions remain mainly rural with only 48% and 40% of their population living in urban areas. The highest levels of urbanization were in Latin America and the Caribbean (80%), North America (81%) and Europe (73%). In 2014, 78% of the inhabitants of more developed regions lived in urban areas, while this figure was only 48% for less developed regions. Since 1950, the rate of urbanization has been high in Asia and Africa, with a 1.5% and 1.1% annual increase in the proportion of urban population respectively. This indicates a rapid pace of urbanization compared to the slow pace seen in regions with high levels of urbanization, where the rate is generally less than 0.4% annually.

According to UN projections, the world's urban population is expected to rise from 3.9 billion in 2014 to 4.9 billion in 2030 and to 6.3 billion in 2050, which corresponds to 66% of the world's population being urban (UN, 2015). From 2014 to 2050, 90% of the increase in the world's urban population will take place in Asia and Africa. The 50% threshold in urbanization would be crossed in 2030 in Asia and in 2050 for Africa, these regions reaching urban populations of 64% and 56% respectively in 2050. In sub-Saharan Africa, the urban population will quadruple, reaching 1.1 billion people, while that of Asia will increase by +61%, with India's rural population doubling to reach 0.9 billion people in 2050. In contrast, in a few developed countries the urban population is expected to decline by 2050, with falls of -7 million in the Former Soviet Union and -12 million in Japan. The regional hypothesis of an eventual fall in the urban population should also not be excluded, as this has been observed in certain regions in the Northern hemisphere, particularly in some historical cities in regions experiencing economic decline or demographic changes, labelled "shrinking cities" (Pallagst *et al.*, 2009).

According to UN projections, the world's rural population will remain stable between 2014 and 2050. From 3.4 billion people currently, it will reach a peak in 2020 and decline slowly after this date to a rural population of 3.2 billion people in 2050. However, rural trends will be diverse between regions and will even evolve in contrasting ways. The rural population is expected to increase in one-third of the countries in the world, while remaining stagnant or decreasing in the other two-thirds. In sub-Saharan Africa, the rural population is expected to almost double, reaching 0.9 billion people in 2050. In Oceania, the rural population is expected to rise from a quarter (reaching 11 million people in 2050). With the exception of China, the rural population is expected to remain stable in Asia. In China, a major rural decline is expected to reduce the rural population by half, falling to 355 million people in rural areas in 2050.

The growth of urban populations associated with urbanization most often results in a reduction of the rural population.⁴¹ However, this relationship is neither general nor automatic. In developed countries, urban growth has long been based on rural migration fostered by high rural birth rates. The singular position of the African continent should be taken into account when analyzing the urban-rural interactions that are important to food security. That a high-growth rural population is maintained over the course of the urbanization process seems to support the thesis of the existence of urbanization processes without industrialization, or even without growth (Fay and Opal, 2000), in what Bezemer and Headey call the "urban bias" (2008). In this case, urbanization is not able to accelerate the transformation of rural structures (decline in the number of rural active workers and the modernization of agriculture) as was observed in industrialized countries. In addition, it should be pointed out that the UN's methods for estimating trends tend to overestimate the rate of urbanization by 20 to 30% depending on the world region in development. Taking into account other hypotheses for changes in birth rates in urban areas also calls for the downward revision of hypotheses for urban growth (Bocquier, 2004; Montgomery, 2008; Potts, 2009).

Urban settlement size: the emergence of megacities and the development of medium-sized cities

Urban systems may simultaneously be defined by the distribution of the urban population between differently sized cities (urban hierarchy), the configuration of urban networks (polarized, polycentric or mono-centric) and by the morphology of the urban space (linear, star-shaped, compact, spread out etc.). All of these factors result from the history of interactions between cities, and each city's interactions with the natural and other resources of its surrounding area and the wider spaces beyond (the city's interface with the rest of the world).

