The evolution of *in situ* urbanization and quasi-urban populations and their planning and environmental implications in China: Case studies from Quanzhou Municipality[1]

(Draft, not for quotation)

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Introduction

The emergence and development of *in situ* urbanization has been one of the major characteristics of China's urbanization process since the 1980s (Zhu, 2000). Different from the conventional city-based urbanization process dominated by rural-urban migration, *in situ* urbanization is a phenomenon where rural settlements and their populations transform themselves into urban or quasi-urban ones without much geographical relocation of the residents. It has brought tremendous structural and physical changes to vast rural areas, leading to increasingly blurred distinction between urban and rural settlements in China, especially in the densely populated coastal areas (Zhu, 2004); and greatly promoted the emergence and development of some 20,000 small towns in China, concerning more than 100 million employees engaged in rural non-agricultural activities and their family members.

This urbanization pattern has important implications for population, development and environment (PDE) dynamics and related policy making. On the one hand, this offers an alternative to the conventional urbanization models dominated by rural-urban migration and the growth of large cities, benefiting economically a large number of rural population often neglected in the development processes, and diverting many potential rural-urban migrants who would otherwise contribute to the growth of slum areas commonly seen in large cities of developing countries; on the other hand, it is often regarded as lacking the benefits of agglomeration economy of large cities, and has serious negative effects on the environment, although whether such negative effects are more serious than those seen in mega-cities of developing countries is not clear due to the lack of comparative studies. These implications raise a series of further questions, namely whether such a urbanization pattern is only a short-lived phenomenon caused by China's planned economy in the past and its legacy, or a long-lasting and inevitable trend of settlement evolution; whether it is sustainable in both economic and environmental terms; and whether and how it can be incorporated in urban and rural planning if it is inevitable in China's urbanization process. These issues have not been well addressed so far, due to the conventional rural-urban dichotomous approaches in settlement definitions and corresponding data collection processes, as well as in conventional urban and rural planning theories and practices.

Based on case studies from Fujian Province (Figure 1), especially its Quanzhou Municipality where *in situ* urbanization is well developed, this paper tries to tackle the above issues, and demonstrate the important planning and environmental implications of *in situ* urbanization in China. It is hoped that such a study will also contribute to a better understanding of settlement evolution in today's developing countries, which is remarkably different from that in the past of developed countries and has important implications for PDE dynamics.

Figure 1 The location of Fujian Province and its municipalities and selected cities

Source: Zhu, 2004: 217

The status of *in situ* urbanization in China's urbanization process: the case of Fujian Province and its Quanzhou city-region

Examining socioeconomic development of Fujian Province since the early 1980s, one of the noticeable facts is the fast development of Quanzhou and its rising position among the province's nine city-regions[3]. In the earlier 1980s when the reform in China just began, the total GDP of Quanzhou ranked the second last among the nine city-regions, and its share of the agricultural sector in employment stood at 71.9 per cent according to the 1982 census. However since then, Quanzhou's economic development has been the fastest among the nine city-regions. By the end of 1993, Quanzhou's GDP ranked on the top of the 9 city-regions for the fist time, and has remained the No.1 economic powerhouse in Fujian Province since then. In 2000 census, Quanzhou's share of non-agricultural sectors in employment was 67.4 per cent, far above the provincial average of 52.2 per cent. This suggests that in less than 20 years, most of Quanzhou's rural residents

[3] Here the city-regions refer to 8 prefecture-level municipalities and 1 prefecture in Fujian Province, each of which is composed of one main city and several counties and county-level municipalities.

have completed the transfer from the agricultural to non-agricultural sectors. The economic development in Quanzhou has not only created employment opportunities for a large number of local rural residents, but attracted a massive influx of migrant worker from inland China, diverting a great number of people who would otherwise have migrated to other major cities in China.

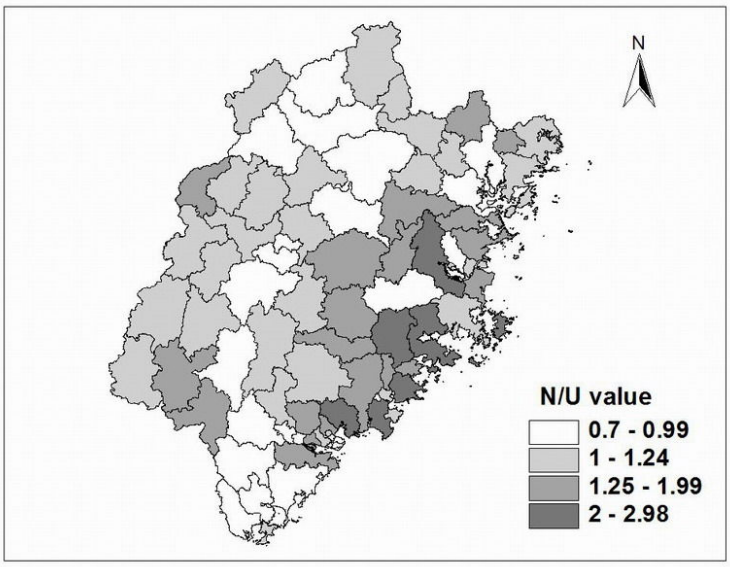
However, contrasting to its top ranking position in terms of economic development and strength, Quanzhou's urbanization level measure by the conventional criteria is still quite low. According to the figure from the 2000 census, only 38.9 per cent of Quanzhou's population lived in cities and towns, lower than the provincial average of 42.2 per cent. The case of Jinjiang in this region is even more striking. In this place, the share of non-agricultural employment was as high as 89.9 per cent in the 2000 census; however its proportion of urban population measured by the official definition was only 32.5 per cent.

Such strong contrast between low level of urbanization and high proportion of non-agricultural employment has been closely related to the fact that rather than moving to existing cities, especially large ones, most of Quanzhou's rural residents have been absorbed by township and village enterprises (TVEs[4]) located at the bottom levels of the settlement hierarchy, i.e designated small towns, market towns, and villages. These TVEs have been the most important driving forces for Quanzhou's socioeconomic development since the reform era, offering local rural residents many opportunities of *in situ* development instead of moving to existing cities, especially mega-cities, as commonly seen in many other developing countries.

Quanzhou is not the only place with well-developed TVEs absorbing a large number of rural residents into local non-agricultural activities. In the coastal areas of Fujian Province, similar transformation is also well developed, although to a lesser extent (Zhu, 2002; 2004). This is reflected in Figure 2 showing the distribution of N/U values of county-level administrative units in Fujian Province, where N stands for the share of employment in non-agricultural sectors, and U stands for urban proportion of the total population, and the higher the N/U value is, the stronger the contrast between high proportion of non-agricultural employment and low level of urbanization. As can be seen in Figure 2, the areas with such a strong contrast in Fujian are widespread. Such transformation has brought many urban elements to the previous rural areas, greatly affecting the urbanization process of the regions concerned, and occupies an important position in China's overall urbanization process.

