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Mega-Urbanization in China
Rural-Urban Synthesis as a Foundation for Sustainability

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Mega-Urbanization in China: Rural-Urban Synthesis as a Foundation for Sustainability

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Abstract: In the first part of the twenty-first century China still faces ongoing challenges of maintaining economic growth while simultaneously creating a more equitable, just, and sustainable society. This issue is set within the context of the rapid growth of mega-urban regions in the East Asian region. Central to this challenge is addressing the deep and growing economic disparities between rural and urban areas and creating a more balanced relationship, particularly in agriculture and food supply which are effected by the spatial spread of urbanization. The key challenges of increasing productivity of food production and the effectiveness of the food supply system pivot on the rapidly urbanizing mega-urban regions of China illustrated by the case study of the lower Yangzi delta mega-urban region. These changes are occurring because of increased urban and international demand for diversified food and industrial crops, loss of good agricultural land, changes in food distribution in response to increased urban and export demand, increased competition for resources such as land and labor, and environmental problems caused by global climate change and pollution. While these outcomes are viewed by some as the inevitable consequences of the twin forces of China's national economic growth and globalization, we invoke the concepts of synergetic and eco-capital to argue for the development of policies promoting rural-urban synthesis that present a more comprehensive response to the simultaneous challenges of economic growth and environmental and social sustainability.

Keywords: Urbanization, Sustainability, China, Food Supply for Urban Areas

Introduction

This paper explores one of the main challenges facing China as it moves rapidly to become a modern developed society in the twenty-first century—namely how to grow economically while at the same time creating a more equitable, just, and sustainable society. Central to this task, despite the fact that China is one of the most rapid economically growing societies in the world, is that it has not yet resolved the ongoing problems of rural-urban inequality that are demonstrated in the ongoing spatial inequality between the predominantly rural areas of Western and Central China and the eastern coastal zone of China. Of course, the Chinese government recognizes this challenge and has made vigorous efforts to reduce these rural-urban disparities in the eleventh and twelfth Five Year Plans. But at the same time the main focus remains upon the rapidly urbanizing coastal zone and in particular on the growth of large mega-urban regions.

In this respect China is repeating a model of development that has and is occurring in the East Asian region that stretches from Korea and Japan through China to Southeast Asia. In such areas there is an increasing concentration of population in the large zones of urban activity or mega urban regions (MURs) located in deltaic coastal zones that developed throughout history as the “food baskets” of their countries. Mega-urban regions include one or more core mega-cities (usually over 10 million), up to several medium and large secondary cities (over 1 million), a number of smaller cities and towns, and large areas in between of mixed agricultural and non-agricultural land-use. This is part of the urbanization process that has accompanied the surge in economic growth that has been occurring at an uneven pace across most of East Asia since 1960.

In recent years as the global economy has undergone radical restructuring in the face of global economic volatility the East Asian region has emerged as one of the pivotal regions that is

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leading the global economic recovery. However, this process is happening in the context of a number of global environmental, economic and social challenges that will be particularly acute in the twenty-first century and threaten the sustainability of the MURs.

This paper positions the Chinese urbanization experience within the context of the urbanization processes of the rest of East Asia. These developments are discussed under six broad headings:

1. The growth of Mega-Urbanization in East Asia
2. Urbanization Processes in East Asia
3. Mega-Urban Regions in East Asia
4. Special Features of the Urban Transition in China
5. Rural Urban Relations on the Margins of Chinese Mega-Urban Regions: The Example of Food Production
6. Policies for Rural Urban Synthesis in China's Mega-Urban Regions as a Foundation for Sustainability

The main argument of these six sections is that the growth of mega-urbanization is producing major changes to rural activities that have characterized the deltaic regions into which urban activities are spreading. These challenges are occurring because of increased urban demand for diversified food and industrial crops, loss of good agricultural land, changes in the food distribution system in response to increased urban demand, and increased competition for resources of these regions such as land and labor in addition to the many environment problems caused by climate change and pollution. While some economists see this as an inevitable process that is leading to increased economic rewards it can be argued that these developments are also increasing the threats to sustainability of mega-urban regions. The final section of the paper argues for developing policies of rural-urban synthesis that will be sensitive to issues of sustainability using the concepts of *synergetic capital* and *eco-capital*. These concepts capture some of the elements of the Chinese concept of "harmony" that are embodied in the most recent development plans.

The Growth of Mega-Urbanization in East Asia

The first part of our argument is that the urbanization process at a global level is an inevitable part of the process of development that is now gaining momentum in the developing countries of the world. Four facts support this assertion:

1. For the first time in human history the twenty-first century has more than 50 percent of the global population living in urban places;
2. This urban shift will involve a decrease in the proportion of people engaged in rural activities in developing countries as the process of development encourages the movement of rural people to urban areas. This will mean an increase not only in urban populations but will also an increase of the employed people in non-agricultural activities in areas that remain defined as rural;
3. This urban shift will involve an ongoing increase of the number of people living in mega-urban regions;
4. The growth of large mega-urban regions poses many challenges of governance, environmental sustainability and economic and social development particularly in developing countries.

China is a microcosm all these global trends. By 2020 China will have more mega-urban regions than any country in the world and this will involve a large increase in the proportion of

urban population in a time-frame that is much shorter than that experienced by Western countries at comparable periods of rapid urbanization. The implications of these facts concerning contemporary urbanization are obvious to most East Asian governments and China. Their responses have been driven by a position that sees the economic advantages of increased urbanization to be a central concept that drives policy formation. This position is supported by the economic arguments that emphasize the importance of economies of scale, the creation of mass urban markets, the encouragement of foreign investment and the higher productivity that occur in urban places. Of course these developments have been heightened by the growing integration of the global economy and the restructuring of the economies of the developed world that are part of the much debated process of globalization (Olds et al. 1999; McGee and Watters 1997). The results of these urban-orientated development strategies in the more developed East Asian economies have been the decline in the proportion of the employed population in agriculture, the depopulation of rural areas, a sharp reduction in the number of family farms and a restructuring of agriculture with growing emphasis on capital intensity, off-farm employment, the employment of migrant farm labor and food imports and increased agricultural productivity. Another result is an increase in rural-urban income disparities that accentuates out-migration from rural areas.