The settlement size induced by urbanization processes is also important for urban-rural linkages. Recurring discourse in the media associates urbanization dynamics with the

41. In the early 20th century there were seven rural inhabitants for one urban inhabitant, today the ratio is one for one.

multiplication of large metropolises on a global scale, 'megacities', emphasizing their strong demographic growth and their spatial expansion ('sprawl'). Indeed, one of the features of 20th century urbanization was that it led to the appearance of these large cities. In 50 years, the average size of the 100 most populated cities climbed from 2 million inhabitants in 1950 to 6.3 million inhabitants in 2000. There were just two 'megacities' (*i.e.* cities with more than 10 million inhabitants) in 1950, 10 in 1990 accounting for 6.7% of the world's urban population, and 28 in 2014. Between 1990 and 2014, the number of large cities of 5 to 10 million inhabitants more than doubled. In 2014, most of the large cities and megacities are already located in developing regions (Asia, Latin America and Africa). Contrary to the generally accepted idea, these large cities only host a small proportion of the global population. In 2014, megacities accounted for 12% of the world's urban population, while small urban settlements with less than 500,000 inhabitants currently host half of the world's urban population.

Moreover, medium-sized cities (1 to 5 million inhabitants) have been growing at a much faster pace than megacities. The population living in medium-sized cities doubled between 1990 and 2014, with 20% of the urban population living in these cities.

There is a scientific debate about the future of urban settlement trends. Some argue that historical trends, which tend to slowly shrink the share of urban population in small settlements in favour of megacities, will continue (UN, 2015). Others argue that the growth of large cities is decelerating and that the urban population is relocating in small and medium-size cities organized in networks (Satterthwaite *et al.*, 2010; Moriconi-Ebrad *et al.*, 2008). Despite past predictions of strong urban growth, megacity growth has slowed over recent decades (Jakarta), to reach a state of virtually no growth (Bangkok and Seoul) (Montgomery, 2008), or are increasing only through their natural demographic growth (for example, in India).

In 2025, the urban population in large cities with over 5 million inhabitants is expected to rise to 22% and to 24% for cities with 1 to 5 million inhabitants (UN, 2012). In 2030, the emergence of larger cities is expected, located in developing regions. One more megacity and six more large cities are expected to appear in China, seven more megacities in India, three more megacities and nine more larger cities in Africa and two more megacities in Latin America (UN, 2015). This trend to higher urbanite concentration in large cities is greater in developing countries than in developed countries, where the proportion of cities with less than 500,000 inhabitants is expected to fall from 50% to 41% in 2025, compared to only 53% to 46% in developing countries. However, according to Montgomery (2008), in the future these smaller towns (with fewer than 500,000 inhabitants) will continue to absorb close to half of the growth in the urban population, whereas megacities will not absorb a large share of this growth (about 10%).

The emergence of metropolitan regions

With the rise of megacities, the forms of urbanization in Asia and particularly in South-East Asia have been described as the emergence of large metropolitan regions within which

urban-rural distinctions tend to disappear (McGee, 2009). Many terms have been used in the analysis of this specific urbanization processes, such as 'Desakota', 'City-Regions', 'Mega-Urban Regions' and 'Extended Metropolitan Regions'. The first metropolitan regions identified were Jakarta-Bandung, Hong Kong and the Pearl River delta region, and Bangkok.

This process of metropolization is characterized by the transformation of large cities in a fragmented peri-urban space and multi-polarized urban settlements. As described by other authors studying other world regions, the process of metropolization does not appear as a monocentric settlement pattern with a concentric spatial increase around one centre (as in Moscow) but as the emergence of a metropolitan network of cities with a poly-centric agglomeration pattern (as in Brussels/Anvers, Milan/Verona and Porto) (Moriconi-Ebrad, 2014).