[4] According to the Township and Village Enterprise Act of the People's Republic of China, TVEs are those enterprises located in townships and towns (including villages under their jurisdiction), with investment mainly from rural collective economic organizations or farmers and the obligation of supporting agriculture (Tang and Kong, 2000:4) For detailed examination of TVE's role in *in situ* urbanization see Zhu (1999; 2000; 2002; 2004).

Figure 2 The N/U value of Fujian's county-level administrative units, 2000 census



Source: based on 2000 census data.

The important status of the above transformation in China's urbanization process is far from being fully recognized, as has been shown in the case of Quanzhou. In fact, a well-known description in the literature about China's rural transformation since the reform era has been 'industrialization without urbanization' (Ma and Lin, 1993), implying that the transformation as that in Quanzhou has not contributed to China's urbanization process. To some others, this even violates what is termed 'world rules of urbanization', and is abnormal (Liao, 1995; Zhao, 2002). From the perspective based on conventional urban definitions and statistics concerning mainly the final results of the rural-urban transformation usually achieved by rural-urban administrative changes, such understanding of the above rural-urban transformation seems well justified.

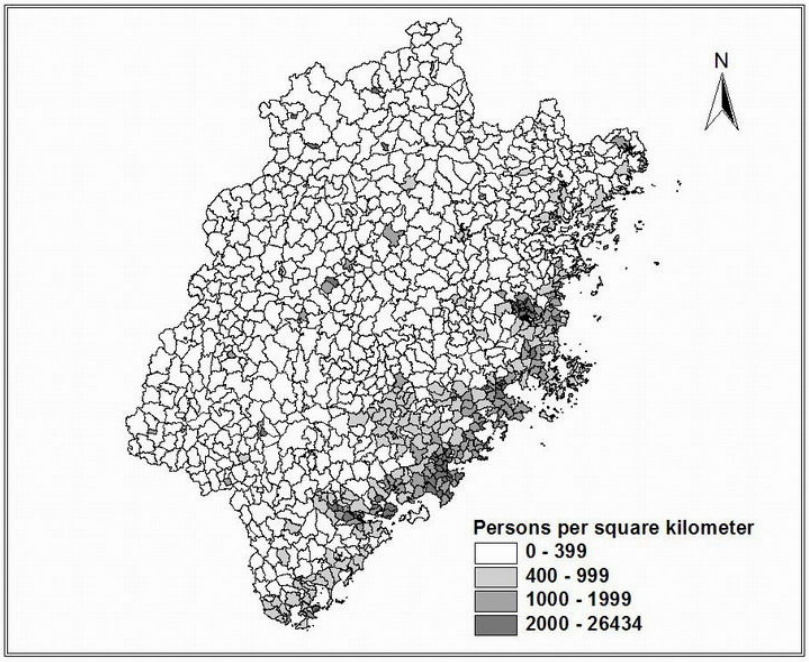
However, closer examination of the above transformation process suggests that the above understanding neglects the accumulation of urban elements in the transformation process from rural to urban before the official urban criteria are reached. This accumulation process may not be significant for the conventional urbanization patterns dominated by rural-urban migration; however it is getting increasingly important when the unconventional rural-urban transformation is so widespread as just demonstrated. Furthermore, the conventional rural-urban definitions usually takes a dichotomous approach, neglecting the fact that rural-urban distinction is now increasingly blurred, and the emergence and development of quasi-urban populations and areas are important part of the urbanization process. Therefore in the following we will examine the transformation process in Fujian Province, especially its Quanzhou city-region, from a non-conventional perspective, so that the important role of *in situ* urbanization in China's urbanization process can be fully recognized.

The accumulation of urban elements in the process of in situ rural-urban transformation

As Champion and Hugo (2004: 9) points out, 'the fundamental distinction between urban and rural places is normally in terms of continuously builtup area, population density, and the economic and political functions carried out in those areas'. The transformation in economic and employment structure in Quanzhou examined earlier has obviously contributed to more urban economic functions in the regions concerned, and even political functions as a result of the emergence of an increasing number of newly designated cities and towns (Zhu, 1998; 2002). Furthermore, such transformation is not the full story, as has often been perceived; In fact, it has also heavily involved the accumulation of urban elements in the other two dimensions of urban functions, i.e high population density and the development of continuously builtup area.

The urban elements in terms of population size and density have already existed in the coastal areas of Fujian Province well before the above mentioned economic and employment transformation (Zhu, 1999). As a result of fast population growth since the 1950s, villages with a population of 2,000 persons were common in the coastal areas of Fujian Province, and the even bigger *Piancun*, i.e. incorporated villages formed through the expansion and connection to each other of these villages, had long been observed before the 1980s (Chen and Huang, 1991; Zhu, 1999). As a result, rural settlements with the population size and density of an urban or quasi-urban place are not unusual in these areas (Zhu, 2004). As can be seen from Figure 3, in this region several large areas have the population density higher than 400 persons per square kilometer. In fact, the population density of the 27 coastal counties and municipalities in the 2000 census was as high as 663 persons per square kilometer; in Jinjiang, it was even as high as 2,279 persons per square kilometer. This compares to the average population density of 1,000 people per square kilometer of the urbanized areas in USA in 1990 (U. S. Bureau of the Census, 1990, cited in Zhou and Shi, 1995), and 400 persons per square kilometer as the density criterion for identifying urban territory proposed in the US (Lang, 1986). Therefore, although many settlements in these areas are still regarded as rural, in a way they have already accumulated urban element in terms of population size and density, and this geo-demographic characteristic of the region is an important basis for *in situ* urbanization, reducing one of the fundamental distinction between urban and rural in the coastal area of Fujian Province. This can be said about the coastal area of China as a whole to a large extent, as a preliminary estimate suggests that the rural population density of China's coastal zone has also reached the threshold of 400 persons per square kilometer (McGranahan, Marcotullio et al., 2005).

Figure 3 Population density of Fujian Province



Source: based on the 2000 census data.

So far the importance of such high population density areas to China's urbanization process has not been paid enough attention, largely because of the perception that the area with high population densities in the coastal region is only a small proportion of China's land area. Indeed, the area of the above coastal region in Fujian only accounts for 25 per cent of the total area of Fujian Province. However, few have noticed that although small in area, the coastal region in both Fujian and China as a whole is the main concentration of the respective population. In the case of the 27 coastal counties and municipalities of Fujian Province, their population accounts for 56 per cent of the total population in Fujian Province, suggesting that *in situ* rural-urban transformation in this area will greatly affect the overall urbanization process in the province. In the case of China as a whole, Heilig's analysis (1997) shows that although the high population density (of 354 persons per km^2) area accounts for only 30 percent of the country's land area, its population is roughly one billion, more than 76 per cent of China's total population. Clearly, what happens in such high density areas is of critical importance for China as a whole.