In this context China's institutional framework of "market socialism" (which it shares with Vietnam) makes it distinctive in the East Asian region. On the one hand, the historical experience of socialism encourages a form of gradualism that emphasizes efforts to decrease rural-urban differences through policies of improvements in infrastructure, new delivery systems for education, health and social welfare in rural areas and investment in increasing agricultural productivity. This is supported by policies of regional development focused on improving the economic conditions of disadvantaged rural areas as, for example, in Western China. But at the same time these pro-rural policies are being implemented, accelerated economic growth in urbanizing areas of the Eastern coastal region have been the drivers of national economic growth fueled by both international, national and domestic investment and have led to a rapid "marketisation" of this region. Thus at the national level this model of development seems to offer no alternative but to encourage structural shifts to the industrial and service sector locating in urbanizing areas. Despite ongoing commitment to rural development there is still a strong belief that urbanization is an inevitable part of creating a modern state.

Urbanization Processes in East Asia

We argue that in the twenty-first century these national policies need to be combined with regional responses, particularly at the level of the mega-urban region, which place emphasis on developing "synergies" between rural and urban activities. Development should aim to increase linkages within and between rural and urban areas to produce regional transformation as part of a strategy that is designed to create a sustainable region (Douglass 1998). These synergies and linkages are influenced by three main processes driving urbanization in East Asia:

1. Structural change in East Asian economies;
2. The "transactional revolution" in communications and transportation (Marton 2000);
3. The spatial extension of urban areas outside core cities which we have labeled "diffuse urbanization" (McGee 2016).

Structural Change in East Asian Economies

This brief summary of the prevailing developmental wisdom of East Asia is supported by a quick overview of the relationships between urbanization and structural change in East Asia. Table 1 presents an overall picture of the relationships between urbanization trajectories and structural

change in the contribution of the three main economic sectors of agriculture, industry and services to GDP in selected East Asian countries for the forty-year period between 1960 and 2000. These urbanization trajectories are organized into (Type I) developed post-industrial societies with urbanization levels of above 70 percent; (Type II) developing societies with urbanization levels of between 30 and 70 percent; (Type III) underdeveloped societies with under 30 percent levels of urbanization, and; (Type IV) China, with the most rapid growth in urbanization levels since 2000—reaching more than 50 percent by 2011.

Table 1: Changes in Distribution of GDP and Urbanization Levels 1960, 1980, 2000 (%)

Year	Agriculture			Industry			Services		
	1960	1980	2000	1960	1980	2000	1960	1980	2000
TYPE I (Urbanization above 70%)									
Taiwan	28	9	3	29	46	35	43	49	62
Japan	13	4	1	45	43	32	42	53	66
South Korea	37	16	5	20	39	44	43	45	51
TYPE II (Urbanization 30 to 70%)									
Malaysia	36	23	9	18	39	51	46	47	40
Thailand	40	22	9	19	28	42	41	50	49
Indonesia	54	26	16	14	39	46	32	35	38
Philippines	26	22	16	28	36	32	46	42	52
TYPE III (Urbanization below 30%)									
Myanmar	33	48	57	12	13	10	55	39	33
TYPE IV (Urbanization 46% in 2009)									
China	39	33	15	38	47	46	23	20	39

Notes: Figures for Singapore and Hong Kong (SAR, China) not included because both are considered as 100 percent urban. Figures for Laos, Cambodia and Vietnam not included.

Sources: World Bank (various years) World Development Report. Washington. Taiwan (China) data from Taiwan Statistical Data Book (various years)

From the point of view of the arguments developed in this paper it is the group of post-industrial East Asian societies in trajectory Type I that appear to be the model that China and other East Asian countries will follow. In particular it is the development of the urbanized corridors that run between the major urban centres (Tokyo-Osaka; Seoul-Pusan; Taipei-Kaoshiung) that is important. Thus, for example, while the population of Greater Seoul and Pusan was 14 percent of the national population in 1960, by 2000 it was more than 50 percent. Similar patterns were also true of Tokyo-Osaka and Taipei- Kaoshiung.

The Transactional Revolution

East Asian countries in trajectory Type I of the urbanization process have been very successful in breaking down the “friction of distance” reducing transportation costs, extending urban subway systems, implementing improvements in digital informational systems and national and local highway infrastructure (McGee and Lin 1993). It is important to note that China has been dramatically successful in a much shorter time in introducing these improvements. In all these countries transactional corridors have been formed linked by super-fast railway systems. While current accounts lay much emphasis upon the role of globalization and national policy in this urbanization process, the major fact that effects the urbanization transition is that it is occurring is at a very much faster rate than that urban transitions of developed countries. Marcotullio and Lee have argued with respect to the urban transition that the “...unique feature of the present era is the compression of the time frame in which the transitions are occurring” (Marcotullio and Lee

2003, 331). What is important in the China case is the large volume of population that will be involved in this urban transition with creates great challenges to managing the urban transition.

Such transitions are being driven by accelerated transactional flows of people, commodities, capital and information between, and within, countries. The international components of this transactional revolution are generally referred to as part of a new era of globalization in which foreign investment encouraged by national states is an important component. The different character of the transactional revolution places much more emphasis on the flows of people, commodities, information and capital within national space economies. Thus, development is seen as occurring in a dynamic sense as a process of transformation of national economic space in which interactions and linkages are a more accurate reflection of reality than the idea that rural and urban areas are undergoing somehow spatially separated transitions (Marton 2000).

In contemporary East Asia the rural-urban transformation is fundamentally driven by a network of linkages that provides a dynamic spatial frame of flows of people, commodities, information and capital. This involves the recognition these “transcending networks” are restructuring urban space in a way that emphasizes the emergence intensely transaction networks particularly focused on mega-urban regions. This is leading to very rapid economic growth rates focused on these mega-urban regions but at the same time is creating many environmental and social problems and increasing disparities at the level of individual nations.