In Asia, the emergence of metropolitan regions is also characterized by a high degree of mobility of people between workplace and residential areas (commuting), mobility of goods and by the close articulation of farming and non-farming activities (McGee, 2009). Studies carried out in Asia have characterized these dynamics in Manila, Jakarta, Bangkok, Kuala Lumpur, Ho Chi Minh City and Hanoi (McGee, 2009). To refer to the emergence of these new metropolitan spaces hybridizing rural and urban characteristics, in his study of Jakarta McGee uses the term *desakota*, combining the Indonesian words *desa* (village) and *kota* (city). It stresses the interpenetration of urban activities (industries and infrastructure) and rural areas, and at the same time a certain urbanization of rural lifestyles (forms of mobility and non-farming activities). The term *desakota* also conveys an urbanization process that does not fit the classical theory of rural migrations fuelling the growth and expansion of cities while rural regions decline (McGee, 1991). It differs from Western visions of peri-urbanization, mainly fuelled by households' migration from towns towards their peripheries. The term *desakota* describes an urbanization that takes place *in situ* in rural areas with a high population density and which, through the growth of rural populations close to large metropolises, gives rise to extended metropolitan regions where farming and non-farming activities are closely intertwined, where urban buildings border fields and where transport and communication conditions have improved. This *in situ* urbanization is particularly strong in China, where rural migration towards cities is regulated by the Hukou system and where the influence of coastal metropolises is giving rise to vast metropolitan regions, as in the case of the Quanzhou 'city-region' (Zhu *et al.*, 2009) and the Shenyang-Dalian region (Wang, 1997).

The governance of metropolitan regions combines several land-use systems, one based on rural or 'agrarian' regulation and the other urban, based on titled land ownership. Traditional land regulations often break down with the urban activities that characterize these spaces and so they escape urban planning tools, making these spaces 'grey areas' for metropolitan governments. In addition, low-income households are often excluded from cultivated land since the competition for land usage intensifies with urban expansion (Tacoli, 2003; Shantiko, 2014). A major problem with these areas concerns the environmental tensions surrounding farmland, due to the pressure on land for urbanization

and the environmental deterioration due to highly intensive use, particularly of water, and air pollution (McGee, 2009).

Urbanization has concentrated consumers in large urban centres, physically distancing them from agricultural production spaces, and so the feeding of urbanites relies on complex and sometimes extremely long supply chains that mix the local, regional and international scales. As Allen (2009) highlights, as global trade expands, large cities become “less reliant upon their hinterland for sustenance and are increasingly importing not only their consumer goods, but also food, energy, water and building materials from distant sources.”

The role of intermediate cities

The importance of small towns in urbanization dynamics and in the distribution of the urban population has also been highlighted by different authors (Moriconi-Ebrard *et al.*, 2010; Denis and Marius-Gnanou, 2011; Cohen, 2006; Montgomery, 2008; UN, 2012). The Africapolis study identified three contexts propitious for the growth of small cities: (i) in the densest rural regions, (ii) in the peripheries of large cities, and (iii) along major transport arteries, emphasizing the need to deepen knowledge on this last context. In sub-Saharan Africa, the emergence and multiplication of small towns results from *in situ* growth of villages and rural towns, essentially through natural growth without migration. Moriconi-Ebrard *et al.* (2008) stress the singularity of the urbanization dynamics at play, contrary to the classical perception of urban growth due to rural migration: it is “the lack of rural exodus [that] explain[s] urbanization, which in this case materializes through the proliferation of small and medium-sized towns” (Africapolis, 2008). These trends are driving the appearance of an ever-denser fabric of small towns, which can form vast nebulae or networks, such as the loose urban fabric that entirely covers the Kerala region in India (Denis and Marius-Gnanou, 2011).

Small urban centres provide access to employment in economic activities and to basic services such as health and education, both to urban people and to rural people from surrounding areas (Satterthwaite *et al.*, 2010). As highlighted by Cohen (2006), policies in favour of small cities remain weak and in view of future changes in small cities, they need to improve their basic services in order to be able to manage their rapidly growing populations.

Small towns are also major places of intermediation with rural surrounding areas and agriculture (Chaléard, 1996). They simultaneously concentrate markets for agricultural products, transport activities, food processing and spaces of intermediation with external urban markets. They are central places for regional economies generating incomes for residents and migrants, and consuming and processing food from surrounding agriculture (Satterthwaite and Tacoli, 2003; Albaladejo, 2012; Robineau, 2014 and 2015). For example, in Bobo-Dioulasso, agriculture was previously based on the production of a main cash crop (cotton) and part of globalized networks. Today, Bobo-Dioulasso is a city in a strong relationship with its rural areas, which host diversified agricultural production: “the city acts as a relay for agricultural products, both for their processing and marketing, and

maintains close links with the agricultural activities in the region” (Robineau, 2014). Several contexts highlight the importance of these intermediary cities as vectors for shaping rural economies in response to urban demand, including China (Shen and Mab, 2005) and Europe (Toccalci, 2014).