The urban elements in terms of continuously built-up areas have also significantly increased in the above-mentioned rural-urban transformation. As I mentioned elsewhere, after the initial stage of dispersed development at the bottom hierarchy of the settlement, some TVEs have adopted more concentrated development pattern (Zhu, 2000). This affects the urbanization process in two ways. First, some TVEs in Fujian as well as in many other parts of China moved to investment zones, industrial zones, and development zones, some of which are part of the builtup areas of designated towns or their expansion. The inflow of foreign investment in the rural areas since the late 1980s has further enhanced this trend. TVE development and foreign investment have also created the demand and provided capital for the development of public facilities, infrastructure, and

service sectors (Zhu, 2004). All this has greatly contributed to the increase of urban element in terms of 'continuously builtup area' mentioned earlier, although these built-up areas are mostly located in small places. This has led to a further effect of *in situ* urbanization, i.e. its contribution to the development of an urban system with an increasing share of the population of small urban centers, which overshadowed the growth of large cities. This is evidenced in Fujian by the fact that during the period of 1982 to 2000 censuses, the increase in the town population and the increase in the population of newly designated cities, which were transformed from towns, account for 44.2 per cent and 27.8 per cent respectively of the increase in the population of cities and towns, making small urban places dominant in Fujian's urban growth (Zhu, 2002). Clearly, from a process-oriented analytical perspective, *in situ* urbanization is not irrelevant to the urbanization process, even in the conventional senses; rather, the accumulation of urban elements in this process is an important factor shaping the overall urbanization process in China.

The emergence and development of quasi-urban areas and populations

Examined from a non-conventional perspective, another important but neglected result of *in situ* rural-urban transformation in China has been the emergence and development of quasi-urban populations and areas. This is well evidenced by the delineation of zones in Quanzhou city-region based on two major criteria reflecting urban characteristics, i.e. the population density and the share of non-agricultural employment.

This analysis is based on the zonal approach used by Jones and his colleagues (Jones et al., 2000; Mamas et al., 2001) in their study on several Asian mega-urban regions. In their study they divided the mega-urban regions into three zones, i.e. a metropolitan core, an inner zone, and an outer zone. While the core is completely urban in nature, the inner zone has strong urban characteristics, and the outer zone is also heavily influenced by the urban core but with weaker urban characteristics. Taking this approach, in this paper we divide Quanzhou city-region into the following three zones using the following criteria, which are based on urban criteria used in the literature both from China and abroad (Lang, 1986; Zhou and Shi, 1995; Qadeer, 2004):

Urban core: contiguous areas surrounding the city center with the population density exceeding 5,000 persons per square kilometer;

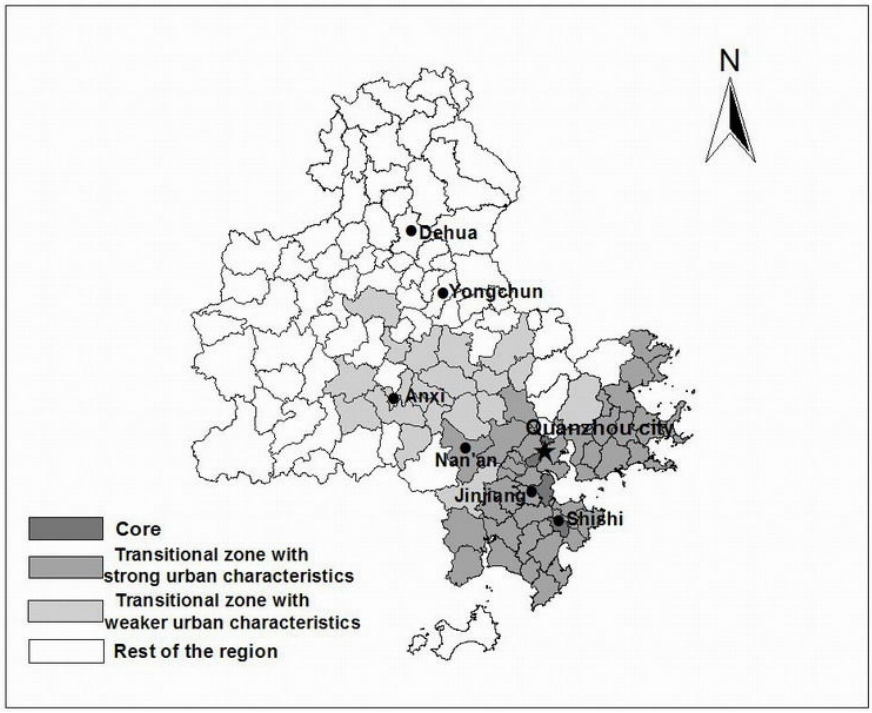
Transitional zone with strong urban characteristics: contiguous areas outside the core with a population density exceeding 1,000 persons per square kilometer; or share of employment in agriculture less than 30 per cent;

Transitional zone with weaker urban characteristics: contiguous areas outside the above zones with a population density exceeding 400 persons per square kilometer, and share of employment in agriculture less than 60 per cent;

Rest of the city-region: contiguous areas outside the above zones still predominantly rural.

The results of the delineation for Quanzhou city region are shown in Figure 4 and Table 1. One of the most important findings from the results is the widespread area of the two transitional urban to quasi-urban zones in the city region, and their high share of the region's population. The area of urban core accounts for only 0.7 per cent of the region's area. However, the area of the two transitional zones account for 19.1 and 16 per cent of the city-region's total area respectively, and the combined area of the two transitional zones and the urban core is 3,888 square kilometers, accounting for 35.8 per cent of the area of Quanzhou city-region. In terms of the population, the important position of the two transitional urban to quasi-urban zones is even more impressive. While the population of the urban core only accounts for 10.6 per cent of the total population, the population of the transitional zone with strong urban characteristics and the population of the transitional zone with weaker urban characteristics account for 50.4 and 15.2 per cent per cent of the city-region's total population respectively, and 5.55 million, or 65.6 per cent of the population of Quanzhou's city-region live in these two transitional zones and urban core. This is twice the urban population of 2.835 million in Quanzhou city-region measured by conventional urban statistics provided by the 2000 census, suggesting that apart from the urban population meeting the conventional urban criteria, there is a quasi-urban population of the same size not covered by conventional statistics. Even stricter criteria are taken to exclude the transitional zone with weaker urban characteristics, the population of the urban core and the transitional zone with strong urban characteristics still stands at 4.445 million, 1.6 times the urban population measured by conventional urban statistics. These results clearly suggest that the conventional urban statistics only provide an incomplete picture about the urbanization process in Quanzhou, and suggest the important position of transitional urban or quasi-urban zones in Quanzhou's spatial planning. Similar situation exists in other coastal areas of Fujian Province, although to a lesser extent. Clearly, the evolution of these transitional urban to quasi-urban zones needs to be closely monitored, and new planning approach need to be developed to deal with this component of the urbanization process.

Figure 4 Quanzhou city-region and its zones



Source: 2000 census data; Quanzhou Statistical Yearbook (2000).