Diffuse Urbanization

A third component of the overall urbanization process, is the ongoing operation of the process spatial expansion from city cores that has been labeled “diffuse urbanization” (McGee 2016). This is occurring in both developed and developing countries of East Asia and China. This has resulted in radical changes to urban space that is reflected in the process of territorial extension from the core urban areas which have expanded urban territory and led to the reconfiguration of urban space with the creation of areas outside the core cities of mixed agricultural and non-urban activities that include industrial estates, residential settlement and increased commercial activity such as shopping malls This region of diffusing urbanization has been called “desakota” by McGee (1991). In the early phases of the urban transition these regions (previously largely rural) have been characterized by an increase of “in-situ urbanization” with informal sector activities including building and renting accommodation for in-migrants, creating petty enterprises in retailing and industry. But in the latter phases of the changes in desakota spaces urban activities in industry and services have increased and this has led governments to create organized urban spaces such as new towns and industrial estates that have increased the demand for middle and high income housing. This has also resulted in an increase in income for the population of these desakota spaces that have created opportunities for local entrepreneurialism. But at the same time, this has created conflicts that are reflected in rural opposition to urban development, economic and social inequality, and environmental problems that create difficulties of administration and governance (Brenner 2014).

At the urban level, the way exogenous actors such as developers and facilitative administrators drive expansion, and the degree of their interaction with endogenous local actors, needs to be set in the particular context of specific “desakota spaces.” Past theory has attempted to universalize these realities of urban spaces by creating zonal models, often drawn from the North American experience, of core cities, peripheral zones, and mixed rural-urban zones on the margins of urban places. But the latest phase of urbanization is dominated by the rapid growth of urbanization in the Global South, occurring in a new phase of global capitalism – globalization of the market system – which has created a multiplicity of capitalisms which Jessop labels “variegated capitalisms” (Jessop 2014). This makes comparison between different sites of desakota change a complex task. It is these extended rural-urban spaces created by “diffusing urbanization” that are the crucial “sites” of the changing features of rural-urban relations in China

today. Before taking a closer look at the Chinese context, it would be useful to briefly highlight key features of mega-urbanization across East Asia.

Mega-Urban Regions in East Asia

In order to understand the challenges of rural-urban relations in mega-urban regions of East Asia it is necessary to discuss briefly how such regions may be defined. At its simplest, formation of mega-urban regions are linked to a process whereby an increasing proportion of a country's GDP and urban population are concentrated in one or more extended spaces. As was highlighted earlier, this must include not only one or more core mega-cities, but other secondary and smaller cities, and regions in between which account for significant proportions of GDP. The only statistical database that enables the temporal measurement of these large urban regions is the UN Population Division's bi-yearly publication that provides data on urban areas of more than one million in size, including information for agglomerations of more than 5 to 10 million people which may be classified as mega-urban regions (MURs). Analysis of the estimated increase in the number of large cities between 2000 and 2015 show the importance of China at a global scale. However, this data-base is limited for measuring MURs because it relies upon administrative definitions that do not always include cities and other areas which are part of an integrated spatial network in its definition of urban agglomerations.

A more satisfactory definition is based upon the measurement of functional integration in MURs as measured by transport flows, economic linkages (industry, service and agriculture) labor markets and population movements that make-up the "transactional space" of the MUR. Because MURs usually have the most well developed "transactional space," the main concentrations of human, social and economic capital, as well as a developed infrastructure, they offer an environment that is attractive to both domestic and foreign capital.

A major feature of MURs is the ongoing spread of urbanization from built up city nodes that arises from improvements in transportation systems and economic growth. Initially in East Asia (with the exception of Japan), transportation systems were dominated by automobile systems but now many countries, including China, are beginning to adopt the Tokyo model of subway systems linked to buses in the outer areas. This urban spread is also associated with an increasing dispersion and insertion of industry into the urban margins and a restructuring of the urban cores towards service functions. Residential decentralization is also important as urban cores are restructured from industry to service functions displacing inner city population.

At a global level there are also processes facilitating the emergence of mega-urban regions which force them to become increasingly competitive so as to attract more investment and establish their branding image globally. While industrial investment has dominated much of this process of international integration, as the global service economy becomes more integrated there is a need to attract part of these national and global transactions through the development of financial services, tourism and conferences. While this competition for "transactional capital" was initially led by individual cities it is increasingly being realized that it is necessary to develop marketing campaigns that emphasize opportunities across the wider region. Because of these processes MURs are increasingly becoming the "engines" of economic development of their countries often contributing above 50 percent of the national GDP. In part because of their very success, MURs present policy challenges that are focused on four main areas: (1) Developing effective governance and management systems for mega-urban regions; (2) Making mega-urban regions sustainable in the face of environmental deterioration and global economic competition; (3) Making MURs livable in terms of employment, services infrastructure and effective social policy, and; (4) Developing new policies for rural-urban relations in MURs. However there are distinctive features of the urbanization process in China that are at present shared by only one other East Asian country, Vietnam, that stem from the nature of the transition from socialism to a market economy. These are discussed in the following section.

Special Features of the Urban Transition in China

At present China appears to be exhibiting many of the same features of the rural-urban transformation that occurred in the case of Japan, Korea and Taiwan. Since 1978 China has been experiencing increasing urbanization fueled by rural-urban migration both legal and illegal, rapid industrialization and increased agricultural productivity in city margins, and structural change with an increase in services in the large core municipalities such as Shanghai. By 2000 China had a population of 450 million people defined as urban—a level of urbanization of 36.9 percent. By 2030 it is estimated that this urban population will nearly double to 883 million reaching an urbanization level of 60 percent. However, with the acceleration of urban growth since 2000, China had already reached an urbanization level of 60 percent by 2015—much earlier than predicted. In addition, it may be argued that these figures are an under count of actual urban populations because they do not take into sufficient account the spread of urban activities into the surrounding countryside of many cities in China creating a form of rural-urban hybridity (Marton 2016).

These margins serve as locations for new land development projects including residential and industrial estates that are often located alongside proliferating small industries (township and village enterprises) that developed during the 1980s. Such areas can be defined as assemblages of urban and rural activities that are characterized by an intense mixture of rural and urban activities (Marton 2002). This pattern of urbanization is not evenly distributed throughout China with much of the surge of urbanization since 1978 occurring in the eastern zone which has the highest rate of increase of cities of all sizes in China, particularly large cities—defined on the basis of non-agricultural population in excess of 1 million in population. They have received over 60 percent of the national fixed asset investment in the period since 1978 and a high proportion of total national foreign investment (McGee et al. 2007).