The hypotheses of reverse dynamics of urbanization

Along with Southern Asia, sub-Saharan Africa is a region with one of the world’s lowest urbanization levels (37%) but is undergoing urban growth, the intensity, nature and forms of which are debated. Urbanization in Africa is often characterized as the migration of poverty, driven by permanent rural migration towards urban areas (UN-HABITAT, 2008). However, as Fay and Opal (2000) noted, these cities are not in a position to create sufficient employment to absorb the influx of rural migrants. Based on the analysis of recent data collected by the UN-HABITAT Programme, Potts (2013) sheds light on unexpected variation rates in the urban population in sub-Saharan Africa.⁴² In a general trend reversal compared to the previous period, which saw a general rise in the levels of urbanization, a counter-urbanization trend (*i.e.*, a drop in the share of the urban population) can be observed in 10 countries, while four others have a low rate of urbanization and only three countries are still experiencing a rise (*ibid.*).

The analysis of migratory dynamics sheds light on complex trends in urban-rural relationships. Even though migration towards cities continues to exist, at a statistical level, over the past 10 years, it has been counterbalanced by out-migration due to the lack of economic opportunities and security in the cities. As Andersson Djurfeldt and Jirstrom (2013) put it, the fall in rural migration as the main source of urbanization reflects changes in migratory behaviours. In part, permanent rural to urban migrations are being replaced with circular or seasonal migrations. These forms of mobility are resources that allow individuals and households to face up to the uncertainties encountered in urban settings (Andersson Djurfeldt, 2002; Simon *et al.*, 2004). Temporary migrations have been studied in Zimbabwe (Anderson, 2002), Ghana (Simon *et al.*, 2004), Zambia (Potts, 2005), West Africa (Beauchemin and Bocquier, 2004) and sub-Saharan Africa in general (Potts, 2013). These migration strategies in the face of precariousness translate into the development of a ‘culture of mobility’ between urban and rural habitats, sometimes on a transnational scale.

Rural transformations

At the global level, agriculture is still the main sector of employment. In 1990, 31% of the active population in middle-income countries worked in farming and 69% in low-income countries. The agricultural sector accounted for only 5% of the active population in high-

42. “By contrast urbanization in most countries in Asia has really been rapid: in the past two decades a much larger proportional shift out of rural areas has occurred than has recently been typical in Africa” (Potts, 2013).

income countries. These figures illustrate the wide variety of rural economies found around the world, but also the predominance of farming activities. In developing countries, most regional and rural household income depends essentially on small farms. Worldwide, it is estimated that 450 million farmers cultivate holdings of less than 2 ha, most of them living in Asia, supporting a population of around 2 billion (Rigg *et al.*, 2016). Rural areas and agricultural activities continue to face specific issues concerning poverty, food insecurity and undernutrition; more than half of the people in the world facing food insecurity are small farmers.

In the coming years, rural areas of certain developing countries where the rural population is still growing will face strong rural transformations. For example, in sub-Saharan Africa, between now and 2025, economies will have to incorporate 330 million youths, 195 million in rural areas and 135 million in cities; 60% of the new workers entering the labour market will be rural (Losch *et al.*, 2012). Currently, 65% of sub-Saharan Africa's population still lives in rural areas and 65% of the labour force is engaged in agriculture. Given the challenges sub-Saharan Africa will face over the short and medium term (a 15-year period), it is difficult to imagine the creation of hundreds of thousands jobs a year in urban areas. This means that rural activities, which refers to both agriculture and the rural non-farm economy, will account for the "major part of the equation of youth employment" (Losch *et al.*, 2012).