Table 1 Area and population of Quanzhou city-region and its zones

	Area		Population	
	Km²	% of the total	Number (000s)	% of the total
Core	74	0.7	775	10.6
Transitional zone with strong urban characteristics	2,078	19.1	3,670	50.4
Transitional zone with weaker urban characteristics	1736	16.0	1105	15.2
Rest of the region	6,978	64.2	1,733	23.8
Total	10,866	100.0	7,283	100.0

Source: 2000 census data; Quanzhou Statistical Yearbook (2000).

Short-lived or long-lasting: The evolution of *in situ* urbanization in Quanzhou

As mentioned earlier, one key issue regarding *in situ* urbanization is whether it is only a short-live phenomenon, or a long-lasting trend. Evidence from Quanzhou seems to

suggest that the latter is the case, and the evolution of *in situ* urbanization is an important factor shaping China's urbanization process in the future, at least in the coastal areas.

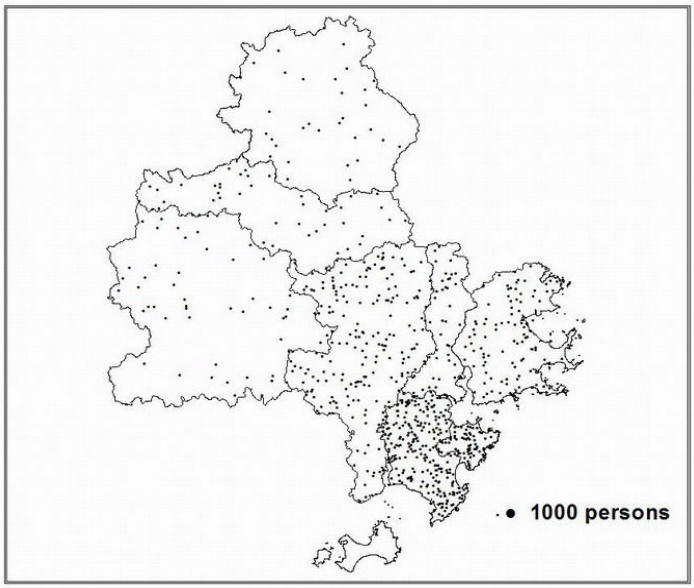
Table 2, Figure 5 and Figure 6 show the development TVEs, which have been the major driving force of *in situ* urbanization in Quanzhou as mentioned earlier, and distribution of their employed, in 1990 and 2004 respectively. Examining the table and comparing the two figures, two trends can be identified. First, the size of TVE employees has increased significantly. Despite of the long-standing doubts about the feasibility and desirability of TVE development and rural industrialization (for example see Kirkby 1985:230-44), TVE development has been sustained in Quanzhou. This is reflected in Table 2 that during the period of 1990 to 2004, the number of TVE employees increased from 560,900 to 2,180,378, and TVE output value increased from 4678.14 million Yuan to 295,844.82 million Yuan. Although since the late 1990s the development of TVEs has decelerated, they still constitute the major component of Quanzhou's economy, accounting for 50 per cent of Quanzhou's employment and 80 per cent Quanzhou's economic output. This suggests that TVEs as a whole as the major driving force of *in situ* urbanization have kept their trend of continuing development.

Table 2 The development of TVEs in Quanzhou since 1990, selected years

Year	1990	1992	1993	1995	1996	2003	2004
Number of TVEs	62,625	52,268	67,258	82,796	93,750	89,526	103,910
Number of TVEs employees	560,900	780,849	1,018,948	1,277,006	1,346,954	2,012,194	2,180,378
Total output value (000s Yuan)	4,678,140	13,847,330	31,060,990	75,036,580	10,307,9060	258,831,860	2958,44,820

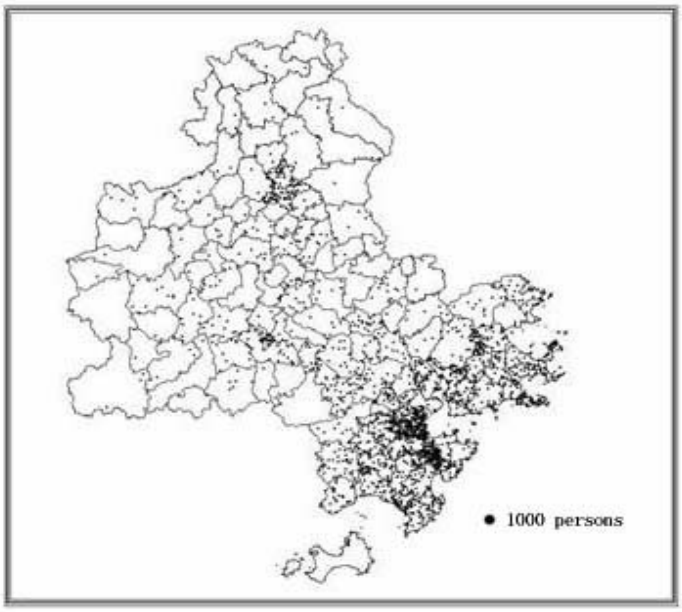
Source：Based on the data from Quanzhou Statistical Yearbook (2005).

Figure 5 The distribution of TVEs' employees in Quanzhou, 1990



Source: Based on the data from Quanzhou Statistical Yearbook (1991).

Figure 6 The distribution of TVEs' employees in Quanzhou,2004



Source: Based on the data from Quanzhou Statistical Yearbook (2005).

Second, the spatial distribution of TVE employees was still in the process of expansion. In 1990 most TVE employees were concentrated in the rural areas in the vicinity of Quanzhou's urban core; however, after 14 years their distribution expanded to more widespread areas, although relatively concentrated in the area where TVEs originated in their early stage of development. This spatial pattern of development is further confirmed by calculating the index of concentration (IC)[5] using county-level figures on TVE employees and land areas. The results show that the index of concentration was 0.45 for 1990, and 0.25 for 2004, suggesting that the development of TVEs at the end of 1990-2004 period was spatially more dispersed than at the beginning, and that centrifugal forces in favour of *in situ* urbanization were still prevail over centripetal forces in Quanzhou.

Analysis on the spatial distribution of Quanzhou's GDP and financial revenue is also consistent with the above results. As Table 3 shows, in the period of 1990-2004, Quanzhou's central urban districts' proportions of GDP and financial revenue of the city-region's totals were below 20 per cent and 35 per cent respectively, suggesting that more than 80 per cent of Quanzhou's GDP and 65 per cent of it's financial revenue were produced in the city-region's periphery. It is also noticeable that the position of Quanzhou's central urban districts in the city-region declined in terms of both GDP and

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[5] $\mathrm{IC}=0.5\sum_{i=1}^{n}/Xi-Yi/$

Where IC is the index of concentration; n is the number of county-level administrative units; Xi is proportion of each unit's population of the total population of the city-region; Yi is proportion of each unit's area of the total area of the city-region.

financial revenue, although there were some fluctuations. Thus *in situ* rural-urban transformation not only has transformed the employment structure of Quanzhou's previous rural areas, but also has been the main source of Quanzhou's economic growth since the reform era, and the main contributor to its rising position to the number 1 economic powerhouse in Fujian. All the above suggests that there is still no indication for *in situ* urbanization to phase out in Quznahou's city-region, and this further enhances the necessity and importance of monitoring and incorporating it in urban and rural planning. In fact, even if the spatial pattern of *in situ* urbanization starts to be reversed towards a more concentrated one someday, the legacy of its long-term dispersed development will still be an important factor shaping the spatial pattern of Quanzhou's urbanization.