There is considerable interest in China in the emergence of these large mega-urban regions. They were first recognized by Zhou (1991) who suggested they had some similarity with the urban region between Boston and Washington D.C defined as *megalopolis* by Gottmann (1961). However, Zhou also recognized there were important differences between China and the USA including China's high density in-situ population and the development of market socialism. He used the following criteria to define what he called "interlocking metropolitan regions (IMRs)," including: (1) two or more cities with more than 1 million population; (2) an important port; (3) convenient lines of communication that act as a development corridor; (4) numerous small and medium sized cities; (5) intensive interaction between rural and urban. Based on these criteria Zhou delineated four interlocking metropolitan regions: (1) Nanjing-Shanghai-Hangzhou in the lower Yangzi River delta; (2) Hong Kong-Guangzhou in the Pearl River Delta; (3) Beijing-Tianjin in the North China Plain; and (4) Shenyang-Dalian in central and south Liaoning Province. He also delineated two incipient IMRs in the Shandong peninsula and Fujian coastal zone. Data from the 2000 census suggests that the latter two IMRs now fulfill the criteria. In addition the interior IMR of Chengdu-Chongqing should now be added. These seven IMR's contain 15 percent of China's population, account for more than 50 percent of China's GDP and are the major drivers of the economic success of the last fifteen years (McGee et al. 2007).

The prospect that China may be duplicating the developmental trajectories of the East Asian NICs raises serious concerns at a national and global level for environmental sustainability. China became the world's second largest economy in 2010 and thus is a key player in the global economy. This advance has been accompanied by a rapid growth in trade and investment. It is projected that China will become the world's largest consumer of global fossil fuels by 2030. Even with the "new normal" of relatively slower economic growth around 6 to 7 percent, as China continues to move rapidly towards higher levels of GDP per capita and becomes more urbanized, demands on the environment and resources will continue to increase substantially.

One of the arguments supporting this assumption has been that China's commitment to the development of auto-centered transport systems, including private cars, motor-bikes, trucks and various forms of public transportation such as buses and mini-buses, will place increasing pressure on land and energy as China continues to urbanize (Freud and Martin 1999). Despite a rapid growth of alternative forms of transportation leading to an expansion of national super-fast rail communications between the major cities and a large increase in urban and suburban rail systems, the rate of auto-centred transportation has continued to increase and will place increasing pressure on land and energy in China particularly in the mega-urban regions. These auto-centered systems encourage the outward spread of urban-based activities (residence, work and leisure) that are complemented by state policies of industrial decentralization to urban margins and the need for linkages to transport nodes such as ports and airports. Spatially, these forces are focused on the urban margins of Chinese cities and particularly in the coastal zones of China where some of the most fertile and productive agricultural land is located.

Although China's land area is huge, cultivated land accounted for only 122 million hectares in 2008, or 12.7 percent of China's land surface, with most of the best quality arable land located in the eastern region—the region of the most rapid urbanization and the greatest loss of good agricultural land (Cui and Kattumuri 2010). This creates great demands on available resources such as water, land and energy that are needed as inputs for a rapidly urbanizing society. In addition, growing disparities between rural and urban areas will encourage rural-urban migration that is estimated to be of the order of 500 million over the next twenty-five years. Most of this movement will be to the cities of the coastal zone that face ongoing pressures focused on mega-urban regions. For example, it is estimated that some 20 to 23 percent of agricultural land has been lost to urban expansion over the twenty years to 2008 (Cui and Kattumuri 2008), and despite China's size there are limited possibilities to expand cultivated land (Lin and Ho 2005). The growing use of intensive chemical reliant farming systems is beginning to affect water systems. At the same time the by-products of urban and industrial growth are leading to increased environmental problems that affect agricultural production.

These challenges precipitate a careful consideration of the management of rural-urban relationships in China's mega-urban regions, and it can be argued that China has several advantages in accomplishing this rural-urban transformation. First, China is a late arriver in the development process and therefore has the opportunity to take advantage of previous transformations and look for positive examples from other countries that are most suitable for its local context. Secondly, China is experiencing rural-urban transformation at a unique period of globalization that gives the government access to information and technologies that can be applied to the management of the rural-urban transformation. Thirdly, China is able to engage the management of urbanization as a state project that is part of what has been called "a high modernist ideology." that offers more opportunities for planning and guiding urbanization. Fourthly, rural-urban transformation is being filtered through a series of administrative scales from national to local that is increasingly characterized by decentralization and local control.

In this respect China is experiencing an urban transition within an institutional framework which may be described as a mixture of socialism and capitalism (socialist-market economy) which retains elements of the previous socialist system. This institutional system offers both positive and negative possibilities for policy formation designed to advance national goals of creating an economically developed, modern, sustainable and just society. For example, since the beginning of the reform period China has adopted "endogenous solutions" to these challenges that offer local areas more local control of the development process. This means there is much more opportunity for local involvement in urbanization and in developing policies. This point is particularly important in China's mega-urban regions where there is a mixture of urban and rural activities around a poly-nucleated urban system dominated by one or more very large urban cores. These MURs serve as locations for new land development projects including residential and industrial estates outside the urban core areas that are now being implemented at a national level. These include greater assistance through policies of regional development focused on

Western China and policies designed to decrease the social and economic differences between rural and urban areas, and differences within rural areas and urban areas. Such ideas are being driven by the desire to achieve balance in these relationships and are framed by the concept of “harmony” articulated by the Chinese leadership.