Rural non-farming employment and the 'deagrarianization' hypothesis

Many studies have shown the growing role of non-farm activities in the development of rural economies and its importance for household income in developing countries. Over the past 30 years, non-farm activities (excluding secondary and seasonal activities) have developed and make up 30% of full-time rural employment in Asia and Latin America, 20% in West Asia and North Africa, and 10% in Africa (Haggblade *et al.*, 2010). The household surveys examined by Reardon *et al.* (2007) have measured rural income by including seasonal and part-time activities. The resulting findings show that income from non-farming activities accounts for close to 35% of rural income in Africa and close to 50% in Asia and Latin America. The role of remittances (included in non-farm incomes) in this income varies between 11% of rural income in Asia and 6% in Africa and Latin America. This non-farming employment involves not only industry, which accounts for close to 20-25% of rural non-farming employment, but trade, transport, construction and other local services, which account for 75-80% (Haggblade *et al.*, 2010). The composition of these activities varies hugely: small businesses offering farming services and food processing activities in rural areas, seasonal employment in farming and food processing etc. In some countries, public employment contributes to rural non-farming income, for example, in Egypt and Pakistan (45% and 25% of rural non-farming income respectively), and in India, where it makes up approximately 20% of rural non-farming employment (*ibid.*).

The increase in rural non-farming employment has been particularly strong over the past 20 years and many authors have argued that there is a 'deagrarianization' of the rural economy (Bryceson, 2002). Deagrarianization is seen as a long-term process with peasants

veering away from the traditional production of export crops and staple crops, and finding income diversification in non-agricultural activities (ibid.). However, deagrarianization in sub-Saharan Africa has been much debated. Some authors emphasize the need to develop a livelihood approach to understand these changes. It is not just a change in the development model from agrarian to non-agrarian modes of production, but in terms of livelihood strategies for the adaptation and diversification of activities, bearing in mind the reversibility of such strategies used by households (Yaro, 2006).

There is a particularly large share of part-time activities and income diversification in rural non-farming employment. Studying Bangladesh, Nepal and Pakistan, Davis *et al.* (2010) showed that most households (52%, 53% and 36% respectively) have diversified sources of income (no activity exceeds 75% of total income). So in India (Lanjouw and Murgai, 2009), the share of rural non-farming employment rose from 22% to 31% between 1983 and 2004. Over the same period, the share of full-time farmers dropped from 38.8% to 31.9% and that of farming employees from 24.3% to 21.8%. According to Reardon and Timmer (2014), the current growth of rural income in Asia is mainly due to the growth in non-farming employment.

Multi-local households and new urban-rural mobilities

Mobility is complex and affects urban-rural relationships in multiple ways: long-distance migration, permanent migration, commuting between peri-urban areas and urban centres, circular or temporary migration, not to mention the leisure-related mobility that is particularly significant in developed countries. As Rigg and Salamanca (2014) underlined, “drawing a distinction between rural and urban and farming and non-farming, whether we do that in terms of production or labour, prevents us from seeing the inter-leaving of these activities and spaces”. Several researchers have pointed out that rural–urban migrations in developing countries are increasingly temporary or circular, through multi-local households that remain engaged in farming and develop non-farm activities in rural or urban areas (Tacoli, 2002; Rigg, 2006). Studies in Asia, Latin America and sub-Saharan Africa underline the relationships between temporary mobility and the diversification of rural activities. These studies highlight multiple locations and rural change in Malaysia (Preston and Ngah, 2012), livelihood diversification in rural Laos (Martin and Lorenzen, 2016) and rural Thailand (Rigg *et al.*, 2012), rural livelihood diversification in sub-Saharan Africa (Ellis, 1998; Bryceson, 2002), multi-local livelihood and food security in rural Africa (Andersson Djurfeldt, 2015b), complex livelihood and circular migration for farmers in Mozambique (Mercandalli, 2013), pluri-activity and temporal mobility in rural and farming households in Bolivia and Central America (Vassas Toral, 2011; Prunier, 2013); multi-sited households in Amazonia (Pinedo-Vasquez and Padoch, 2009).

With the aim of diversifying the incomes of rural households, farming ones in particular, temporary migrations connect a rather rural location, where part of the household is located and engaged in farming activities, to another location, urban or rural, where other members of the household are engaged in income-earning activities in industry, services

or agriculture. Temporary or circular migrations that rely on extended family networks are becoming the norm in some developing countries in Asia and Latin America. They support diversified incomes for households, contributing to food security at this level.