Table 3 Central urban districts'* proportions of GDP and financial revenue of the city-region's totals, selected years

	1990	1993	1995	1997	2000	2002	2004
GDP (%)	18.60	16.80	16.30	19.80	19.70	20.00	15.70
Financial revenue (%)	30.10	30.00	30.50	33.50	31.80	34.50	28.90

*Central urban districts refer to the four urban districts directly under the administration of Quanzhou Municipality and located in or near the urban core.
Sources: Quanzhou Statistical Yearbook, various years.

In situ urbanization as part of recent changes in human settlement system: The case of Quanzhou examined in international contexts

After examining the status and evolution of *in situ* urbanization in China's urbanization process, one will ask what is the mechanism underlying the above profound transformation, which is markedly different from the conventional urbanization patterns and at odds with conventional theories based on the experience of developed countries. In the context of China there is a great temptation to attribute such transformation to various 'institutional factors', focusing on the role of the *Hukou* system in preventing people from entering cities, especially large ones, and policies promoting TVE development (eg. Zhao, 2002). The underlying argument is that China's *in situ* urbanization could only exist under its unique institutional arrangements such as the *Hukou* system, and as soon as these institutional arrangements are removed, it will no longer persist. Apart from the deficiency of conventional urban statistics in covering *in situ* urbanization, this is another important reason behind the fact that *in situ* urbanization has been neglected in urbanization studies and urban planning, as these institutional arrangements have been increasing undermined by the market-oriented reform.

It is true that China's institutional factors, such as the *Hukou* system and relevant policies, have contributed to *in situ* urbanization, and this is perhaps why *in situ* urbanization is particularly developed in China. However, it is important to realize that these factors can only be a partial explanation. Recent studies in some areas where *in situ* urbanization is well developed, including a study in Quanzhou city-region, show that local people have little intention of moving to cities, and this would still be the case even if the *Hukou* system did not restrict them (Wang et al 2002, Zhu, 2002). In fact, although the above mentioned *Hukou* system still causes inconvenience and disadvantages to farmers moving

to cities, it has become increasing less so as China's reform and opening-up policies have been further implemented. However, this does not seem to have increased the desire of people in Quanzhou city-region to move to cities. In a survey of 100 enterprises in Jinjiang Municipality and Huian County in 2001, the majority (80 per cent) of the 200 local employees, who were asked whether they wanted to migrate if there was no restriction of *Hukou* system, responded no to the question (Zhu, 2002). Even more recently, a study on Southern Jiangsu by Shen and Ma (2006) identified a new process of '*de facto* urbanization from below', which was caused by the privatisation of collectively owned TVEs, leading to the emergence and development of private enterprises and family workshops in 'urban villages', resembling the process of *in situ* rural-urban transformation in the 1980s in Quanzhou. It is important to note that in this case, the demise of collectively owned TVEs, which are regarded as the legacy of planned economy, did not prevent, rather promoted the emergence and development of 'urban villages', implying that this 'institutional factor' is not the fundamental reason for *in situ* urbanization. All this suggests that apart from the 'institutional factors', more reasons need to be found to explain the successful *in situ* rural-urban transformation.

Although this is not an issue to be resolved easily, many observers have increasingly noted that urbanization in today's developing countries is proceeding under two very different conditions from those when developed countries were urbanized, i.e. high population densities and improved transport and communication conditions, and these are certainly among the 'non-institutional factors' contributing to *in situ* rural-urban transformation in China. As already mentioned earlier, the population densities of many regions in the coastal area of Fujian Province, especially that of Quanzhou, are as high as those in the urban areas of the west. Furthermore, villages in these areas are often connected by well-developed internal road networks, which are further connected to large cities, and relatively cheap transport such as motorcycles, buses and trucks is increasingly available and affordable to local people. These kinds of conditions make spatial concentration less important in these areas than it was when developed countries were being urbanized, enabling *in situ* settlement changes involving transformation of economic and employment structure in Quanzhou and other areas with similar conditions[6].

As high population density and improved transport conditions are not unique to China, it can be logically inferred that *in situ* rural-urban transformation will not be restricted in China, let alone Quanzhou. In fact, evidence of blurred rural-urban distinction and *in situ* rural-urban transformation has long been identified outside China. One of the most important characteristics of the influential *desakota* model and extended metropolitan region concept, which were proposed in the late 1980s, is *in situ* transformation of quasi-urban settlements adjacent to some Asian mega-cities, and the increasingly important role of local non-agricultural activities in rural-urban transformation (Ginsburg, 1991; McGee, 1991). Based on this kind of phenomenon, McGee and Ginsburg further proposed the concept of 'settlement transition', which involves 'the urbanisation of the countryside

[6]For more detailed examination on the roles of population density and transport conditions in *in situ* urbanization see Zhu (2004).

without massive rural–urban migration' in the Asian context (Ginsburg 1991, McGee 1991).

If the applicability of the *desakota* model and EMR paradigm are still limited because they are mostly identified in the areas surrounding Asian's mega cities, Qadeer's recent work (Qadeer, 2002; 2004) on what he calls 'Ruralopolises' and 'urbanization by implosion' certainly further enhanced the universal significance of *in situ* rural–urban transformation. Mainly based on the evidence from India, Pakistan, and Bangladesh, Qadeer identifies a 'largely unacknowledged' form of urbanization in rural parts of vast regions in developing countries. In these areas, the in-place growth of population results in densities that equal or exceed the urban threshold of 400 persons per km^2, comparable to the population densities in exurbs of western cities such as Los Angeles, New York or Toronto (Qadeer, 2004). Calling such rural regions 'Ruralopolises', Qadeer (2000; 2004) points out that they cover most of rural Bangladesh, an area of 311,200 kms^2 from West Bengal to the outskirts of Delhi in India, and the coastlines of Kerala and Orissa provinces with an area of 56,000 kms^2 in Pakistan. The existence and evolution of such settlement patterns further suggest that even in the areas still economically, socially and institutionally rural without the influence of large cities, unprecedented high population density alone is 'the transforming force that invests rural regions with urban spatial characteristics', leading to the emergence and development of 'a hybrid settlement system that is spatially urban' (Qadeer, 2004). Qadeer argues that this level of density 'transforms spatial organization and land market, both for agricultural and residential lands, as well as precipitates thresholds for community infrastructure', and 'recasts settlement patterns, land tenure systems and demand for facilities and services in urban modes' (Qadeer, 2004).