Fifthly, while economic decisions on investment are an important part of this process the rural-urban transformation is primarily an institutionally driven process and China has been very successful in making institutional adaptations in the post-reform period. This is accomplished through the creation of provincial level municipalities (e.g., Chongqing), expansion of existing municipalities (e.g., Guangzhou), reclassification of counties to municipalities (e.g., Dongguan, Kunshan) and the creation of new urban spaces (e.g., Shenzhen, Zhuhai) and the amalgamation of townships (Ma 2005). This process of reshaping of administrative space is thus extending the spatial control of urban areas over former rural areas creates both opportunities and problems in the rural-urban transition. It is this process of reshaping of administrative space is that is extending the spatial control of urban areas over former rural areas creates both opportunities and problems in the rural-urban transition. This expansion of urban space has been facilitated by state-led opening-up of a new market track by increasing use of rural land for non-rural activities and the spread of urban political power into these rural areas adjacent to municipalities. This is further accentuated by state efforts to rationalize land-use to avoid environmental problems and create more livable societies that has led to a proliferation of industrial zones in the margins of the city cores. These programs are further promoted by the need to increase the quality of production to conform to the regulatory environment that has to be set-up as a consequence of the admission to the WTO in 2001 (Lin and Ho 2005).

Sixthly, despite the size of its population China has been able to successfully reduce the rate of population growth because of its One Child Policy and in addition, largely avoided an unmanageable surge of rural migrants to urban areas in the first decade of the reform era through a residential registration system (*hukou*), thus minimizing the growth of extremely large informal squatter settlements that are a ubiquitous feature of urbanization in other developing countries.

A final element in the management of the urbanization process has been the rapid incorporation of China into the global economy which Allen Scott describes as creating a new “social grammar of space in which the whole edifice reposes upon a geographical foundation that can be best described as a mosaic of city regions constituting the economic motors of the global economy” (Scott 2001). What we are describing here is an intensely competitive system in which the mega-urban regions of China, like those in other parts of the world, are competing to capture some portion of these transactions generated at both a national and international level. As such, there is increasing pressure upon governments at both national and city level to create an urban environment that will increase the flow of transactions to the mega-urban region. Olympic venues, major attraction sites such as Disneyland, new airports, convention centres, multi-media corridors, urban renewal and industrial estates in peri-urban areas are all part of packages that are designed to make urban regions more attractive. In some of the transformed NICs such as Japan, Korea and Taiwan (China) this creates an ongoing tension between growth-orientated policies and those directed towards creating more livable urban regions that includes persistence of rural activities (Ma and Wu 2005).

This tension begins to assume a spatial dimension in the imbalance in investment between the MURs nodal cities and its surrounding rural areas. This is, of course, an accommodation to the forces of globalization involving major investments of public and private capital in the enticing built environment of globalization. For example, at a national meeting held in 2005, Wang Guangtao, Minister of Construction criticized these strategies claiming 183 cities had vowed to build themselves into international metropolises with so-called “show-off projects” such as squares, luxury office buildings and airports. As one report noted, most of urban China has been built in the past twenty-five years at a rate of 150 million square metres per year, often on large projects. This rate of urban expansion is unprecedented. This surge of urbanization is

generating a huge demand for capital. The same report estimates the annual costs of Chinese urbanization at 300 to 500 billion yuan (US\$ 37 billion) which is roughly 2 to 4 percent of the Chinese GDP in 2004 (Sustainable Development Research Group 2005). This growth in capital demand has generated a huge amount of borrowing at various administrative levels.

Rural Urban Relations on the Margins of Chinese Mega-Urban Regions: The Example of Food Production

As we have shown in the preceding section, the growth of urban activity in the MURs of China has led to substantial restructuring of agricultural activity within these regions—changes characterized by features of food production in most of the large MURs of East Asia. This is not a new phenomenon. We have argued elsewhere that these densely populated deltaic environments with high densities were in fact large cheap labor reservoirs waiting to be tapped by international, state, and local capital. Most successful in this respect were Japan, Korea and Taiwan where efforts to increase rural income in mega-urban regions were made through the introduction of higher yielding crops, guaranteed prices, diversification into non-staple crops and increased possibility for employment in rural industries. These efforts were aided by physical infrastructure investment, improvements in roads, electrification, improvements in irrigation and institutional changes particularly in land reform. In addition, the state invested in major transportation linkages such as freeways and electrified railways (largely for non-agricultural activities such as industry and residential development). Of course, these developments did not prevent the movement of labor out of agriculture that accelerated in Japan in the 1960s, in Korea and in Taiwan in the 1970 and 1980s. In other mega-urban regions of East Asia such as the Bangkok, Jakarta, Manila, Hanoi and Ho Chi Minh MURs, these processes occurred much more unevenly but have accelerated in the nineties and first decade of the twenty-first century. Allowing for the distinctive elements of its rural-urban transition, it is clear that China has been exhibiting similar patterns since the 1980s.

What are the common features of the previously rural margins, labeled “deaskota” by McGee (1991) around the major Chinese cities? (1) They have all been characterized by large small-holder population primarily engaged in the cultivation of rice but also characterized by non-agricultural activity such as craft industries etc. (2) They have all experienced an increase in the non-agricultural activities that are very diverse including employment in trading, transportation and industry. This increase in non-agricultural activity is characterized by a mixture of activities often by members of the same household. Thus, for example, one person may move to the main urban node of the MUR to work as a clerk, another engage in full-time farming, a third work in industries that are close to the farm and another look after the sale of vegetables in nearby markets. (3) These zones of mixed activities are generally characterized by increased fluidity and mobility of the population. The availability of relatively cheap transport such as two-stroke motorbikes, buses and trucks that becomes more affordable as family incomes increase enable farmers to access markets and employment over much larger distances. Thus these areas are characterized by two levels of transportation movement. At one level the building of freeways and fast rail linkages is integrating the MUR, while at the local level an intermediate form of transportation is integrating sub-parts of the region around local urban nodes that are increasingly interactive. (4) In these rural areas of these MURs there is an increase in household income that depending on the expenditure decisions of the household (e.g., saving/expenditure ratios) means that there may be a greater demand for local goods (food, furniture etc.) or goods from larger urban centres (refrigerators etc.). (5) There is an increase in the participation of females in non-agricultural activities as more diverse sources of employment become more available such employment in factories etc. There is ample evidence that the contribution of these female workers to family income through remittances greatly adds to the household income and increases internal migration to work in these areas. (6) The growth of urban centers in the MUR is an important cause of these changes in rural activities particularly the production of food.