Rigg (2006) stressed the fact that, far from just being poverty management strategies, circular and temporary migrations allow villagers to escape the employment constraints linked to farm work and to work throughout the year, thereby securing more regular income and diversifying the income stream. As Rigg and Salamanca (2014) show in their study of two villages in rural Thailand, households are often multi-sited between a village and Bangkok. These changes are linked to transformations in both rural and urban areas. Improving infrastructure, personal mobility and services in rural areas has permitted villagers to be multi-local, while the development of factories in peri-urban and rural areas brings work to mobile members of rural households. Furthermore, the resilience of farming in a household's activities is closely linked to the vulnerabilities associated with non-farm work (*ibid.*). In this process, households "as a unit of production, emotional attachment and social relations" have not been dissolved, but have been re-spatialized (*ibid.*). In rural Asia, a large proportion of rural households have now diversified their activities in both urban and rural areas with income streams coming from both farm and non-farm activities and can be characterized as multi-local (Rigg *et al.*, 2012).

As the current urbanization processes lead to a growth in small towns and increase the connectivity between urban and rural areas, the improved accessibility of towns or rural markets through transport infrastructure drives the development of rural non-farming activities. As Andersson Djurfeldt (2015a) shows in sub-Saharan Africa, smallholders in rural areas close to small towns are more likely to benefit from these changes in rural employment than those in remote rural areas that are poorly connected to urban centres.

Multi-local livelihoods depend on family networks and comprise temporary migration, remittances from urban to rural areas and food transfers from rural to urban areas (Rigg and Salamanca, 2014; Andersson Djurfeldt, 2015a). Cash transfers from remittances can contribute to the development of agriculture and can reduce rural poverty, thereby improving food security (Rigg, 2006; Satterthwaite *et al.*, 2010; Deshingkar, 2012). However, the consequences of circular migration on agricultural development are ambiguous. On the one hand, remittances "sustain livelihoods, permit investment in education and farming, and bring development and substantial material gains to the village" (Rigg and Salamanca, 2014). Remittances can stimulate agricultural development and food security through higher urban incomes and new commercial opportunities (Andersson Djurfeldt, 2015a). As observed in Africa and Asia, these outside incomes allow investments to be made in farm production, through the purchase of agricultural inputs in particular, but they also help farmers to assure the financial security in their households that is necessary for experimentation with new agricultural practices, particularly crop intensification (Deshingkar, 2012). On the other hand, the departure of workers from the farm, and young people in particular, can lead to an accelerated ageing of the farming population (for example, China and Thailand), a feminization of agricultural work, or a deintensification

process (Rigg and Salamanca, 2014). Moreover, for the poorest households, food transfers from rural to urban areas can have a negative effect on food security for rural household members (Andersson Djurfeldt, 2015a).

Diverse rural transformations

A diversity of rural dynamics has been identified. First, non-agricultural activities develop in rural areas alongside agricultural ones (Haggblade *et al.*, 2010; Losch *et al.*, 2012). Non-farm activities provide additional income streams for rural households, drive permanent and temporary migration towards urban centres (with money and knowledge flowing back towards the countryside) and have led to the phenomenon of multi-local households (Rigg, 2006). In particular, household strategies prompt a reconsideration of the urban–rural dichotomy in favour of diverse possibilities ranging from urban to rural, which provide both opportunities and present challenges for households.

Second, from a spatial perspective, some rural areas develop into peri-urban areas because of urbanization pressures, with a specific mix of agricultural and urban activities (McGee, 1991; Moustier and Fall, 2004; Lerner and Eakin, 2011). Third, synergies arise between rural areas and small towns as they are simultaneously a market for products, a place for food processing and spaces of intermediation with other urban markets. Fourth, agriculture remains the primary activity in rural areas in developing countries. In regions where urbanization processes are weak, some reagrarization could occur because of possible political and social crises.

Future urban-rural linkages in 2050

ANALYZING CHANGES IN THE RELATIONSHIPS between urban and rural areas and their implications for land use and food security needs to take into account both the processes of urbanization and the transformation of rural areas. Rather than an overly dichotomous analysis, for example restricting urban dwellers to the role of consumers and rural dwellers to the role of food producers, we offer inter-relational assumptions for urban and rural areas.