Relating *in situ* urbanization in Quanzhou to 'extended metropolitan areas' and 'ruraloplises', one can find many similarities among them. Thus *in situ* urbanization is not an isolated, short-lived, and unique phenomenon in China; rather it is part of recent profound changes in human settlement system enabled by new conditions, which did not exist in the past of developed countries when they were urbanized. In the case of Quanzhou, such changes have been further stimulated by the independent roles of local communities in initiating rural development, which are often neglected in conventional urbanization and regional development theories (Zhu, 2002). From these perspectives, *in situ* urbanization will continue its evolving process, and its past and future development will have important theoretical and planning implications that need to be further explored.

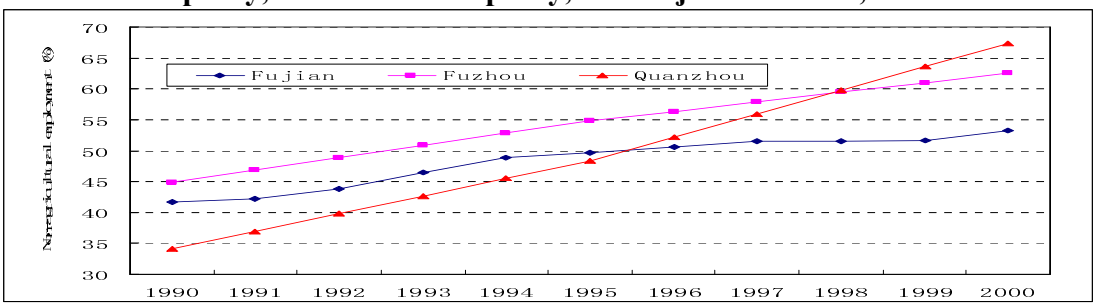
Environmental implications of *in situ* rural-urban transformation

As mentioned at the beginning of this paper, one of the most serious concerns about *in situ* urbanization is its negative environmental consequences. The author's field investigation in Quanzhou seems to confirm such concern, as evidence of various kinds of pollution is widespread. However, a conclusive assessment on such consequences seems more difficult than often imagined, as the following comparative analysis on environmental indicators for Quanzhou, Fuzhou, and Fujian Province as a whole provides a rather complicated picture.

Before presenting findings from the analysis, some data and methodology issues need to be addressed. First, a common benchmark is needed to conduct a comparative analysis. In the case of conventional urbanization patterns, the urbanization level can be such a bench mark so that environmental indicators of different areas can be compared to see who performs better at the same level of urbanization; however, this is not reasonable in the case of *in situ* urbanization, as it is not adequately covered by conventional urban statistics, making urban statistics in the areas with well-developed *in situ* urbanization not comparable with those of areas dominated by conventional urbanization patterns. As an alternative we try to compare the environmental consequences with the level of non-agricultural employment as the benchmark. This is a reasonable alternative, as the transformation in the employment structure is the most important component of urbanization and result of *in situ* urbanization. Second, due to the lack of data we are not able to conduct a spatially disaggregated analysis on environmental consequences of *in situ* urbanization, and only those of Quanzhou as a whole can be analyzed. Third, the environmental implications of *in situ* urbanization in Quanzhou are assessed by comparing indicators of Quanzhou to those of Fuzhou Municipality and those of Fujian Provinces respectively for some recent years when the share of non-agricultural sectors in employment in Quanzhou was the closest to those of Fuzhou and Fujian Province respectively. Although *in situ* urbanization also exists in the later cases, it is less developed, and such comparison can at least demonstrate whether an area with more developed *in situ* urbanization has more positive or negative environmental consequences than those areas where the urbanization pattern is more conventional. The following analysis is conducted on such bases.

As can be seen from Figure 7, as a latecomer Quanzhou's share of non-agricultural sectors in employment has increased rapidly since the 1990s. It first surpassed Fujian Province as a whole between 1995 and 1996, and Fuzhou in 1998. It can be identified that the share of non-agricultural sectors in employment in Quanzhou in 1995 was very close to that of Fujian Province in 1994, and that the share of non-agricultural sectors in employment in Quanzhou in 1998 was very close to that of Fuzhou in the same year. Therefore in the following we will make some comparisons between Quanzhou in 1995 and Fujian Province in 1994, and between Quanzhou and Fuzhou on the same year of 1998, on some environmental indicators.

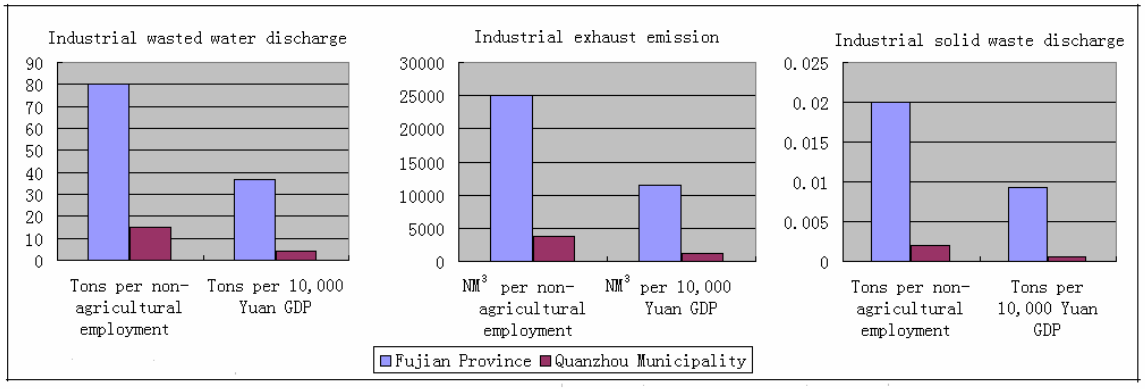
Figure 7 Shares of non-agricultural sectors in employment for Quanzhou Municipality, Fuzhou Municipality, and Fujian Province, 1990-2000



Source: based on relevant data from 1990 and 2000 censuses and 1995 micro-census. Figures for the years between the censuses are interpolated.