Chinese MURs (and indeed beyond) are experiencing consumption changes that effect food suppliers, the food supply chain and the retailing of food in urban areas. (McGee 1991). (7) Finally, in the last two decades the rural margins of Chinese mega-urban regions have been changing rapidly as the result of processes of the growth of secondary cities in the urban hierarchy and the consolidation of housing, industry and agriculture (Webster et al. 2003)

This produces three main results that affect the food producers in the desakota regions of China's MURs. First, historically in the Asian context most food has been produced close to where it is consumed. But as transportation improves food can be conveyed over long distances, which means there is an increasing competition for urban markets. Secondly, previously most food that was consumed in the urban centres of MURs was purchased from wet markets or smaller dry-goods outlets which led to a daily pattern of supply. This is now changing as urban households can store food in refrigerators and buy processed foods from supermarket outlets. Thirdly, increasing urbanization has been shown, generally, to be accompanied by the consumption of processed foods that are a response to the limited time available to spend in food preparation especially as the proportion of women workers in urban areas increases. This means that the retailing structure in urban areas is increasing with a growth of "supermarkets" and larger grocery stores. The retailers increasingly rely upon contracts with "intermediaries" to contract the provision of food to their firms. This process is radically changing food production systems particularly leading to more capital-intensive operations in the MURs of East Asia. This is facilitated by the need to adopt acceptable standards of quality control for food

These processes also have negative effects at a broader scale. First, China has lost more than 20 percent of its first class agricultural land to non-agricultural uses since the early 1980s (Cai and Kattumuri 2010). While many economists argue that the greater wealth earned from an increase in non-agricultural use more than compensates for the loss of agricultural land, it still may be argued that in intensely crowded MURs there is a need to increase food production as urban demand increases. While national food security policies often subsidize the production of rice that encourages farmers to continue to produce this staple there is increasing pressure to shift from mono-crop production resulting in growing diversity with production of livestock, vegetables and fruit. This is characterized by capital intensity. Thus, in the MURs the number of concentrated animal feeding operations (CAFOs) has increased in response to urban demand and the changing food system (Ellis and Turner 2007). There are many reports of the waste, particularly from livestock operations such as pig farms, from CAFOs polluting water systems.

Secondly, the increase of industrialization and urbanization create increasing demands for resources such as land, water etc. for which rural households located MURS cannot compete. This may be further accelerated because of the effects of climate change including droughts, flooding and other environmental challenges particularly water supply, pollution from industry and chemical fertilizers used in agricultural production. (McGee 2008; De Sherbinin et al. 2007; Gu et al. 2010). Thirdly, because the zones of mixed land use in MURs are often administrative "grey zones"—in part because "urban" regulations, are more difficult to apply in "rural" areas—it is more difficult to develop management responses. (Zhong and Zhu 2004; World Bank 2007). Fourthly, political fragmentation and internal competition between different levels of government in these MURs is often a major deterrent to creating national and globally successful economic regions. To reduce these problems new forms of collaborative governance need to be introduced which are inclusive of different sectors of society (Asian Development Bank 2008). Research on these problems by Luo and Shen (2009) and Shieh (2011) give detailed information on the nature of these problems.

Thus there are many challenges to rural-urban relations that are emerging in the contemporary urban regions of China. At a national level, the details of these challenges are more obvious and acute in China's MURs: (1) The proportion of population working in primary occupations (principally agriculture) decreased substantially in the period between 1980 and 2011; (2) The proportion of the contribution of regular non-urban wages to rural household

incomes rose from 18.1 percent in 1985 to 32.6 percent in 2007; (3) The area planted to rice declined by 21 percent between 2000 and 2007. There is increasing evidence that the food systems of the MURs are undergoing rapid change particularly as the urban areas consume food from supermarkets and large grocery outlets. It is well known that large retailing chains, both national and international, increasingly source their food nationally and internationally and this poses a threat to local supply chains (PECC 2007).

The remainder of this discussion focuses on the largest and most economically successful mega-urban region in China – the lower Yangzi River delta. This region is made-up of Shanghai Municipality and the provinces of Jiangsu and Zhejiang that in 2008 had an estimated population of 150 million (7 percent of China’s total) equivalent to the ninth largest country in the world by population. It is estimated that this region produced 25 percent of China’s GDP in 2008. Historically one of the “heartlands” of Chinese rice production, the region has lost some 30 percent of its rice land since 2000. Much of this loss is attributed the urban expansion of industry and residential development. Meanwhile, agriculture is rapidly diversifying as consumption demands of the rapidly urbanizing region shift to a greater emphasis on vegetables, live-stock and fish. In this respect, the region shows a pattern of structural change in agriculture characteristic of other MURs of the East Asian region. Today it is one of the most urbanized regions in China and has a highly developed urban system which is increasingly interconnected by fast railways and freeways. The lower Yangzi delta urban system is made up of the largest cities of Shanghai, Nanjing and Hangzhou, and many other important secondary cities. They form part of an “economic circle” of linked urban centres which have regular meetings to coordinate economic activities (Luo and Shen 2009).

The issue of the provision of food for such large mega-urban regions remains crucial to China’s goals of creating a sustainable, just and economically developed society. A central element of the provision of food is affected by the changing character of food consumption in urban areas in in the mega-urban regions of the coastal zones of China although increasingly secondary cities are also experiencing the similar patterns (Veck and Veck 2000). Earlier work on Hong Kong by Macleod and McGee (1990) demonstrate that food consumption can change very rapidly from a diet heavily reliant on traditional foods such as rice, vegetables, and limited fish and meat products (such as pork and chicken) to one that shows an increasing consumption of imported meats (especially beef), wheat and milk products and imported processed foods such as instant noodles and cereals. The growth of middle and upper income earners are the main consumers. Among lower income urban households, increasing food prices have meant that traditional food outlets small stores, public markets and “illegal hawker markets” offer foods at cheaper prices. A more general trend is the growth in the commitment of more household members to urban wage labor which means there is less time to prepare meals. Access to traditional food outlets and the purchase of instant food such as processed noodles and take-out meals increases. This has created what has been described as an “industrial palate” which relies increasingly on the international food chains, distributors and producers which begins to displace traditional food consumption practices. Hong Kong could afford this embrace of globalization because they were integrated in a regional and national open trading economy, had higher household incomes and sufficient income to buy in international markets.