Based on urban and rural trends, weak signals and possible disruptions, hypotheses for change in 2050 were constructed by the expert group. Three hypotheses for urbanization processes in 2050 have been developed: a concentration in large cities; the emergence of a network of cities; and a reverse trend towards the stagnation of large cities. In addition, four hypotheses for rural transformation based on rural trend processes have been constructed: the marginalization of the rural economy; the relative disappearance of the agricultural economy (deagrarianization); rural-urban synergies; and the diversification of the rural economy. Crossing hypotheses about urbanization processes and rural dynamics in 2050, we produce a matrix describing possible urban-rural linkages in 2050 (Figure 9.1). The aim of this double-entry table is to define the extent of what is possible and to explore the widest possible latitude of rural-urban interactions. These alternative visions of rural-urban relationships in 2050 range from the separation and complete control of one type

Figure 9.1. Alternative hypotheses for urban-rural linkages in 2050, combining urbanization processes and rural transformations.

Urbanisation processes to 2050	Concentration in large cities, spatial disruption	Network of cities		Deconcentration of large cities
Urban population growth	Strong urban growth through rural migration and population decline in rural areas	Endogenous (births) and exogenous (migration) urban growth		Growth stops in large cities, urban deconcentration and counter-urbanization
Urban system: size and distribution of cities	Unipolar urban systems	Multipolar and interconnected urban systems		Multipolar urban systems, degrowth of large cities
Urban morphology	Continuous linear expansion (coastal areas etc.)	Multipolar and interconnected urban systems		Multipolar urban systems, degrowth of large cities
Lifestyles	Standardization of lifestyles: mobility, individualism, consumerism, weakening of family ties	Differentiation of lifestyles: mobility and membership in multiple networks		Inward-looking communities OR new social systems based on deceleration and peer networks
	↓	↓	↓	↓
Rural transformation to 2050	Relative disappearance of the agricultural economy, deagrarianization	Synergy between urban and rural areas	Diversified rural economy	Marginalization of the rural economy
Rural and agricultural employment	Declining employment opportunities, more non-agricultural employment	More non-agricultural employment	Off-farm employment in agriculture is maintained, growth in non-agricultural jobs for processing/marketing	On-farm employment prevails, limited off-farm non-agricultural jobs
Rural connection to cities	Limited connections, metropolization, urban people work in agricultural production	Good infrastructure for both people and goods	Secondary urban centres expand, synergy between rural and secondary urban centres	Difficult connection to urban centres, connections mainly for people, more difficult for agricultural producers
Organization of rural households	Pluriactive households, rural migration (young people)	Specialisation of households in urban and rural areas (archipelago.org), and specialisation within households	Diversified activities	Isolated "urban households" in rural areas
Food strategies	Food supply from global food system	Diversified diet: subsistence + global food systems + family network	Diversified diet based on local market	Home consumption (subsistence)
	↓	↓	↓	↓
Urban-rural relationships to 2050	Large metropolitan region	Multi-local and pluriactive households in rural-urban archipelago	Rural areas integrated into urban networks through value chains	Urban fragmentation and counter-urbanization

of dynamics over another through to the implementation of integrated linkages, with a number of possible intermediate situations.

Our hypotheses to 2050 focus on four main future configurations in rural-urban relationships: megacities and spatial rupture with rural hinterlands; the role of intermediate urban centres in agri-food networks; household mobility and multi-activities between urban and rural areas; urban fragmentation, counter-urbanization and reagrarianization. These four assumptions can help to understand how distinct issues might be articulated and to better differentiate what is at stake for food security in these specific rural-urban linkages. In order to test and to enrich the plausibility of these hypotheses about rural-urban linkages, experts such as Jonathan Rigg and Albert Salamanca (Thailand), Ophélie Robineau (Bobo-Dioulasso), Bayuni Shantiko (Java and Sumatra) and Daniela Toccaceli (Tuscany) were asked to compare them to specific regional configurations and in particular to specify their food security and land use implications, from across Africa, Asia and Europe (Box 9.1 and Mora *et al.*, 2014).