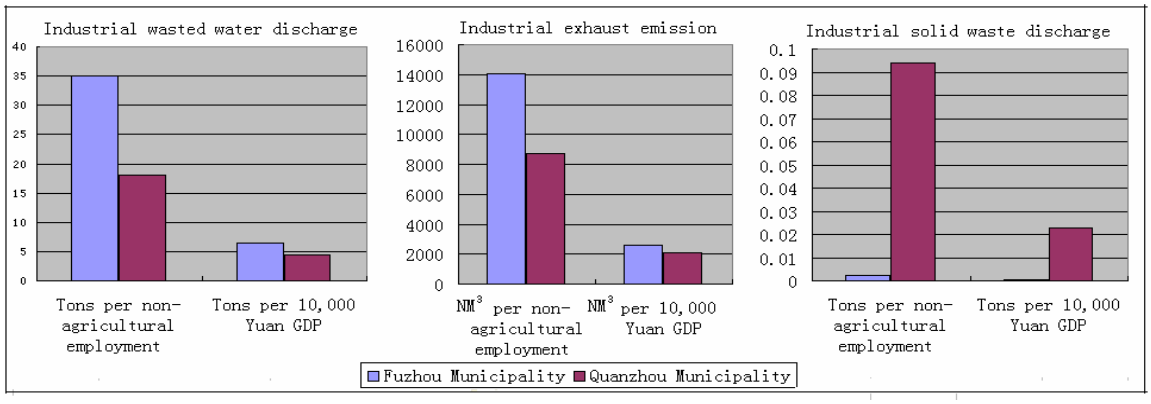
The results of the analysis are rather surprising. As Figure 8 shows, contrary to common perception, all three major environmental indicators seem to suggest that Quanzhou produced much less pollution on both a per non-agricultural employment basis and a per 10,000 Yuan GDP basis than the provincial average when the share of non-agricultural employment was around 48.5 per cent for Fujian Province as a whole in 1994 and for Quanzhou in 1995. For the comparison between Quanzhou and Fuzhou in 1998, the situation is more complicated, however there is still no clear indication that Quanzhou's pollution is more serious than Fuzhou. In fact, on a per non-agricultural employment basis, Quanzhou's performance was still better in terms of both industrial waste water discharge and industrial exhaust emission, although the differences between the two was much smaller than those between Quanzhou and Fujian Province just mentioned above. However, in terms of industrial solid waste discharge, Quanzhou did produced much more pollution than Fuzhou on both a per non-agricultural employment basis and a per 10,000 Yuan GDP basis, with the indicators for Quanzhou 37 times and 49 times that of Fuzhou respectively, and this is the only indication from our analysis that is consistent with common perception.

Figure 8 Selected environmental indicators, Fujian Province (1994) and Quanzhou Municipality (1995)



Source: Based on data from Fujian Provincial Bureau of Environmental Protection.

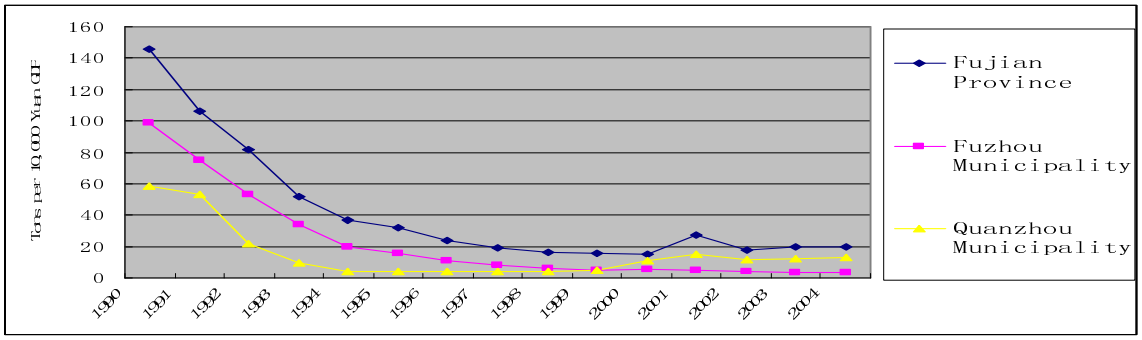
Figure 9 Selected environmental indicators, Fuzhou and Quanzhou Municipalities, 1998



Source: Based on data from Fujian Provincial Bureau of Environmental Protaction.

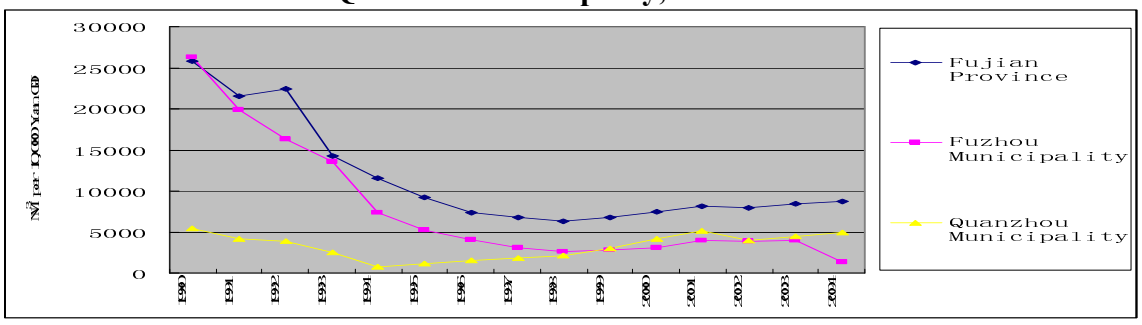
The results of the above analysis suggest that the environmental implications of *in situ* urbanization are more complicated than commonly imagined. While we have not found clear evidence that *in situ* urbanization in Quanzhou has more negative impact on environment than more conventional urbanization patterns, we cannot reach the opposite conclusion that the effects of *in situ* urbanization on environment are more positive than the more conventional urbanization patterns either. This is not only because different conclusions can be drawn depending on what environmental indicators are used, as in the case of Fuzhou, but also because these indicators are not stable and still in the process of change. As can be seen from Table 10, Quanzhou has overtaken Fuzhou in terms of both industrial waste water discharges and industrial exhaust emission per 10,000 Yuan GDP since the year 2000, and in the long run it may indeed has more serious negative environmental impact than Fuzhou on these two criteria. Whether this will be true or not needs to be closely monitored, as it will have great environmental impact, given Quanzhou's status as the number 1 economic power house in Fujian. Besides, Quanzhou's data may underestimate the negative environmental impact of *in situ* urbanization, as enterprises in Quanzhou are much more dispersed and environmental surveillance is more difficult, and therefore its environmental pollution tends to be underreported than in other cases such as Fuzhou. All this suggests that despite of the fact that comparative assessment of Quanzhou's environmental problems seems inconclusive so far, they is no doubt that they are still among the great concerns for Quanzhou's future development.

Figure 10 Industrial wasted water discharge for Fujian Province, Fuzhou Municipality and Quanzhou Municipality, 1990-2004



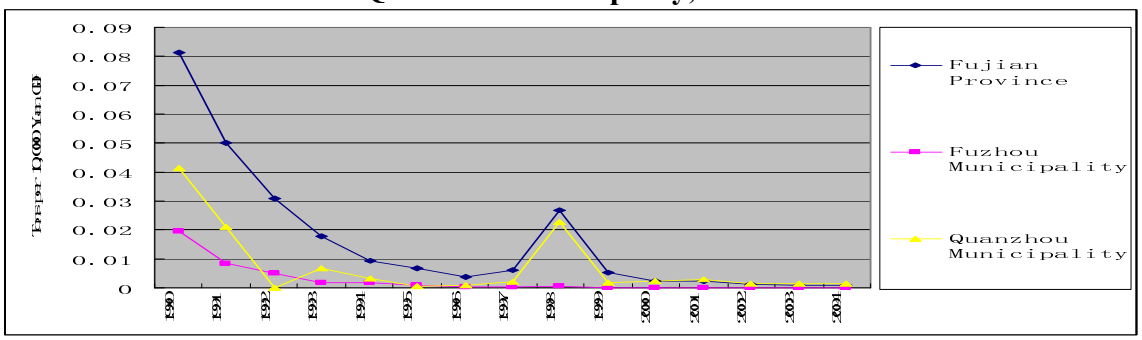
Source: Based on data from Fujian Provincial Bureau of Environmental Protection.