In contemporary China food retailers are divided into five main groups: hypermarkets; supermarkets and convenience stores; on-line markets; wet markets, and; illegal markets. Foreign companies are largely concentrated in the hypermarket, supermarket and convenience store sectors, but there is also evidence that national and local companies are commanding an increasing proportion of sales (See Zhang and Wei 2015). While the more traditional food markets are dominated by small family enterprises, research by Zhang and Pan (2013) in Shanghai Municipality has shown that the rapid growth of commercial retailing and residential development have led to the closure of and reduction in their number by some 30 percent. Illegal hawker markets have also been subject to increasing pressure from the city government to stop their activities because they are regarded as a danger to public health and create congestion in

city streets. While wet markets persist in Shanghai, the number has reduced by two-thirds since the late 1990s and are mostly administered by the municipal authorities.

The Chinese government wishes to avoid an undue reliance on food imports and has adopted three main policies to support this objective. Firstly, at the national level in China policies which stress the need to ensure food security in staple grains, particularly rice, remains central to national planning and are reiterated most recently in the thirteenth Five Year Plan (2016-2020). The thirteenth Five Year Plan also places much emphasis on the demarcation of Farmland Preservation Zones and support for agriculture as the foundation for the preservation and increase in food production needed for the increasing urban population. Earlier policies designed to preserve agricultural land, first introduced in 1986, had limited success in preventing the conversion of agricultural land to other uses. These were radically revised in 1997 by a plan that shifted the responsibility for approval of farmland conversion in excess of 35 hectares to be the responsibility of the national and provincial governments. The downgrading of the role of local governments in this process was also closely linked to national and provincial efforts to encourage the process of settlement consolidation.

Secondly, these policies have led to major changes in the margins of the mega-urban regions in an attempt to gradually produce a more rational organization of consolidated spaces of different land-uses (agriculture, industry, urban administrative, and commercial centres) that contrasts sharply with the mixture of fragmented land uses typical of desakota areas in the 1980s and 1990s (Marton 2016). For example, areas of the lower Yangzi delta have undergone a process of readjustment (*tiaozheng*), whereby spaces of mixed land use, including villages, family farm plots and ancestral resting places, have been relocated to allow for the consolidation of agricultural land. Significant changes in the spatial structure of agricultural production in the landscapes of diffuse urbanization in the lower Yangzi delta are linked to newly re-emphasized policies to protect and enhance food production for urban consumption discussed in the next section. Indeed, there is evidence of a significant increase in both the scale and intensity of commercialization of agricultural production, particularly for high quality and high value output such as mushrooms and medicinal products, and inputs for cosmetics production, including for international markets (Marton 2016). However, in the peri-urban zones of China's MURs it is also clear that local interests exercised through informal institutional frameworks continue to result in excessive conversion of agricultural land for other uses (See Zhu and Guo 2014).

Thirdly, changes in food production and supply, and patterns of food consumption in urban areas indicate that China's socialist-market system is adapting and accommodating to provide a framework for ensuring that food for urban areas in China will remain largely in national hands. At the same time China appears to be continuing to enforce standards of food quality that increasingly meet international standards. However, it is also clear in the thirteenth Five Year Plan that China recognizes there are many challenges to food security. In response there has been a shift towards advocating for a new people-centred urbanization project designed to increase participation and co-operation in the urbanization process at the local level. This will necessarily involve engagement with the extensive spaces of urbanizing activity outside the municipal cores of the mega-urban regions like the lower Yangzi delta.

Policies for Rural Urban Synthesis in China's Mega-Urban Regions as a Foundation for Sustainability

Like other mega-urban regions in East Asia, rapid changes in the lower Yangzi delta have created challenges to the persistence of rural life and sustainability in the wider region. These challenges primarily focus on threats to the eco-system, threats to food security, threats to rural life and systems of food production, distribution and consumption. The issue is how to put in place policies that can improve this situation. Part of the answer lies in recognizing three key elements:

1. That the changing economic structure of the region is creating a situation in which the decline in agriculture will occur as the region moves to a post-industrial economy in which services and high technology industries will dominate;
2. That the loss of agriculture and agricultural land is a major threat to the food security of the region;
3. That the changing structure of the region is going to lead to a post-industrial society in which the majority of the population will be urban.

As highlighted in the previous section, our arguments are that China is already taking steps to strengthen policies that will create a sustainable national food system. In this respect it is suggested that greater emphasis be placed upon the ability to utilize the “synergetic capital” of mega-urban regions to develop interaction between rural and urban areas that will give greater strength to policies of food security and strengthen the retention of rural areas as a major part of the overall sustainability of the region’s social organization. Policies which utilize existing “eco-capital” of the resource systems that constitute the lower Yangzi delta mega-urban region. This approach is informed by the Chilean economist, Sergio Boshier (2001), who suggested that the most important form of capital to be found in a region is “synergetic capital” which denotes a region’s capacity develop a sustainable relationship between its natural capital (the endowment of renewable and non-renewable natural resources (land, etc.) and environmental “services” such hydrological systems, atmospheric carbon cycles, and various forms of what may be labeled “societal capital.” Boshier has suggested that there are seven forms of societal capital that can help this process of adaptation. First, “economic capital” that is the stock of financial resources available for investment in a region that includes national, regional, and international capital. The second is “cognitive capital” which is the endowment of scientific and technical knowledge available within a region. The third form is “cultural capital” which has three aspects: (1) historical development of cultural features that give distinctiveness to the region; (2) the culture of development that exists in the region, including a particular set of attitudes towards work, risk, investment, etc.; (3) symbolic capital which is the capacity to construct a region, and mobilize latent recognition of a region both locally, nationally, and internationally.

The fourth form of capital is “institutional capital” which relates to what Boshier calls the “institutional fabric of a region” that relates both to the “institutional chart” of a region including government and law, but also includes the capacity of institutions to interact with each other and their degree of flexibility and resilience. The fifth form, “social capital,” is the ability of human beings to associate with each other to achieve common goals that involves such components as trust, social participation and ability to negotiate for a common result. The sixth form, “physical capital,” includes both rural and urban infrastructure such as urban waste disposal systems and rural irrigation systems. And finally, “human capital” which is rather narrowly defined by Boshier as knowledge and skills of individuals in a region that defines the “quality” of a region, such as intellectual and practical, that can embody a regions creative powers. More generally it can be defined as the ability to nurture healthy productive humans, livable environments, and education.