I Hypothesis 1: Large metropolitan region with a spatial rupture to rural hinterlands

In 2050, massive rural migration concentrated the population in large urban centres, particularly in coastal areas. This agglomeration was a response to a global dynamic of metropolization where exchanges (not only financial flows, but also flows of information, products and people) are concentrated in a limited number of well-connected cities, creating an archipelago economy at the world level. At the individual level, this generated a standardization of lifestyles, where consumerism is dominant and where regional or family solidarity is weakened. Spatially, these large metropolitan areas experienced an interweaving of urban activities (housing, transport infrastructure and industry) and rural activities, of which agriculture is part. Large cities are connected via international trade to some rural areas that may be far away, taking advantage of low transport costs. In addition, some agricultural activities develop close to large cities (urban agriculture and high added-value products) and in specialized places linked to large cities through international trade. However, farmers living in remote, marginal or disconnected rural locations have no, or difficult, access to food value chains and to urban consumers. Globally, the decline in agricultural employment is mainly due to rural migration to large urban areas. The food strategies of urban and rural households rely mainly on the purchase of food items available through national or international markets.

I Hypothesis 2: Multi-local and pluriactive households in a rural-urban archipelago

In 2050, temporary migration to cities developed according to employment and income opportunities in urban and rural areas. Farming remained a core activity within rural households, but it now took place within multiple activities. The share of non-agricultural

work in the incomes of rural households increased and mobility intensified, thanks to functional transport infrastructure. Circular and temporary migration rose due to uncertain urban growth. Incomes in rural households diversified and led to individual specialisation of activities within households. The organisation of this mobility between rural areas and urban areas is based on a network of cities, where migrants can find employment either in secondary cities in which industry or services are located, or other rural areas where cash crops create a demand for a seasonal workforce, or in large growing cities. Food strategies of multi-local households combine self-consumption, supplies from regional or international markets and supplies through family networks.

I Hypothesis 3: Rural areas integrated within urban networks through value chains

In 2050, urban organization is multipolar, powered by endogenous population growth and rural migrations. The development of cities and their relationships transforms the existing urban network. This urbanization process generates specific relationships between the network of cities and rural areas. The development of secondary urban centres in relation with larger cities leads to a reconfiguration of rural areas where synergies develop between agriculture, food processing and local food markets. Rural households have diversified activities including, in particular, processing operations or the marketing of agricultural products. Household food strategies rely on diversified foods, with traditional products consumed in the region retaining an important place. These are supplied through the markets in secondary urban centres.

I Hypothesis 4: Urban fragmentation and counter-urbanization

This scenario describes a set of de-concentration and fragmentation processes in the urban population through a block or an end to the growth of large agglomerations and by a carry-over effect on the growth of small urban settlements and medium-size cities. The new urban map resulting from this differential growth is favourable for historical locations and, where appropriate, to counter-urbanization. The end of rural migration to the cities is linked to increasing congestion problems, unemployment, pollution and lack of access to housing and basic services. It results in a redeployment of population growth to small towns, medium-sized cities and urban fragmentation (urban sprawl). In some regions of the developing world, an increase in rural populations even leads to reagrarianization and a decline in farm size due to pressure on land. 'Food deserts' develop and food supply is now provided mainly by the informal sector, which relies on community and family networks.

Conclusion

WITHIN THIS FRAMEWORK based on rural and urban current trends, we have explored a number of issues working on assumptions of urban-rural linkages in 2050. Through the assumptions, three main issues appear that could determine food security and nutrition issues in different ways: the role of metropolization in concentrating food value chains, the importance of the intertwining of urban and rural spaces for rural employment and agricultural activities, and household strategies. Modern food value chains, led by transnational food companies, and linked with urbanization, are complexifying the interactions between urban and rural places, convoluting scales, resulting in nutrition transition and changes in the location of agricultural production. Despite the homogeneous global discourse on world urbanization, looking at the plurality and diversity of urban dynamics helps us to reconsider the diverse impacts of urban-rural relationships on food and agricultural issues. In addition, the dominant narratives of urbanization and rural transformation are thrown into question by the development of non-farm employment, deagrarianization and household strategies based on synergies between rural and urban spaces. Regarding food security and nutrition, our hypotheses underline the role of urban agriculture and land planning for metropolitan areas, the importance of food chains in connecting small rural farmers to urban food markets, the role of intermediate cities in collecting, processing and retailing food products, and the importance of mobility between urban and rural spaces as a strategy securing access to food at the household level.