Figure 11 Industrial exhaust emission, Fujian Province, Fuzhou Municipality and Quanzhou Municipality, 1990-2004



Source: Based on data from Fujian Provincial Bureau of Environmental Protection.

Figure 12 Industrial solid waste discharge, Fujian Province, Quanzhou Municipality and Quanzhou Municipality, 1990-2004



Source: Based on data from Fujian Provincial Bureau of Environmental Protection.

Having said the above, it is also important to realize that the above inconclusive assessment on the environmental impact of *in situ* urbanization reflects the complexity of the issues, which goes beyond the spatial pattern of *in situ* urbanization often taken as the focus of discussion so far. In fact, the assessment of the environmental impact of *in situ* urbanization involves many other factors, such as the economic structure, government environmental regulations and their enforcement, and economic strength enabling investment in environment protection, etc. While more spatially concentrated development needs to be promoted to achieve more efficiency in environmental protection and management, the economic benefit of *in situ* urbanization should not be neglected, as it provides much needed fund for environmental protection and management. Government early intervention in terms of both the adjustment of economic structure and environmental regulations could also prevent the negative environmental effects from worsening. All this suggests that it is important for Quanzhou to seek a holistic and balanced approach in its future development, so that it can further benefit from *in situ* urbanization in terms of economic development while minimizing its negative effects in both economic and environmental terms.

Planning implications of *in situ* rural-urban transformation

The important status and ongoing evolution of *in situ* urbanization demonstrated in this paper pose great challenges to conventional urban planning practices. In fact, many of the problems related to *in situ* urbanization are not caused by the urbanization pattern per se, but by the inadequacy of conventional planning practices in dealing with this new form of settlement transformation. The significance of such a new urbanization pattern is by no means restricted to Fujian Province; in fact, while the growth of some major mega-cities in China such as Shanghai and Guangzhou has become increasingly the focus of urban development in China, one of its important components is precisely *in situ* urbanization of the surrounding quasi-urban areas and populations of these cities (Hu et al., 2000). The integration of these quasi-urban areas and populations into the planning of major urban centres has been encountered almost on a daily basis by Chinese urban planners in many fast developing coastal regions, however it remains an unresolved issue. Clearly, a new planning framework going beyond the city-centred, rural-urban dichotomous approach is needed to deal with this situation, and the new trends of settlement transformation such as those examined in this paper need to be incorporated into such a framework.

Such a planning framework could be conceived at two levels to incorporate different dimensions of *in situ* rural-urban transformation neglected by the conventional urban planning practices. At the regional level, an integrated rural-urban planning approach needs to be adopted to accommodate the reality of blurred rural-urban divide. Currently not only is *in situ* urbanization not adequately reflected by conventional urban statistics, but it is mostly not covered by the Urban Planning Act of the PRC, as the Act regulates urban planning only at the level of designated towns or higher. Thus quasi-urban areas and their populations examined in this paper are usually only treated as a background for core urban areas in the planning practice, and little consideration is given to their need in infrastructure, public utilities, and their spatial relationship with the urban cores. To change this situation, a new Urban-Rural Planning Act is needed to replace the current Urban Planning Act, and the basic planning unit should be changed from the city to the city region encompassing both the city core and its surrounding rural and quasi-rural areas under its influence. On such a basis, a settlement system stretching from the urban core to the bottom hierarchy of the rural settlement surrounding the city, and its industrial and infrastructure development, including a well-developed regional transport network, can be planned in an integrated way, and the quasi-urban populations and areas will be covered as part of the regional planning. Fortunately, the first step has been taken to deal with this issue in China, as a draft Urban-Rural Planning Act has just been proposed to the Standing Committee of the National People's Congress for discussion. However, much remains to be done for more technical details to be developed so that it is operational in real planning practices.

The second level of the new planning framework concerns a more detailed approach for the planning of quasi-urban areas and populations resulting from *in situ* rural-urban transformation. Such an approach should be suitable for quasi-urban or even rural settings but introduce and adapt urban elements accumulated in the process of *in situ* rural-urban transformation. More than three decades ago, Friedmann and Douglass (1975:40) proposed the idea of "agropolis" or "city in the fields", stating that "instead of encouraging the drift of rural people to cities by investing in cities", such an approach would encourage rural people "to remain where they are, by investing in rural districts, and so transmute existing settlements into a hybrid form of agropolis, or city in the fields". Such an approach accommodates both the *in situ* and the quasi-urban, quasi-rural natures of *in situ* rural-urban transformation, and can be taken as a basis for the planning of quasi-urban areas and populations, although the limit of such an approach, such as its limited importance attached to non-agricultural development, should be avoided.

Thus unlike the conventional city-centered, dichotomous planning approach paying little attention to rural residential systems as they are regarded as a declining and residual component in the process of rural-urban transformation, the new spatial planning framework for quasi-urban populations and areas will be based on the existing rural residential systems of those areas. Rather than anticipating most of their residents migrating to existing large cities and the disappearance of most settlements, such a planning approach will be focused on the adjustment of settlements within the existing systems, with a great proportion of the existing residents remaining in the system, and a

relative concentration of people and industries moving short distance to some growing settlements within the systems. In this process some sub-centers will be developing on the basis of market towns, and seats of towns and townships, and even some big villages. They will constitute important parts of the overall residential system of the city region, and some of them will be closely linked with the development of the urban core both geographically and functionalhy, and should be taken into account for future development of the urban core. As arable land is precious in China, highly productive land will be retained and used both for agriculture and as open space, and some related industries, such as tourism and urban agriculture producing fruits, vegetables and flowers, should be promoted, complementing the already well developed non-agricultural activities. Obviously, at the macro-level, the population and settlements under such residential systems are more dispersed compared with traditional residential systems dominated by core cities, and their spatial structure bears some similarities to the recent polycentric urban form in developed countries.

At the micro-level, the development of such residential systems should be guided to more concentrated development to make use of scale and agglomeration economies, so that there will be more efficiency in the administration of enterprises, land and infrastructure uses, and control on environmental problems. Such concentration has already begun, but the potential is still great, as the fast economic growth has increasingly reduced the constraint caused by the lack of capital for both the government and enterprises, which has prevented small enterprises from entering various industrial and development zones located in the sub-centers of the residential systems. Stricter regulations for the location of enterprises and their enforcement, and workable planning practices need to be formulated to achieve the above purposes. Apart from the quasi-urban settlement and populations, the transformation of more conventional rural areas with high population densities also needs to be closely monitored, and more attention should be paid to the development of infrastructure and public utilities on the basis of adjustment of industrial and settlement distribution towards relatively more concentration in central villages.

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