To this we would add the concept of “eco-capital”—representing the capacity of a society to adapt and preserve eco-systems in the face of the challenges of development and environmental change. The growth of “eco-capital,” of course, results both from the ability to utilize the strengths of the combined forms of capital in the synergies of eco-capital. However, it is also suggested that a central assumption would be the acceptance of agriculture as a major plank of the development of eco-capital and the development of harmonious rural-urban relations.

Framed by this conceptualization, three main policy areas can be identified. First, there must be a commitment to preservation of the eco-systems of mega-urban regions which, in most East Asian milieus, are characteristically deltaic areas which are more vulnerable to global climate change, including sea level rise, increased fluctuations in water supply, and land deterioration

due to over extraction of ground water, etc. (De Sherbinin et al. 2007; Gu et al. 2010). This means that preserving threatened parts of the eco-system (e.g., rivers, lakes, coastal areas, and sub-ecosystems such as forests and marshes etc.) is essential. Add to this preservation of sustainable agriculture which will be the only way to prepare for the increasing challenges to food security that are likely to be the result of climate change. These underlying challenges are exacerbated by competition between different levels of government in China (Luo and Shen 2009) and reinforce the need to create some form of regional co-operation institutions that can facilitate policy development and implementation. (Otsumi and Sano 2009). One example might include the formation of Metropolitan Regional Authorities which are given the responsibility of coordinating between different agencies and levels of governments in areas such as the environment, transportation, public services such as water, power, and waste removal, social policies and developing sustainable and livable regions. Similar organizations need to be set-up to deal with economic planning at a regional level to reduce duplication, and to encourage a level playing field with respect to land taxes and investment. Regional trade associations can facilitate this process through developing regional branding at a global level. These processes of institutional change can also be applied to rural areas

Secondly, it must be recognized that the process of diffuse urbanization is inevitable even in the special situation of the Chinese transition to full market socialism, and can occur at the same time as policies of sustainability in agriculture and eco-systems can be put in place. As the number of MURs increases in China, urbanization is increasingly characterized by an urban hierarchy typically having one very large urban core, a spreading pattern of secondary cities, and a large number of third level cities and smaller towns. Urbanization is spreading outwards from large and secondary city cores into the surrounding territories and along transportation corridors between them. Diffuse urbanization is thus increasing throughout the hinterlands of MURs. Historically, as these delta areas have developed, close relationships have emerged between rural and urban areas. However, as this pattern grows, urban market demands are causing major challenges to agricultural food production and distribution systems. The central issue is whether food producers in the MURs will be able to keep up with changes in food systems and urban demand which could be characterized by increasing concentration of the suppliers who increasingly source their supplies in other parts of China, or internationally. This is already occurring in many of the developed countries of East Asia.

The issue of whether food producers in the MURs will be able to remain an important part of the food system of their region as urban demand changes is central. Already, we see in China an increase of the proportion of food sales that is processed and sold through large food producers and retailers—both domestic and international. Some argue that traditional Chinese dietary preferences for fresh food will slow down this process, but research in Hong Kong in the 1970s and 1980s indicates that these changes can occur very quickly even in a cultural context that historically placed great emphasis upon fresh food in their diets (McGee 1967; Macleod and McGee 1990). In a region such as the lower Yangzi delta there are several components of synergetic capital at the regional level that offer opportunities for local producers. There are already many examples of local farmers that form various types of associations to enter into contracts with food companies to supply output. These groups have responded in a very entrepreneurial manner to the needs of larger urban markets for more diversified food. But this could be strengthened by more vigorous government support, including extension services, credit provision, infrastructure provision and the recognition that this “new agriculture” demands some redirection of fiscal resources from the present urban focus. At the local level policies can also be put in place to strengthen the local marketing of food in secondary and smaller urban centres (Douglass 1998). Support can be given to the already well developed system of wet markets and small dry-goods stores by imposing restrictions that require supermarkets to locate in areas at some distance from these small market sellers. Such progressive policies have already been put in place in other MURs in East Asia.

The third area of policy focus proposed would utilize the new concept of *eco-capital*. Just as the inevitability of urbanization should be accepted, the concept of “eco-capital” must be linked to the acceptance of the co-existence of urban *and* rural areas within MURs during phases of rapid economic and urban growth. This is not a new idea in the history of the attempts of planners and policy makers to resolve the contradictions between rural and urban areas. For example, the idea of green belts was fundamentally driven by the desire to create barriers to urban expansion and preserve rural areas rather than develop policies that can enhance the co-existence of urban and rural activity. In this respect, the experience of Japan’s policies that have attempted to emphasize the positive aspects of agriculture within urbanizing areas may be of some relevance to the current experience in China (Nakai 1988). The arguments for these policies are strong: environmental sustainability; food security, and a synergy between rural and urban areas that will strengthen the capacity of the MURs of East Asia to respond to the new challenges of the twenty-first century and build sustainable, livable regions.

In the last two years the Chinese government has become increasingly aware of these challenges and is making determined efforts to enforce regulations on the loss of farmland in the periphery of mega-urban regions. In an announcement on November 3, 2014 the Ministry of Land and Resources and the Ministry of Agriculture jointly declared that areas of prime arable land near cities and traffic routes should be characterized as “permanent basic farmland” and would be protected from urban development (Peng 2014). Such protected land typically has intensive features such as greenhouses and aquatic farming that are prone to expropriation for urban construction, but highly important for the supply of food to cities. This policy was reiterated by Chinese Premier Li Keqiang in a speech on January 5, 2015 in which he emphasized the importance of the implementation of these policies in fourteen of China’s largest cities by the end of 2016 (TBP 2015). This commitment to preserving land for food production, combined with ongoing improvements in the implementation of environmental policies in these areas, suggest that China is moving to adopt strategies which seem to recognize the key elements of eco-capital creating viable solutions to the challenges of providing food for its rapidly growing urban population.

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